CONCERT: A CLOUD-BASED ARCHITECTURE FOR NEXT-GENERATION CELLULAR SYSTEMS

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Abstract
Cellular networks are one of the cornerstones of our information-driven society. However, existing cellular systems have been seriously challenged by the explosion of mobile data traffic, the emergence of machine-type communications, and the flourishing of mobile Internet services. In this article, we propose CONCERT, a converged edge infrastructure for future cellular communications and mobile computing services. The proposed architecture is constructed based on the concept of control/data (C/D) plane decoupling. The data plane includes heterogeneous physical resources such as radio interface equipment, computational resources, and software-defined switches. The control plane jointly coordinates physical resources to present them as virtual resources, over which software-defined services including communications, computing, and management can be deployed in a flexible manner. Moreover, we introduce new designs for physical resources placement and task scheduling so that CONCERT can overcome the drawbacks of the existing baseband-up centralization approach and better facilitate innovations in next-generation cellular networks. These advantages are demonstrated with application examples on radio access networks with C/D decoupled air interface, delay sensitive machine-type communications, and real-time mobile cloud gaming. We also discuss some fundamental research issues arising with the proposed architecture to illuminate future research directions.

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1. Introduction

Nowadays, cellular systems are faced with drastic changes and great challenges. The rapid penetration of smart phones and tablets has triggered an exponential growth of mobile data traffic in the past few years. In response, both academia and industry have been devoted to enhancing the capacity of existing cellular systems with dense small cells, high-frequency bands, and novel transmission technologies such as massive multiple-input multiple-output (MIMO). It is anticipated that through these enhancements, the next-generation (5G) cellular system can have 1000× capacity and 100× transmission rate compared to 4G (Release 8) systems. However, we have hardly managed to accommodate billions of mobile devices before an even greater number of machines are already waiting to communicate with each other. Besides bringing a massive volume of connections, machine-to-machine (M2M) communications also have other unique communication requirements. For example, applications like fleet management and industrial control demand extremely low access latency and high reliability, which existing human-oriented cellular systems cannot satisfy. In this regard, it is also expected that 5G cellular systems can support more than 10 billion M2M communication links and down to 1 ms access latency. Beyond these fast emerging requirements, cellular networks are also in danger of becoming economically unprofitable data pipes for increasingly Internet-based services. To this end, 5G cellular systems should have the ability to quickly adapt to requirement changes and the capability to support a wide spectrum of new services. Since last year, considerable effort has been devoted to investigating 5G cellular systems, and the drawbacks of the conventional cellular design paradigm have been realized. In a conventional cellular system the physical infrastructure comprises geographically distributed hardware subsystems such as base stations (BSs). These subsystems are often proprietary devices that are highly integrated and optimized for specific tasks.

They communicate with each other via predefined network protocols to present network functions together. Conventional cellular systems have sufficient capabilities to serve traffic with moderate

quality of service (Qos) requirements; its subsystem-based design also facilitates modular system upgrades. However, the conventional paradigm leads to several severe problems:

Flexibility: Network functions of conventional cellular systems are embodied in the proprietary subsystems and their interfacing protocols. Once these subsystems are widely deployed, it would be time-consuming and costly to upgrade functions or add services.

Efficiency: The distributed system layout limits the information exchange between subsystems, and hence prohibits cooperation technologies such as coordinated multipoint (CoMP) transmission and CHORUS which can improve network performance.

Resource utilization: Geographically distributed subsystems rely on local physical resources to function. Thus, resources must be over provisioned for peak load, leading to a low resource utilization ratio. These problems make it hard to incorporate the features of 5G networks into conventional cellular systems. Because of this, it is proposed that 5G networks should be constructed with centralized physical resource placement and become increasingly software-defined. The baseband-up centralization architecture was proposed for radio access networks (RANs) leveraging the cloud concept and technology. In such architecture the computational resources are aggregated from distributed sites to form a centralized computational resource pool.

In this article, we propose Convergence of Cloud and Cellular Systems (CONCERT), a converged edge infrastructure for cellular networking and mobile cloud computing services. The physical resources in CONCERT are presented as virtual resources so that they can be flexibility utilized by both mobile communication and cloud computing services. The virtualization is achieved through a C/D decoupling mechanism, by which a logical control plane entity dynamically coordinates data plane physical hardware such as servers, packet switches, and radio interfacing equipment in response to the requirement of services. Note that C/D decoupling has been successfully applied in software defined networking (SDN) to orchestrate homogeneous packet forwarding hardware, and it has also been exploited in RANs to coordinate physical BSs. Here we adopt this concept to coordinate and virtualizes heterogeneous physical hardware. Our proposal provides a general framework that not only addresses the problems associated with baseband-up centralization, but also opens up new opportunities for innovations in the next-generation cellular networks: first, we overcome the drawbacks of baseband-up centralization by allowing flexible combination of distributed and centralized strategies in allocating data plane computational resources for signal processing functions.

The rest of the article is organized as follows. We first describe the proposed architecture with an anatomy on its physical infrastructure and software-defined services. After that, we demonstrate the advantages of CONCERT by illustrating its ability to support diverse applications. Some fundamental research issues that arise from CONCERT are then discussed to lay a foundation for future exploration. After that, we summarize our article in the conclusion.

2. Real-Time Cloud Computing Service

Mobile phone users enjoy cloud services by which computational and storage capabilities can be enhanced at low cost. Take cloud gaming service as an example: game engines require massive computation to render 3D animation and simulate physical interaction. Hence, operating game engines will incur high power consumption. As a result, current mobile devices usually do not support 3D video gaming well. However, if the cloud gaming service is introduced, mobile devices can offload most of the computation to the server applications hosted in clouds to save energy and boost user experience. Nevertheless, data delivery across wide area networks (WANs) may experience long latency. When providing cloud gaming services, the server-side game engine instance needs to interact with the user within a delay constraint beyond what current Internet clouds (ICs) can provide. Consequently, delay-sensitive applications such as computation.

In contrast, CONCERT can provide computational resources located much closer to the users than those of the ICs. Furthermore, the latency of data delivery within CONCERT can be guaranteed through proper

allocation of switching resources. In this way, real-time cloud gaming service is constructed. Specifically, to construct a cloud gaming service, the service provider first creates a gaming manager (GM) application on the VM. As illustrated in Fig. 4, a user can initiate a service session by sending a request to the GM using any kind of mobile data service. In response, the GM negotiates with a wireless network deployed in CONCERT for virtual wireless links to connect with the requesting user. The Conductor will provision virtual resources accordingly. After the required resources are properly configured, the GM will acknowledge the user with the method to access the wireless network and the game engine so that an end-to-end link between the user and the game engine can be established.

The user and game engine then start to communicate. In the downlink direction, the game engine generates the video frames to be displayed on the user's screen, encodes them, and sends them to the user. The user receives and decodes the data, and then displays the frames. In the uplink direction, the user reports his/her input to the game engine, which then decides the forthcoming frames accordingly. When the user and game engine are communicating, the Conductor monitors the mobility of the user through the NCI updates. If the physical resources in use no longer satisfy the negotiated QoS, the Conductor will migrate the functionalities involved, such as the VM running the game engine instance, to more proper physical resources to maintain the negotiated QoS.

3. Fundamental Research Issues

As discussed above, CONCERT is capable of supporting a wide variety of services through the virtualization of data plane physical resources. Such a cloud-based design poses some fundamental issues that demand further investigation.

3.1. Mathematical Modeling And Analysis

Proper resource placement and task scheduling are the basis for providing desired QoS in CONCERT. However, optimal resource placement and efficient task scheduling are challenging research issues. To get the best placement and scheduling strategy, we may need to solve optimization problems with multiple (possibly conflicting) objectives such as real-time requirements, resource utilization, and power consumption. Different decisions on placement and scheduling strategies will achieve different trade-offs between those objectives. Take centralized and localized physical layer (PHY) processing as an example: through centralized processing, we can reduce the processing latency by provisioning more computational resources, but aggregating tasks from distributed places will inevitably incur some networking delay. In contrast, localized processing may consume more processing time because the computational resources are more limited, but the networking delay can be eliminated.

The optimal strategies that achieve minimum overall latency can only be obtained after carefully evaluating the tradeoff between the processing and networking latency. Moreover, the optimal strategy will become more complicated when we take other objectives, such as resource utilization and bandwidth requirements, into consideration. To address these problems, an analytical framework based on queuing theory may be developed. With such a framework, computational tasks can be modeled as customers, and resources (e.g., local computational resources, processors in the centralized pool, switches) can be modeled as queuing nodes. Customers travel across the network of queues according to some routing policy and are serviced at each node according to some scheduling policy enforced by the Conductor. Within this framework, various performance metrics can be explicitly evaluated. For example, the task processing latency can be evaluated as the total time the corresponding customer spends traveling from the source node to the destination node, and resource utilization can be mapped to the utilization of corresponding nodes. These results will provide a mathematical foundation for optimizing or finding trade-offs between objectives.

4. Conclusion

In this article, we propose a converged edge infrastructure for future mobile communication and cloud computing services. We refactor the conventional cellular infrastructure with a decoupled control plane and heterogeneous reconfigurable data plane. The control plane serves to coordinate and virtualizes physical data plane

resources. With the virtual resources, a wide variety of software-defined services ranging from mobile communications to real-time cloud computing can be supported. CONCERT avoids the drawbacks of baseband-up centralization by combining centralized and distributed strategies in resource placement and utilizing virtual radio resources. It also enables the deployment of real-time mobile cloud computing services. We illustrate the capability of CONCERT with three novel use cases and also discuss some fundamental related research issues.

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Sustainable Environment Friendly Green Computing for Futuristic Technologies

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ABSTRACT

Green computing is the study of designing, manufacturing/engineering, usage and disposal of computing devices in a way that reduces the environmental impact. Green computing aims on reducing the use of hazardous materials maximize energy efficiency during the product's lifetime and promote the recyclability. It also motivates towards biodegradability of obsolete products and factory waste. The usage of computers is increasing day by day which increases the consumption of electricity. This crisis has been realized by people and measures are being taken which help in minimizing the power usage of computers. This initiative can be called as Green Computing. This paper focus on current trends in Green Computing approaches technologies in green computing and means to address the challenges of Green Computing.

Keywords: **Green computing; sustainability; environment; energy-efficient.**

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1. Introduction

Green computing is the study of utility of the resources which are efficient and eco-friendly in a sustainable manner. Green computing includes using resources in a way that reduces the usage of hazardous materials, Designing objects and services that comply with the environment, recycling e-waste with no or little impact on the environment is the prime motto behind the green computing. This includes discovery and development of new products that reduces or eliminates the use of hazardous substances in manufacturing [8]. Many organizations are continuously investing in designing the devices which are energy efficient and thus encourage the recyclability. Hence, the main idea of green computing is to find the solution of these indirect adverse effects on the environment.

1.1 History

In 1992, the U.S Environmental Protection Agency has launched Energy star which is an international standard for energy-efficient electronic equipment, climate control equipment and other technologies. Energy Star switches the product into ―sleep‖ mode when not in use for reducing the amount of energy consumed by a product rather than the amount of power used by a product when it is in ―standby‖ mode. At the same time for achieving low magnetic and electrical emissions from CRT-based computer displays. Swedish organization TCO had launched the TCO Certification program which includes standard of energy consumption. In 1998, the China National Development and Reform Commission (NDRC) founded the China Energy Conservation Program (CECP) which is a non-profit organization in-charge of the administration, management and implementation of energy certification, conserving, water-saving, and environmentally friendly products. The Energy Conservation Center in Japan is responsible for raising public awareness on conservation of energy, training, state examinations for energy managers and their energy-conservation campaign[6][4].

1.2 Current scenario of green computing

1.2.1 Electronic waste: Electronic waste is an increasing problem globally due to the quick replacements of electronics devices and components. E-waste includes discarded electronic appliances such as mobile phone, computers, and televisions etc. Based on the Gartner estimations over 133,000 PCs are discarded by U.S. homes and businesses every day and less than 10 percent of all electronics are currently recycled [3].

1.2.2 Wasting Electricity and Environmental Statistics: Research shows that most PC's are left

idle whole day, which leads to wastage of electricity. CRT monitors typically use more power than LCD monitors. According to OECD in 1990 there were 6169592.14 tons of CO2 equivalent, thousands emission in USA which has been increased to 6665700.866 tons of CO2 equivalent, thousands in 2011. There is also an increasing growth in the e-waste generated. This shows how vastly the environment is contaminated.

2.0 Need for green computing

2.1 Climate Change: The Research shows that CO2 and other emissions are causing global climate and environmental damage. It's leads to global warming. The major task in front of the world is to preserve the planet.

2.2 Reliability of Power and Performance Tuning: Reduction in the energy costs leads to the serious cost savings. As the demand for energy increases the supply decreases. Performance tuning is the process of adjusting a computer so that it will perform to the best of its ability, given its current or aggregate workload. It reduces the overall energy of the given system [1].

2.3 Capacity Planning and Reliability Considerations: Capacity Planning minimizes the amount of hardware needed to perform all required operation**.** It avoids the purchasing of overpowered and underpowered equipments. Reliability of hardware reduces the overall costs of energy associated with system failures and E-waste [5].

3.0 Recent implementations motivations for Green Computing

3.1 Blackle: It is a search –engine site developed by the Google search. The principle of Blackle is that the display of different colors consumes the different amount of energy on computer monitors. In brief, when a computer screen is white, computer consumes 74W. When the screen is black it consumes only 59W. Based on this if everyone changes from Google to Blackle, it would save 750MW each year. This reduces the energy consumption.

3.2 Fit-PC: A tiny PC that consumes only 5w.It has the size of a paperback and it is extremely silent. It is enough to run Windows XP or Linux .fit-PC is designed to replace the PC which is too bulky, noisy and consume more power. It consumes less power than a traditional PC. we can work 24/7 on a fit-PC without having an adverse effect on electricity bill[2].

3.3 Zonbu Computer: It is an energy-efficient PC. This device runs the Linux operating system using 512 megabytes of RAM and 1.2 gigahertz processor and. It does not enclose moving parts and does even contain a fan. It just consumes one-third of the power of a typical light bulb .we can buy it for US$99, but it requires to signing up for a two-year subscription.

3.4 The Asus Eee PC and other ultra portables: The ultraportable classes of personal computers are of small size, low power CPU, low cost and innovations such as using flash memory for storage rather than spinning platters, compact screen. All this factors enable them to consume less power and run more efficiently. The Asus Eee PC is on example of an ultraportable. It has the size of a paperback, weight less than a kilogram. It uses flash memory instead of the hard drive and built in WI-FI. It runs Linux too costs for office space.

3.5 IBM and its "Aquasar"*:* It is the cooling system. It has energy efficiency of about 450 megaflops per watt. To reduce the power consumption of the supercomputer stationed at the "Swiss Federal Institute Technology Zurich" it uses hot water. An additional energy of nine kilowatts is used by the thermal power to the building's heating system.

3.6 HP Labs Data Center in a Dairy Farm: HP Labs Design is utilizing a Farm Waste Data Center Ecosystem. This data center refers to a farm that power up a typical modern data center and the dairy farm using 10,000 cows which provide methane gas. In rural areas, the animal manure power is abundant. It also helps the other farmers to get rid of their farm wastes.

3.7 Google's Sustainable Operations: Google, which flourish in data centers is well-known for being at the forefront of advocating the benefits of green computing. The company's data centers depend on Google-designed edifices that utilize only

half the energy used by a typical data center. The energy used by Google search consumes only about 0.0003 kWh and 0.2g of CO2 emission. Google is out to prove that energy will be preserved by encouraging other data centers to do the same.

4.0 Issues and hurdles

• Manufacturers are preparing devices which are more efficient and accurate but they use more energy and evolve very toxic, dangerous gases and chemicals [4][6].

• Several electronic companies use lead (4 to 8 pounds), mercury, cadmium and other toxic chemicals in computers.

• New research has estimated that computers and other electronic devices make up two-fifth of all lead in land-fills on the earth which increases pollution rapidly.

• By conducting survey in America energy consumed by data center in USA and all over the world will be doubled in next few years.

• Green computing could actually be quite costly. Some computers that are green may be considerably low powered also.

• Rapid change in technology.

• Implementation cost for installing, training, updating and technology support.

5.0 Challenges

According past researchers, the main focus was on efficient computing, cost associated with IT equipments and infrastructure services were considered low cost and available. By growing computing needs, cost of energy and global warming is becoming the bottleneck in IT environments and this shift is a big challenge to the IT industry. Currently, the researchers are focusing on the cooling system, power and data center space. Processing power which is important to business is extreme and maintaining it is the real challenge of environment-friendly system. Green computing challenges are for IT equipments users and vendors. For example, Hewlett-Packard recently unveiled what it calls ―the greenest computer ever‖—the HP rp5700 desktop PC which exceeds U.S. Energy Star 4.0 standards, and is expecting at least five years life, and 90% of its materials are recyclable. Dell is speeding up its programs by providing new Dell OPTIPLEX Desktops which are 50% more energy-efficient than similar systems manufactured in 2005. Credit goes to more energy-efficient processors, features of new power management and other related factors. Currently, IBM is working on new technology to develop cheaper and more efficient solar cells and also solutions for supporting sustainable IT[7][6]. According to researchers the few prominent challenges of Green Computing are as follows:

• Equipment power density / Power and capacity of cooling.

• Growing of energy cost and requirements for Data Centers.

• Control on requirements of heat removing equipment, which increases in total power consumption by IT equipments.

• Equipment Life cycle management.

• Disposal of Electronic Wastes [5].

5.1. Some tips for green computing practices

 When electronic devices are not in use turn off the devices.

 Buy an Energy star computer of good quality which observes the power consumption.

 Set the computers for enabling standby/sleep mode and power management.

 As many times as you can recycle the waste papers.

 Print as little as possible. Evaluate and modify documents on the screen and use print preview. Minimize the number of hard copies. Instead of printing, save information to disks.

 If you use a laser printer, don't turn your printer on until you are ready to print.

 Instead of using bright colored display, choose dark background screen display which consumes less power.

 Instead of printing the document drafts and e-mails, review it.

 Petroleum filled plastic may be substituted by Bio plastic (plant based polymers) which requires less oil

and energy. Bio plastic materials made computer are more secure and cool.

6. Advantages

Green IT technologies and other computing initiatives have enabled people from all over the world to interact as one global community without worsening the CO2 emissions and the E-wastes The IT industry has begun to address energy consumption in the data center through a variety of approaches including the use of more efficient cooling systems, storage area networks, virtualization and blade servers. Green Computing can help us to secure and safe place for us in the world to live. If each person tends to save the environment then the planet earth would be healthy and happier for survival.

 By reducing the energy usage by green computing techniques leads to lower carbon dioxide emission and also reduces the fossil fuel used in power plants and transportation.

 By the saving energy and resources saves money.

 Green computing even includes changing government policies governing the acquisition, usage and disposal of electronics to minimize energy consumption and environmental impact

 Preventing the overuse of resources means less energy is required to produce, use, and dispose of products.

 Recycling the products leads to the reduction in the e-waste.

 Green computing plays the major role in the development of a business by meeting requirements. It also a good way to meet demands of the customers and employees.

 Reduce the hazard existing in the laptops such as chemical is known to cause cancer, nerve damage and immune reactions in humans.

 Green computing leads to reduction in energy bills, Less wasted power, paper, and storage space, environmental consciousness, improved public image and decreased need for travel.

 Virtualization technique of green computing can enhance the server utilization rates for the organizations.

 Green computing reduces the pressure on paper industry which is a main issue of conservation. Renewable resources are encouraged for reuse.

 Green computing techniques help us to reduce the amount of pollution in air or surrounding.

7. Conclusion

Green computing represents a responsible way to address the issue of global warming. Green manufacturing is the key initiatives towards Green computing. Current challenges to achieve Green Computing are enormous and the impact is on computing performance. Government norms are pushing the organizations to act green; behave green; do green; go green; think green; use green and to reduce energy consumptions as well. This paper has depicted the importance of Green computing. Today awareness about the benefits of green computing and the use of environmentally sustainable products is a must to common man and save world from harmful impacts of CO2 emission.

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An IoT based reference architecture for smart water management Processes

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Abstract

Water is a vital resource for life, and its management is a key issue nowadays. Information and communications technology systems for water control are currently facing interoperability problems due to the lack of support of standardization in monitory and control equipment. This problem affects various processes in water management, such as water consumption, distribution, system identification and equipment maintenance. OPC UA (Object Linking and Embedding for Process Control Unified Architecture) is a platform independent service-oriented architecture for the control of processes in the logistic and manufacturing sectors. Based on this standard we propose a smart water management model combining Internet of Things technologies with business processes coordination and decision support systems. We provide architecture for sub-system interaction and a detailed description of the physical scenario in which we will test our implementation, allowing specific vendor equipment to be manageable and interoperable in the specific context of water management processes.

Keywords: **Water management, Irrigation, OPC UA, Internet of Things.**

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1. Introduction

Water management is defined as the activity of planning, developing, distributing and managing the optimum use of water resources. This impact on several key matters of human lives, such as food production, water consumption, sewage treatment, irrigation, purification, energy generation and utilization, etc.

The lack of water ICT (Information and communications technology) standards prevents an effective interoperability, and increases the cost and the maintenance of new products. Nowadays there are many small and local producers of specific solutions in a weak and fragmented market. The almost no adoption of complex and interoperable systems jeopardizes the control and monitoring of water distribution networks, preventing also their evolution and necessary improvements, as an adoption of IoT (Internet of Things) paradigm.

In previous work we defined an Internet of Things-based model for smart water management using OPC UA. This previous work has been extended by the provision of a detailed architecture in which we consider IoT technologies for decoupling decision support systems and monitoring from business processes coordination and subsystem implementation. This functional architecture considers several layers and interfaces to enable layer interaction. We also extended our reference model describing a practical use case defining how the MEGA architecture is used to develop a simple water management process control by using recipes, and explaining more practical aspects.

The rest of the paper is as follows: Section 2 proposed a high level architecture based on industrial challenges, water management requirements and OPC UA functionalities; Section 3 describes the integration of IoT into the water management system; Section 4 develops the reference model for smart water management, comes up with a simple use case, and finally analyses current water management scenario and future implementation.

2. High Level Architecture for Effective Water Management

Consumers in the water sector provide a weak critical mass to influence in decisions resulting in appropriate changes. The water sector operates in a complex interaction between water resources and the socio-economic and environmental systems. The range of stakeholders is huge, public and private, from global to local companies, supported by national, regional and again local authorities. This different nature in stakeholders and also the various schemes for water governance, which are continuously evolving in every country, are the main reasons for current market fragmentation in water management solutions.

An excessive market fragmentation is a severe barrier for innovation under the desirable paradigm of an Integrated Water Resources Management (IWRM), by slowing down the adoption of open reference architectures and standards. This approach could enable interoperability, making it easier for developers to upgrade current solutions and integrate and adopt innovative ones.

2.1 Challenges for Defining Industrial Standards for Water Management

In order to define feasible and wider industrial standards for water management processes, two main challenges must be solved: 1) The lack of integration of current solutions and 2) the unexisting common ICT reference model for water management processes. There is a lack of integration of current solutions. Although there are many global vendors integrating water management solutions, local solutions can be also developed and maintained. The small and local nature of these companies makes them anticipate to unexpected changes and enables them to provide various solutions for intra-regional issues. However, as consumers, small businesses do not have the critical mass to influence in decisions and to foster a reference system by themselves. The definition of a common framework to canalize these efforts is required, not only to reinforce synergies among different players, but also to enable the integration and widespread adoption of specific solutions.

Global and local vendors use different standards, methods, data models and communication channels for their solutions. These solutions are often very complex and sometimes economically unsustainable for their customers. This barrier leads to monitoring issues preventing the necessary decision making process. It states the need of common understandings and consistent methodology for an effective water management.

There is not an ICT reference model for water management processes. Nowadays, there are many companies involved in water management activities, such as collection, distribution, conduction and treatment. Furthermore, companies involved in areas related to soil management or chemistry also demand suitable technologies for water support and provision.

2.2. Requirements Reference Architecture

We define the following requirements that must be fulfilled to develop a standard water management model:

REQ #1: The system should cover these water management functions: remote management of physical elements and operation of basic units; identification of resources in the water network, definition of operations and conditions over the network.

REQ #2: It should support interoperability with other applications such as geographic information systems and also databases containing information regarding soils, weather forecast, environment, farming, etc.

REQ #3: It should provide a flexible and extensible architecture for the integration of various systems. To do that, it must define open interfaces among communication and process control layers, and also integrate IoT systems for a direct access to individual water management devices.

REQ #4: It should support integration with legacy systems, controlling current equipment. Water Management infrastructures currently deployed in the countryside consist of many interconnected and simple devices that must be managed using legacy systems. They integrate communication functions, data models, and protocols dependent on a specific technology of the manufacturer. Overriding these systems with new ones is not always a feasible solution.

2.3 Requirements

OLE for Process Control (OPC), which stands for Object Linking and Embedding (OLE) for Process Control, is the original name for a standard specification developed in 1996 by an industrial automation industry task force. The standard specifies the communication of real-time plant data between control devices from different manufacturers.

As of November 2011, the OPC Foundation has officially renamed the acronym to mean ”Open Platform Communications”. The change in name reflects the applications of OPC technology for applications in process control, discrete manufacturing, building automation, and many others. Initially, the OPC standard was restricted to the Windows operating system. This specification, which is currently known as OPC Classic, enjoyed widespread adoption across multiple industries, including manufacturing, building automation, oil and gas, renewable energy and utilities.

With the introduction of service-oriented architectures in manufacturing systems new challenges in security and data modeling arrived. The OPC Foundation developed the OPC UA (OPC Unified Architecture) specification to address these needs and at the same time to provide a feature-rich open platform architecture to be future-proof, scalable and extensible.

OPC UA, released in 2008, consists of the following parts: Concepts, Security Model, Address Space Model, Services, Information Model, Mappings, Profiles, Data Access, Alarms and Conditions, Programs, Historical Access, Discovery and Aggregates. It also defines a platform independent service oriented architecture that integrates all the functionality of the individual OPC Classic specification into one extensible framework. The multi-layered approach of OPC UA accomplishes these original design goals:

- Functional equivalence: all COM OPC Classic specifications are mapped to UA
- Platform independence: from an embedded micro-controller to cloud-based infrastructure
- Secure: encryption, authentication, and auditing
- Extensible: ability to add new features without affecting existing applications
- Comprehensive information modeling: for defining complex information

3. IoT for Water Management

The provision of Internet of Things capabilities in water management scenarios can be achieved if we consider some considerations from the business, social and technical point of view. Here we list the main benefits of providing IoT in water management scenarios:

Efficiency increase: water management companies and associations can use real-time operational control to make smarter business decisions and reduce operating costs. They use real-time data from sensors and actuators to monitor and improve water management infrastructures, making them more efficient, reducing energy costs and minimizing human intervention.

Cost savings: water management costs can be reduced through improved asset utilization, process efficiencies and productivity. Customers and organizations can benefit from improved asset utilization (e.g., smart water irrigation units that eliminate manual operation) and service improvements (e.g., remote monitoring of irrigation conditions).

Asset utilization: with improved tracking of assets (machinery, equipment, tools, etc.) using sensors and connectivity, companies can benefit from transparency and visibility into their assets and supply chains. They can easily locate assets and run preventive maintenance on critical pieces of infrastructure and machinery.

Productivity increase: Productivity is a critical parameter that affects the profitability of any organization. IoT allows real-time control, new business models, process optimization, resource conservations, service time reduction, and the capability to do all of this globally, reducing the

mismatch of required vs. available skills and improving labor efficiency.

Expansion of new and existing business models: IoT is beneficial in any of the three defined layers. In the subsystem layer, IoT subsystems are able to execute processes and communicate using a standard communication interface; in the coordination layer, it can be useful to enable SMEs to design new coordination applications, with the purpose to orchestrate the management and exploitation layer with the subsystem layers; and finally, in the management and exploitation layer, IoT identification capabilities contribute to provide tailored information services for an specific water distribution network community.

4. Conclusion and Future Work

Water management impacts on several key matters of human lives and several scenarios, such as cities, natural areas, agriculture, etc. Some works focus in the lack of ICT services and tools for water management, which would enable information reuse easier fulfillment of policy regulations and resource monitoring.

In this paper we presented the MEGA initiative for defining reference architecture for water management based on integrating IoT capabilities to achieve a scalable and feasible industrial system. We define the management exploitation layer, coordination layer, subsystems layer and administration layer and the interfaces that enable layer interaction. We also consider the physical model, which defines the physical elements executing water management processes in a hierarchical way, and also, the process model, which organizes the execution of particular processes in water management subsystems. Processes are defined based on automation principles and using the widely used standard OPC UA. Finally, we describe the deployment scenario we have defined for validation the MEGA model.

We can conclude that the adoption of IoT and OPC UA facilitates water management companies the access to a wider global market and incorporates new benefits to decisions support systems, monitoring, water governance and also water-energy nexus. Future work will describe the performed test and will focus on the contribution to solve coordination problems when executing multiple recipes over the same physical resources, considering priority and conditional executions and also process optimization.

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Implementation of Data Mining Techniques to Perform Market Analysis

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Abstract

Market analysis is an important component of analytical system in retail companies to determine the sales for different segments of customers to improve customer satisfaction and to increase profit of the company which has different channels and regions. These issues for a leading shopping mall are addressed using frequent item set mining and decision tree technique. The frequent item sets are mined from the market basket database using the efficient Apriori algorithm and hence the association rules are generated. The decision tree can be constructed using ID3 and C4.5 algorithm.

KEYWORDS: *Association Rules, Frequent Item sets, Apriori, Decision tree, Market Basket Analysis.*

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1. Introduction

One of the challenges for companies that have invested heavily in customer data collection is how to extract important information from their vast customer databases and product feature databases, in order to gain competitive advantage. Several aspects of market basket analysis have been studied in academic literature, such as using customer interest profile and interests on particular products for one-to-one marketing, purchasing patterns in a multi-store environment to improve the sales. Market basket analysis has been intensively used in many companies as a means to discover product associations and base a retailer's promotion strategy on them. Informed decision can be made easily about product placement, pricing, promotion, profitability and also finds out, if there are any successful products that have no significant related elements. Similar products can be found so those can be placed near each other or it can be cross-sold.

A retailer must know the needs of customers and adapt to them. Market basket analysis is one possible way to find out which items can be put together. Market basket analysis gives retailer good information about related sales on group of goods basis and also it is important that the retailer could know in which channel and in which region the products can be sold more and which session (i.e.) morning or evening.

Market basket analysis is one of the data mining methods focusing on discovering purchasing patterns by extracting associations or co-occurrences from a store's transactional data. Market basket analysis determines the products which are bought together and to reorganize the supermarket layout and also to design promotional campaigns such that products' purchase can be improved. Association rules are derived from the frequent item sets using support and confidence as threshold levels. The sets of items which have minimum support are known as Frequent Item set. The support count of an item set is defined as the proportion of transactions in the data set which contain the item set. Confidence is defined as the measure of certainty or trustworthiness associated with each discovered pattern. Association rules derived depends on confidence.

2. Related Work

A number of approaches have been proposed to implement data mining techniques to perform market analysis. Loraine et al. in their work proposed a market basket analysis using frequent item set mining. They compared Apriori with K-Apriori algorithm to find the frequent items. Vishal et al. implemented data mining in online shopping system using Tanagra tool. They made decision about the placement of product, pricing and promotion. Sudha and Chris et al. proposed the impact of customer's perception and crm on Indian retailing in the changing business scenario using

data mining techniques. Comparing to the works discussed above, our work is different by using Apriori and decision tree to perform market basket analysis.

3. System Architecture

A. Customer Data Set:

The Wholesale customer data provided by the UCI Machine Learning Repository is used for analysis of this work. The dataset has 8 continuous and 1 numeric input attributes namely channel, region, fresh, milk, grocery, frozen, detergents, delicatessen and session. It also has the predicted attribute (i.e.) the class label. Here the channel1 represents horeca (hotel/restaurant/café), channel2 represents retail shops. Region1 represents Lisbon, region2 represents Oporto, and region3 represents the others.

B. Association Rules:

Association rules are of the form if X then Y. Frequent patterns is patterns (such as item sets, subsequences, or substructures) that appear in a data set frequently. Frequent pattern mining searches for recurring relationships in a given data set. Association rules are not always useful, even if they have high support, confidence and lift > 1. Association rules can also be improved by combining purchase items. Items often fall into natural hierarchies.

C. Decision Trees:

Decision tree induction is the learning of decision trees from class-labeled training tuples. Decision tree algorithms, such as ID3, C4.5, and CART, were originally intended for classification. Decision tree induction constructs a flow chart like structure where each internal (non leaf) node denotes a test on an attribute, each branch corresponds to an outcome of the test, and each external (leaf) node denotes a class prediction. The topmost node in a tree is the root node. The construction of decision tree classifiers does not require any domain knowledge or parameter setting, and therefore is appropriate for exploratory knowledge discovery. Decision trees can handle high dimensional data. Their representation of acquired knowledge in tree form is intuitive and generally easy to assimilate by humans.

The learning and classification steps of decision tree induction are simple and fast. In general, decision tree classifiers have good accuracy. Decision trees are the basis of several commercial rule induction systems. At each node, the algorithm chooses the “best” attribute to partition the data into individual classes.

ID3:

ID3 uses information gain as its attribute selection measure. The expected information needed to classify a tuple in D is given by where pi is the probability that an arbitrary tuple in D belongs to class Ci and is estimated by jCi, Dj/jD. A log function to the base 2 is used, because the information is encoded in bits. Info (D) is just the average amount of information needed to identify the class label of a tuple in D. Info A (D) is the expected information required to classify a tuple from D based on the partitioning by A.

The smaller the expected information (still) required, the greater the purity of the partitions. This can be measured by The term Dj acts as the weight of the jth partition. Information gain is defined as the difference between the original information requirement (i.e., based on just the proportion of classes) and the new requirement (i.e., obtained after partitioning on A). That is,

C4.5:

C4.5 is an algorithm used to generate a decision tree developed by Ross Quinlan. The decision trees generated by C4.5 can be used for classification, and for this reason, it is often referred to as a statistical classifier. C4.5, a successor of ID3, uses an extension to information gain known as gain ratio, which attempts to overcome this bias. C4.5 builds decision trees from a set of training data in the same way as ID3, using the concept of information entropy. The training data is a set $S=s1, s2...$ of already classified samples. Each sample si consists of a p-dimensional vector $(x1,i,x2,i,...,xp,i)$, where the xj represent attributes or features of the sample, as well as the class in which si falls. At each node of the tree, C4.5 chooses the attribute of the data that

most effectively splits its set of samples into subsets enriched in one class or the other.

4. Simulation Results

The whole dataset was given to the data mining tool like Tanagra. Then frequent item set is found using Apriori algorithm in the association technique .This paper is mainly focused to find out whether the products can be sold more at morning session or evening session. For this, it uses two decision tree algorithms called ID3 and C4.5. Using ID3 the dataset parameters can be splitted and also found the error rate with confusion matrix. Using C4.5 algorithm, the decision tree can be constructed for the given confidence level and minimum size of leaves. It gives the mean and accuracy of the product sold in two sessions.

A receiver operating characteristic (ROC) curve is a graphical plot that illustrates the performance of a binary classifier system as its discrimination threshold is varied. The curve is created by plotting the true positive rate against the false positive rate at various threshold settings. The ROC curve of our work is shown here the positive value should be taken as morning and the result becomes nearly true positive is little bit higher than the false positive. This diagram illustrates at what channel and region our products sends more in the morning and whether it gets true positive or not.

5. Conclusion

In this paper, a framework for Decision tree and frequent item set is developed for the analysis of wholesale data. The wholesale customer dataset is taken and analyzed to know the session at which the product can be sold more using decision tree algorithm like ID3 and C4.5. The data in the dataset is preprocessed to make it suitable for classification. The preprocessed data is used for classification and we obtained high classification accuracy.

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Data Mining Models for the Internet of Things

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Abstract
In this paper, we propose four data mining models for the Internet of Things, which are multi-layer data mining model, distributed data mining model, Grid based data mining model and data mining model from multi-technology integration perspective. Among them, multi-layer model includes four layers: 1) data collection layer, 2) data management layer, 3) event processing layer, and 4) data mining service layer. Distributed data mining model can solve problems from depositing data at different sites. Grid based data mining model allows Grid framework to realize the functions of data mining. Data mining model from multi technology integration perspective describes the corresponding framework for the future Internet. Several key issues in data mining of IoT are also discussed.

Keywords: *Internet of Things, data mining models, RFID technology.*

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1. Introduction

The Internet of Things (IoT) refers to the next generation of Internet which will contain trillions of nodes representing various objects from small ubiquitous sensor devices and handhelds to large web servers and supercomputer clusters. It is the next technological revolution after the revolution of computer and Internet. It integrates the new technologies of computing and communications (eg. sensor networks, RFID technology, mobile communication technologies, real-time localization, ubiquitous computing and IPV6 etc.) and builds the development direction of the next generation of internet. IoT is the core of Smart Planet that is proposed by IBM Corporation. Smart objects of the Internet of Things (eg. sensor inputs, actuators etc.) are able to communicate via the internet based on the new technologies of information and communication.

S. Haller et al. have given the following definition of IoT : "A world where physical objects are seamlessly integrated into the information network, and where the physical objects can become active participants in business process. Services are available to interact with these 'smart object' over the Internet, query their state and any information associated with them, taking into account security and privacy issues." Prof. Liu has provided the ideas of IoT from the aspects of technology and economy respectively: "From the viewpoint of technology, IoT is an integration of sensor networks, which include RFID, and ubiquitous network. From the viewpoint of economy, it is an open concept, which integrates new related technologies and applications, productions and services, R. & D., industry and market."

The Internet of Things will produce large volumes of data. Let us take a supermarket in a supply chain, which adopts RFID technology, as an example. The format of raw RFID data is of the form: EPC, location, time. EPC represents the unique identifier read by an RFID reader; location is the place where the reader is positioned; and time is the time when the reading took place. It needs about 18 bytes to save a raw RFID record. In a supermarket, there are about 700,000 RFID tag. So for a RFID data stream of a supermarket, if the supermarket has readers that scan the items every second, about 12.6 GB RFID data will be produced per second, and the data will reach 544TB per day. Thus, it is necessary to develop effective methods for managing, analyzing and mining RFID data. The data in the Internet of Things can be categorized into several types: RFID data stream, address/unique identifiers, descriptive data, positional data, environment data and sensor network data etc. It brings the great challenges for managing, analyzing and mining data in the Internet of Things.

2. Related Works

As a completely new paradigm of Internet, researches on the Internet of Things are still at the preliminary stage. Currently, there are some works

about data mining in the Internet of Things, which mainly include the following three aspects: Some works focus on managing and mining RFID stream data. For example, Hector Gonzalez et al.[4] proposed a novel model (RFID-Cuboids) for warehousing RFID data, which preserves object transitions while providing significant compression and path-dependent aggregates. RFID-Cuboids maintain three tables: (1) Info table, which stores path-independent information about product, (2) Stay table, which stores information about items that stay together at a location, (3) map table, which stores path information for performing structure-aware analysis. Hector Gonzalez et al.[5] adopted Flow Graph to represent the transportation of commodity, and also used it for multi-dimensional analysis of commodity flows. In reference [6], Hector Gonzalez et al. proposed a kind of compressed probabilistic workflows that capture the movement and significant exceptions of RFID flows. Elio Masciari [8] researches outlier mining in RFID data stream. Some works interest in query, analyze and mine moving object data which is generated by various devices of IoT, e.g., GPS devices, RFID sensor networks, RADAR or satellites etc. For example, Xiao lei Li et al. [7] put forward a new framework, called ROAM, which is used for anomaly detection in moving object. In reference [10], Jae-Gil Lee et al. developed a novel partition-and-detect framework for trajectory outlier detection of moving object. Jae-Gil Lee et al. [9] also put forward a new trajectory classification method called TraClass using hierarchical region-based and trajectory-based clustering. In reference [11], a partition-and-group framework is proposed for trajectory clustering of moving object. Other works are knowledge discovery from sensor data.

Sensor network has several characteristics, e.g., limited resources, easy deployment of sensors, no maintenance, multi-hop and mass data etc. So data mining in sensor networks has its own features. Joy deep Gosh proposed a general probabilistic framework that allows supervised learning under the constraints of computational/memory/power limitations. Betsy George et al.[13] put forward Spatio-Temporal Sensor Graphs (STSG) to model and mine sensor data. STSG models are able to discover different types of patterns: anomaly patterns, centralized locations at each time interval, and nodes of future hotspot. Parisa Rashidi et al. [14] developed a novel adaptive mining framework for pattern mining from sensor data, which adapt to changes in data. Although there are several contributions towards data mining from IoT, they mainly focus on the rudiments of IoT, eg. sensor network, RFID etc. As a completely new paradigm of Internet, IoT is still lack of models and theories for directing its data mining.

3. Data Mining Models for the Internet of Things

3.1. Multi Layer Data Mining Model for IoT

According to the architecture of IoT and data mining framework of RFID [15], we propose the following multilayer data mining model for IoT, which is divided into four layers: data collection layer, data management layer, event processing layer and data mining service layer. Among them, data collection layer adopts devices, e.g. RFID Reader and sinks etc., to collect various smart object's data, which are RFID stream data, GPS data, satellite data, positional data and sensor data etc. Different type of data requires different data collection strategy. In the process of data collection, a series of problems, e.g., energy-efficiency, misreading, repeated reading, fault tolerance, data filtering and communications etc., should be well solved. Data management layer applies centralized or distributed database or data warehouse to manage collected data.

After object identification, data abstraction and compression, various data are saved in the corresponding database or data warehouse. Take RFID data as an example, the raw format of RFID data stream is (EPC, location, time), where EPC marks smart object's ID. After data cleaning, we can obtain Stay table which contains records as the format (EPC, location, time_in, time_out). Then we use data warehouse, called RFIDCUBOID, to save and manage the corresponding data, which includes Info table, Stay table and Map table. Based on RFID-CUBOID, users can online analytical process RFID data conveniently. Besides, XML language can be adopted for describing data in IoT. Smart objects are connected with each other via the data management layer in the Internet of Things. Event is an integration that combines data, time and other factors, so it provides a high-level mechanism for data processing of IoT. Event processing layer is used to analyze events in IoT effectively. Thus we

can perform event-based query or analysis in event processing layer. The observed primitive events are filtered, and then complex events or events that are concerned by user are obtained. Then we can aggregate, organize and analyze data according to events. Data mining service layer is built based on data management and event processing. Various object-based or event-based data mining services, such as classification, forecasting, clustering, outlier detection, association analysis or patterns mining, are provided for applications, e.g., supply chain management, inventory management and optimization etc. The architecture of this layer is service-oriented.

3.2. Distributed Data Mining Model for IoT

Comparing with the common data, data in IoT has its own characteristics. For example, the data in IoT is always mass, distributed, time-related and position-related. At the same time, the data sources of IoT are heterogeneous, and the resources of nodes are limited. These characteristics bring several problems to centralized data mining architecture. At first, mass data of IoT is stored indifferent sites. Therefore, it is difficult for us to mine distributed data by centralized architecture. Secondly, data in IoT is mass and needs preprocessing in real time. So if we adopt central architecture, the requirement for hardware of central nodes is quite high. Thirdly, for the consideration of data security, data privacy, fault tolerance, business competition, legal constraints and other factors, the strategy of putting all relevant data together is often not feasible. Fourthly, the resources of nodes are limited.

The strategy of sending all data to central nodes does not optimize the use of energy-costly transmissions. In most cases, the central nodes do not need all data, but some estimates of parameters. So we can pre-process the raw data in the distributed nodes, and then send the necessary data to the receiver. Distributed data mining model for IoT is not only able to solve the problems brought by distributed storage of nodes, but also decompose the complex problems into simple ones. Thus the requirement of high performance, high storage capacity and computing power is reduced. In this paper, we propose a distributed data mining model for IoT.

In this model, the global control node is the core of the whole data mining system. It chooses the data mining algorithm and the data sets for mining, and then navigates to the sub-nodes containing these data sets. The sub-nodes receive the raw data from various smart objects. These raw data is pre-processed by data filter, data abstraction and data compression, and then is saved in the local data warehouse. Local models are obtained by event filtering, complex event detection and data mining in local nodes. According to the demand of the global control node, these local models are submitted to the global control node and aggregated together to form the global model. Sub-nodes exchange object data, process data and knowledge with each other. The whole process is controlled by the multi agent based collaborative management mechanism.

3.3. Grid Based Data Mining Model for IoT

Grid computing is a novel computing infrastructure, which is able to implement heterogeneous, large scale and high performance applications. As the same to IoT, Grid computing receives an increasing attention both from industry and the research community. The basic idea of Grid is that users can make use of the computation resources of Grid as the same as power resources. Various computing resources, data resources and devices resources can be accessed or used conveniently. The basic idea of IoT is to connect various smart objects via internet. Thus smart objects become intelligent, context-awareness, and long-range operable. Therefore we may regard smart objects of IoT as a kind of resources for Grid computing, and then use data mining services of Grid to implement the data mining operations for IoT. P. Brezany et al. [19] proposed a fundamental infrastructure called GridMiner, which supports distributed online analytical processing and data mining. In reference [20], A. Congiusta discussed design aspects and implementation choices of WSRF-compliant Grid Services. In this paper, based on Data Mining Grid [21] which was put forward by Stankovski, V. et al., we propose a Grid-based data mining model for IoT.

The differences between Data Mining Grid-based data mining model for IoT and Data Mining Grid is the part of software and hardware resources. IoT provides more types of hardware, e.g., RFID tags, RFID Readers, WSN, WSAN and Sensor networks etc. It also offers various software resources, e.g.,

event processing algorithms, data warehouse and data mining applications etc.. We also can make full use of high-level services of Data Mining Grid.

3.4. Data Mining Model for IoT from Multi Technology Integration Perspective

The Internet of Things is one of the most important development directions of the next- generation Internet. At the same time, there are still a number of new directions, e.g., trusted network, ubiquitous network, grid computing, cloud computing etc. Therefore, from the perspective of multi-technology integration, we propose the corresponding data-mining model for IoT.

4. Key Issues in Data Mining of IoT

4.1 .Data Collections from Smart Objects of IoT

When we conduct our data collection from smart objects of IoT, the special needs of smart objects should be taken into account. For example, if we want to collect data from distributed sensor networks, energy-efficiency, scalability and fault-tolerance should be considered. A series of strategies, e.g., data aggregation, can be adopted. Thus, the amount of transmission data is reduced, and the utilization of energy of sensor nodes is promoted. In reference [12], in order to reconcile the goals and conflicts in the process of sensor network data mining, Joydeep Ghosh proposed a general probabilistic framework under the constraints of computational/memory/power limitations.

4.2. Data Abstraction, Compression, Index, Aggregation and Multi Dimensional Query

The Internet of Things will produce a massive data of smart objects. Therefore, it is necessary to consider how to manage data of IoT effectively and how to implement online analytical query and processing conveniently [1, 5]. Data of smart objects has its own characteristics: (1) In the environment of IoT, devices such as RFID and sensors will produce massive data streams. (2) Data of smart objects is likely to inaccurate, and usually is time-related or location-related. (3) Data of smart objects tends to have its own implicit semantics. So it is necessary to recognize the implicit semantics of data. The characteristics of IoT data put forward new demands for data management and data mining. The key issues are includes:

1) *Identification and addressing of smart objects:* In IoT, the number of entities of smart objects will be billions. In order to query or interact with smart objects, it is necessary to realize smart objects' identification and addressing effectively.

2) *Data abstraction and compression.* Effective methods should be developed for filtering redundant data.

3) *Data archive, index, scalability and access control for IoT data.*

4) *Data warehouse and its query language for multidimensional Analysis*

5) *Interoperability and semantic intelligibility for heterogeneous data of IoT.*

6) *Time-series level and event level data aggregation.*

7) *Privacy and protection problem in data management of IoT.*

4.3. Event Filtering, Aggregation and Detecting

Event filtering and complex event processing are used to process simple events in data. The whole process includes the following steps. At first, data are aggregated according to events. The primitive events are filtered, and valuable events are obtained. And then, these simple atomic events are integrated into complex events. Thus we can detect the corresponding business logic by detecting complex events. For example, Tai Ku et al. [17] proposed a new complex event-mining network for monitoring RFID-enable application, and defined the fundamental concepts for the event management of supply chain, which uses RFID technology.

4.4. Centralized Data Processing and Mining Vs. Distributed Data Processing And Mining

In different situations, centralized or distributed data processing and mining models can be adopted flexibility. Let's take distributed sensor network as

an example. Under the constraints of nodes' computational/memory/power limitations, the strategy of sending all data to sink nodes does not optimize the use of energy-costly transmissions. In fact, in most cases we do not need all raw data, but are interested in some values of parameters. Therefore, a better approach is to pre-process data at each distributed nodes in advance. And then only necessary data is sent to sink nodes.

4.5. Research on Data mining Algorithms for IoT

Based on data management and event processing for IoT, a key issue is to study the novel data mining algorithms for IoT. The main tasks include classification, forecasting, clustering, outlier detection, association analysis, spatial and temporal patterns mining for IoT. For example, Chen Zhuxi et al.[16] proposed the frequent closed-path mining algorithm for RFID applications. Elio Masciari [8] studied outlier detection from RFID data stream.

4.6. Data mining Towards The Next Generation

The next generation of Internet has many potential direction of development: IPV6 technology, ubiquitous networks, trusted network, semantic web, Grid (Semantic Grid, Data Grid and Knowledge Grid), service-oriented applications, optical transmission and cloud computing etc. In the next generation of Internet, these new technologies will integrate with IoT. Therefore, many new data mining problems need to be studied intensively. For example, semantic-based data mining from IoT, Grid-based data mining from IoT and Service-oriented data mining from IoT etc.

5. Conclusions and Future Works

As an important development direction of the next generation of Internet, the Internet of Things attracts many attentions by industry world and academic circles. IoT data has many characteristics, such as distributed storage, mass time-related and position-related data, and limited resources of nodes etc. These makes the problem of data mining in IoT become a challenge task. In this paper, we propose four data mining models for the Internet of Things, which are multi-layer data mining model, distributed data mining model, Grid based data mining model and data mining model from multi technology integration perspective. Among them, multilayer model includes four layers (e.g. data collection layer, data management layer, event processing layer and data mining service layer). Distributed data mining model can well solve the problem arose from depositing data at different sites. At the same time, the complexity of problem is decomposed, and the requirements of high performance, high storage capacity and high computing power for central nodes are reduced. Grid based data mining model adopts Grid framework to realize the functions of data mining. Data mining model from multi technology integration perspective describes the corresponding framework for the future Internet. Several key issues in data mining of IoT are also discussed. Possibilities for future work include: a) studying various data mining algorithms for IoT; b) implementation of Grid-based data mining systems and the corresponding algorithms.

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Green Computing For System Efficiency and Optimization

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Abstract

Green computing or green IT, refers to environmentally suitable computing or IT. It is the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems—efficiently and effectively with minimal or no impact on the environment. Green IT also strives to achieve economic viability and improved system performance and use, while abiding by our social and ethical responsibilities. Thus, green IT includes the dimensions of environmental sustainability, the economics of energy efficiency, and the total cost of ownership, which includes the cost of disposal and recycling. It is the study and practice of using computing resources efficiently.

Keywords: *Environment, carbon, electric, power, solar, VIA technology.*

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1. Introduction

Green computing researchers look at key issues and topics related to energy efficiency in computing and promoting environmentally friendly computer technologies and systems include energy-efficient use of computers, design of algorithms and systems for environmentally-friendly computer technologies, and wide range of related topics.

With increasing recognition that man-made greenhouse gas emissions are a major contributing factor to global warming, enterprises, governments, and society at large now have an important new agenda: tackling environmental issues and adopting environmentally sound practices.

Greening our IT products, applications, services, and practices is an economic and an environmental imperative, as well as our social responsibility. Therefore, a growing number of IT vendors and users are moving toward green IT and thereby assisting in building a green society and economy.

2. A Brief History of Green Computing

One of the first manifestations of the green computing movement was the launch of the Energy Star program back in 1992. Energy Star served as a kind of voluntary label awarded to computing products that succeeded in minimizing use of energy while maximizing efficiency. Energy Star applied to products like computer monitors, television sets and temperature control devices like refrigerators, air conditioners, and similar items.
One of the first results of green computing was the Sleep mode function of computer monitors which places a consumer's electronic equipment on standby mode when a pre-set period of time passes when user activity is not detected. As the concept developed, green computing began to encompass thin client solutions, energy cost accounting, virtualization practices, e-waste, etc.

2.1 Roads to Green Computing

To comprehensively and effectively address the environmental impacts of computing/IT, we must adopt a holistic approach and make

the entire IT lifecycle greener by addressing environmental sustainability along the following four complementary paths:

- Green use — reducing the energy consumption of computers and other information systems as well as using them in an environmentally sound manner
- Green disposal — refurbishing and reusing old computers and properly recycling unwanted computers and other electronic equipment
- Green design — designing energy-efficient and environmentally sound components, computers, servers, cooling equipment, and data centers
- Green manufacturing — manufacturing electronic components, computers, and other associated subsystems with minimal impact on the environment.

2.2 Governments Go Green

Many governments worldwide have initiated energy-management programs, such as energy star, an international standard for energy-efficient electronic equipment that was created by the United States Environmental Protection Agency in 1992 and has now been adopted by several other countries. Energy Star reduces the amount of energy consumed by a product by automatically switching it into "sleep" mode when not in use or reducing the amount of power used by a product when in "standby" mode. Surprisingly, standby "leaking," the electricity consumed by appliances when they are switched off, can represent as much as 12 percent of a typical household's electricity consumption.

In Australia, standby power is a primary factor for the country's increased greenhouse gas emissions — more than 5 megatons (CO2 equivalent) annually. Worldwide, standby power is estimated to account for as much as 1 percent of global greenhouse emissions. Most of the energy used by products on standby does not result any useful function. A small amount can be needed for maintaining memory or an internal clock, remote-control activation, or other features; but most standby power is wasted energy. Energy Star–enabled products minimize this waste.

3. Approaches to Green Computing

3.1 Algorithmic Efficiency

The efficiency of algorithms has an impact on the amount of computer resources required for any given computing function and there are many efficiency trade-offs in writing programs. As computers have become more numerous and the cost of hardware has declined relative to the cost of energy, the energy efficiency and environmental impact of computing systems and programs has received increased attention. A study by Alex Wissner-Gross, a physicist at Harvard, estimated that the average Google search released 7 grams of carbon dioxide (CO??). However, Google disputes this figure, arguing instead that a typical search produces only 0.2 grams of CO.

3.2 Power Management

The Advanced Configuration and Power Interface (ACPI), an open industry standard, allows an operating system to directly control the power saving aspects of its underlying hardware. This allows a system to automatically turn off components such as monitors and hard drives after set periods of inactivity. In addition, a system may hibernate, where most components (including the CPU and the system RAM) are turned off. ACPI is a successor to an earlier Intel-Microsoft standard called Advanced Power Management, which allows a computer's BIOS to control power management functions.

Some programs allow the user to manually adjust the voltages supplied to the CPU, which reduces both the amount of heat produced and electricity consumed. This

process is called undervolting. Some CPUs can automatically undervolt the processor depending on the workload; this technology is called "SpeedStep" onIntel processors,"PowerNow!"/"Cool'n'Quiet" on AMD chips, Long Haul on VIA CPUs, and LongRun with Transmeta processors. Recently a computer activity and putting computers into power saving modes if they are idle. 1000 PC and more can be administered very easily resulting in energy consumption reduction of 40 - 80%.

3.3 Storage

Smaller form factor (e.g. 2.5 inch) hard disk drives often consume less power per gigabyte than physically larger drives. Unlike hard disk drives, solid-state drives store data in flash memory or DRAM. With no moving parts, power consumption may be reduced somewhat for low capacity flash based devices. Even at modest sizes, DRAM-based SSDs may use more power than hard disks, (e.g., 4GB i-RAM uses more power and space than laptop drives).

Though most flash based drives are generally slower for writing than hard disks. in a recent case study Fusion-io, manufacturers of the world's fastest Solid State Storage devices, managed to reduce the carbon footprint and operating costs of MySpace data centers by 80% while increasing performance speeds beyond that which is was attainable by multiple hard disk drives in Raid 0. In response, MySpace was able to permanently retire several of their servers, including all heavy-load servers, further reducing their carbon footprint.

3.4 Display

LCD monitors typically use a cold-cathode fluorescent bulb to provide light for the display. Some newer displays use an array of light-emitting diodes (LEDs) in place of the fluorescent bulb, which reduces the amount of electricity used by the display.

3.5 Operating Issues

Microsoft has been heavily criticized for producing operating systems that, out of the box, are not energy efficient. Due to Microsoft's dominance of the huge desktop operating system market this may have resulted in more energy waste than any other initiative by other vendors. Microsoft claim to have improved this in Vista, though the claim is disputed. This problem has been compounded because Windows versions before Vista did not allow power management features to be configured centrally by a system administrator. This has meant that most organizations have been unable to improve this situation.

Microsoft Windows Vista has improved this by adding basic central power management configuration. The basic support offered has been unpopular with system administrators who want to change policy to meet changing user requirements or schedules. Several software products have been developed to fill this gap including Auto Shutdown Manager, Data Synergy Power MAN, Faronics Power Save, 1E NightWatchman, Verdiem Surveyor/Edison, Verismic Power Manager, Wakeup On Stand By (WOSB), Greentrac (also promotes behavioral change) among others.

3.6 Materials Recycling

Computer systems that have outlived their particular function can be repurposed, or donated to various charities and nonprofit organizations. However, many charities have recently imposed minimum system requirements for donated equipment. Additionally, parts from outdated systems may be salvaged and recycled through certain retail outlets and municipal or private recycling centers.

Recycling computing equipment can keep harmful materials such as lead, mercury, and hexavalent chromium out of landfills, but often computers gathered through recycling drives are shipped to developing countries where environmental standards are less strict than in North America and Europe. The Silicon Valley Toxics Coalition estimates that 80% of the post-consumer e-waste collected

for recycling is shipped abroad to countries such as China and Pakistan.

3.7. Via Technologies Green Computing

VIA Technologies, a Taiwanese company that manufactures motherboard chipsets, CPUs, and other computer hardware, introduced its initiative for "green computing" in 2001. With this green vision, the company has been focusing on power efficiency throughout the design and manufacturing process of its products. Its environmentally friendly products are manufactured using a range of clean-computing strategies, and the company is striving to educate markets on the benefits of green computing for the sake of the environment, as well as productivity and overall user experience.

3.8 Carbon-Free Computing

One of the VIA Technologies' ideas is to reduce the "carbon footprint" of users — the amount of greenhouse gases produced, measured in units of carbon dioxide (CO2). Greenhouse gases naturally blanket the Earth and are responsible for its more or less stable temperature. An increase in the concentration of the main greenhouse gases — carbon dioxide, methane, nitrous oxide, and fluorocarbons — is believed to be responsible for Earth's increasing temperature, which could lead to severe floods and droughts, rising sea levels, and other environmental effects, affecting both life and the world's economy. The emissions are mainly a result of fossil-fuel-burning power plants. (In the United States, such electricity generation is responsible for 38 percent of the country's carbon dioxide emissions.)

In addition, VIA promotes the use of such alternative energy sources as solar power, so power plants wouldn't need to burn as much fossil fuels, reducing the amount of energy used. Wetlands also provide a great service in sequestering some of the carbon dioxide emitted into the atmosphere. Although they make up only 4 to 6 percent of the Earth's landmass, wetlands are capable of absorbing 20 to 25 percent of the atmospheric carbon dioxide. VIA is working closely with organizations responsible for preserving wetlands and other natural habitats, and others who support extensive recycling programs for ICT equipment.

Carbon-emissions control has been a key issue for many companies who have expressed a firm commitment to sustainability. Dell is a good example of a company with a green image, known for its free worldwide product-recycling program. Dell's Plant a Tree for Me project allows customers to offset their carbon emissions by paying an extra $2 to $4, depending on the product purchased. AMD, a global microprocessor manufacturer, is also working toward reducing energy consumption in its products, cutting back on hazardous waste and reducing its eco-impact. The company's use of silicon on- insulator (SOI) technology in its manufacturing, and strained silicon capping films on transistors (known as "dual stress liner" technology), have contributed to reduced power consumption in its products.

For that purpose, VIA partnered with Motech Industries, one of the largest producers of solar cells worldwide. Solar cells fit VIA's power-efficient silicon, platform, and system technologies and enable the company to develop fully solar-powered devices that are nonpolluting, silent, and highly reliable. Solar cells require very little maintenance throughout their lifetime, and once initial installation costs are covered, they provide energy at virtually no cost.

Worldwide production of solar cells has increased rapidly over the last few years; and as more governments begin to recognize the benefits of solar power, and the development of photovoltaic technologies goes on, costs are expected to continue to decline. As part of VIA's "pc-1" initiative, the company established the first-ever solar-powered cyber community center in the South Pacific, powered entirely by solar technology.

Energy Efficient Computing

A central goal of VIA's green-computing initiative is the development of energy-efficient platforms for low-power, smallform-factor (SFF) computing devices. In 2005, the company introduced the VIA C7-M and VIA C7 processors that have a maximum power consumption of 20W at 2.0GHz and an average power consumption of 1W. These energy-efficient processors produce over four times less carbon during their operation and can be efficiently embedded in solar-powered devices.

VIA isn't the only company to address environmental concerns: Intel, the world's largest semiconductor maker, revealed eco-friendly products at a recent conference in London. The company uses virtualization software, a technique that enables Intel to combine several physical systems into a virtual machine that runs on a single, powerful base system, thus significantly reducing power consumption. Earlier this year, Intel joined Google, Microsoft, and other companies in the launch of the Climate Savers Computing Initiative that commits businesses to meet the Environmental Protection Agency's Energy Star guidelines for energy-efficient devices. Most developers of computer software and hardware focus on solving problems with maximum speed and minimum storage space.

On the Horizon

Green technology is gaining more and more public attention through the work of environmental organizations and government initiatives. VIA is one of the first corporations to concentrate on green computing that seems less a passing trend than a first step toward significant changes in technology. In May 2007, IBM unveiled its Project Big Green, dedicated to increasing energy efficiency across the company's branches around the world. Experts say that businesses will continue to invest in clean computing, not only because of future regulations, policies, and social demands to reduce their carbon footprint, but also due to the significant long-term savings it can make. Several companies are already headfirst into the green-computing business. Located in the Silicon Valley and founded in 2006, Zonbu was the first company to introduce a completely environmentally responsible computer - Their "Zonbox" computer is a carbon-emission neutral computer, thanks to a low-power design and regulatory-grade carbon offsets. The device, which compiles both to Energy Star standards and the Restriction of Hazardous Substances Directive (RoHS), consumes only 15W, compared to the 175W consumed by a typical desktop PC. Zonbu also provides a free take-back program to minimize environmental e-waste.

4. Conclusion

So green computing is a mindset that asks how we can satisfy the growing demand for network computing without putting such pressure on the environment. There is an alternative way to design a processor and a system such that we don't increase demands on the environment, but still provide an increased amount of processing capability to customers to satisfy their business needs. Green computing is not about going out and designing biodegradable packaging for products. Now the time came to think about the efficiently use of computers and the resources which are non renewable. It opens a new window for the new entrepreneur for harvesting with E-waste material and scrap computers.

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Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones& social media

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ABSTRACT

The purpose of this research was to explore teaching and learning when mobile computing devices, such as cell phones and smart phones, were implemented in higher education. This paper presents a portion of the findings on students' perceptions of learning with mobile computing devices and the roles social media played. The students' teachers had been integrating mobile computing devices, such as cell phones and smart phones, into their courses for at least two semesters. Data were collected through student focus group interviews. Two specific themes emerged from the interview data: (a) advantages of mobile computing devices for student learning and (b) frustrations from learning with mobile computing devices. Mobile computing devices and the use of social media created opportunities for interaction, provided opportunities for collaboration, as well as allowed students to engage in content creation and communication using social media and Web 2.0 tools with the assistance of constant connectivity.

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1. Introduction

The Edu cause Center for Applied Research [ECAR] survey on Mobile IT in higher education states that students are driving the adoption of mobile computing devices, such as cell phones, smart phones, and tablet computers, in higher education, and 67% of surveyed students believe mobile devices are important to their academic success and use their devices for academic activities. The increased ubiquity of mobile computing devices on college campuses has the potential to create new options for higher education students and the exploration of mobility and social media as an instructional strategy. Mobile computing devices can provide educational opportunities for students to access course content, as well as interact with instructors and student colleagues wherever they are located. These facile interactions are made even more accessible by using mobile devices in conjunction with social media, free web tools that allow for communication and enhance learning. Because mobile computing devices and social media are still rather new and evolving, research has tended to focus on evaluating the effectiveness of implementing mobile computing devices. Some of the most rigorous research used survey methods in order to depict students' intentions However, there is little applied research into how these tools are actually being used to support teaching and learning with few descriptions of how mobile computing devices and social media are used by university students.

The purpose of this research was to explore how higher education teaching and learning were affected by the integration of mobile computing devices. As mobile devices continue to grow as part of the higher education landscape, mobile computing devices present both opportunities and challenges to higher education institutions. The goal of our broader research was to present in depth perspectives of instructors and students about their experiences of implementing mobile computing devices. However, this present paper will focus only on students' experiences and perceptions mobile computing devices brought to learning and the roles social media played. The primary research question for this study was,

"What are students' experiences when mobile computing devices are integrated into higher education courses?"

2. Foundations of Mobile Learning

Technically still in its infancy in higher education, learning with mobile computing devices has been described and defined in a variety of ways Because our interest was focused on how mobile computing devices impacted learning with coursework, we felt a combination of definitions was most appropriate. So, in this study, mobile learning was defined as (a) more than just learning delivered and supported by handheld, mobile computing devices but (b) learning that is both formal and informal, and (c) context aware and authentic for the learner. Each of these components is briefly discussed below.

2.1. Learning Delivered and Supported By Mobile Computing Devices

Mobile computing devices have included technologies that are transportable, such as cell phones and smart phones, and these may include tablet computers, laptop computers, and net books however, recognized that mobile learning should focus on the actual mobility of the device. That is, mobile learning should be "restricted to learning on devices which a lady can carry in her handbag or a gentleman can carry in his pocket". This is the essence of mobile learning — accessing information and knowledge anywhere, anytime from devices that learners are used to "carrying everywhere with them" and that they "regard as friendly and personal".

2.2. Learning Is Formal And Informal

Formal learning, by design, is where learners are engaging with materials developed by a teacher to be used during a program of instruction in an educational environment, highly structured, institutionally sponsored, and generally recognized in terms of a certificate or a credit upon completion. Informal learning is often defined as learning that results "from daily work-related, family or leisure activities". It is often intentional but unstructured and contextualized. This type of learning is sometimes "unanticipated, unorganized, and often unacknowledged, even by the learner". Activities such as reading, using the Internet, visiting community resources, such as libraries, museums, and zoos, and on-the-job learning are usually considered informal learning activities, though there is no conclusive definition of informal learning. During any of these activities, learners can use and access their mobile computing devices to research, investigate, or collect information to be used in their formal learning environment. Nevertheless, Billett (2002) argued that learning is ubiquitous and much of our learning takes place outside the formal educational setting. Therefore, informal learning should not be regarded as something that occurs after formal learning has been accomplished but in combination with formal learning. Mobile computing devices can be used as the bridge between formal and informal learning opportunities.

2.3. Learning Is Context Aware and Authentic

Traxler (2010) contended that with mobile learning, content can be more contexts aware, authentic, and situated in the surroundings where the learning is more meaningful to the learner. Learners can personalize the way they interact with the course content. They can also customize "the transfer and access of information in order to build on their skills and knowledge to meet their own educational goals" based on their needs and abilities. Mobile computing devices also allow for learning to be situated and context aware in which learning takes place in meaningful surroundings — most likely outside the classroom and in the student's surroundings or environment at a time appropriate for the learner. However, and warn that learning across contexts and at different times may produce fragmented knowledge and incomplete schemata.

3. Social Media

Higher education students and faculty members typically use the term social media interchangeably with Web 2.0. Web 2.0 is typically defined by the characteristics, or technical design patterns, set forth by O'Reilly (2005). Social media, a term coined in 2005 after the term Web 2.0, is defined more specifically as "a group of Internet based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content" (Kaplan & Heinlein, 2010, p. 61). The social aspect of the term "implies that it exists in a social space" (Rodriguez, 2011, para. 3), which may be used for individual, professional, and/or entertainment purposes, and leverages social networks cultivated by individuals. The media portion of the term suggests that the social interactions are mediated through social networks, digital networks, and digital devices.

Admittedly, the lines among social media and Web 2.0 tools, or "web apps," are blurred. Broadly, social media encompasses (a) social networking sites, such as Facebook, Twitter, and LinkedIn, (b) media sharing sites, such as YouTube and Flickr, (c) creation and publishing tools, such as wikis and blogs, (d) aggregation and republishing through RSS feeds, and (e) remixing of content and republishing tools (Greenhow, 2011, p. 140). Siemens's (2005) theory of connectivism, and Sharples' (Sharples, 2000; Sharples, Taylor, & Vavoula, 2010) notion of learning as conversation propose that learning events do not halt but may continue within other networks to which we are part. Organized, or structured, formal learning can purposively leverage these networks, such as through Facebook or Twitter. Likewise, informal learning can flow throughout a day or days, tolerating pauses and disruptions (Ng, Howard, Loke, & Torabi, 2010). Greenhow (2011) summarizes that using social media tools in learning promotes a more student-centered course. These tools allow students to interact and collaborate with each other and instructors and "promotes personal choice, customization and student familiarity" (Hoffman, 2009, para. 23). Students are better able to create their own understanding of content when creating with these tools. Furthermore, Light (2011) identified elements that shape how Web 2.0 tools can be used meaningfully. Without structure, social media can negatively impact student learning.

4. Applications Of Mobile Learning And Social Media

In this section, we describe applications of mobile computing and social media around three broad themes that reoccur in published studies and cases. These characteristics include (a) engaging learners with constant connectivity, (b) fostering collaborative learning and (c) enabling authentic learning on the move.

4.1. Engaging Learners with Constant Connectivity

Mobile devices allow learners to access content and communicate with classmates and instructors, no matter where they are. In addition, mobile technologies "enable learners to find, identify, manipulate and evaluate existing knowledge" and successfully integrate and communicate this new knowledge into their work. These activities support the focus on the importance of social media in which the learners are creating user generated content. For example, user generated content allows for collaborative activities like the use of wikis, blogs, and even social bookmarking tools. In essence, these collaborative projects promote the idea that the joint effort of many — the idea of "collective intelligence" — leads to a better outcome than any one person could achieve individually. The term collective intelligence, coined by Levy, describes a participatory, friendly environment for the growth of new ideas that grow from cyberspace. The constant connectivity afforded by the mobile devices allows students to remain engaged in content creation and receive feedback and formative guidance, which is needed in facilitating a

learner-centered environment.

4.2. Fostering Collaborative Learning

Mobile devices provide learners opportunities to collaborate, discuss content with classmates and instructors, and create new meaning and understanding. Furthermore, social media provides for collaborative and engaging opportunities for students. Cochrane and Bateman (2010) identified how the use of mobile computing devices in one project-based course created a sense of connectivity with students, instructors and their clients by allowing for the constant and immediate connection to the Internet to blog about work progress, share photos and communicate using instant messaging or text messaging. This social media tool allowed for students to collaborate and share with each other in learning. Implemented effectively, mobile computing devices can support this collaborative, constructivist approach to learning.

4.3. Enabling Authentic Learning on the Move

Mobility with learning "enables knowledge acquisition across context and environments, rather than simply exploiting handheld devices for the fruition of learning". Applications on mobile computing devices – many of which are considered social media tools – allow learners to create video/audio, take photographs, geotag (i.e., geographical identification metadata added to media to identify the location to others), micro blog (i.e., a type of blog that consists of a short sentence fragment, an image or embedded video), receive or send text messages, and access social networking sites for communication with classmates and their instructor. In essence, by using the applications available on mobile devices as well as social media tools, a personalized, authentic learning experience can be created for learners.

5. Methodology

The goal of the research was to present students' in-depth perspectives of experiences with implementing mobile computing devices. Therefore, characterization and process of a general qualitative study were used, where transcripts were read several times to identify themes and categories. The qualitative approach allowed for the representation of reality through the eyes of the individuals interviewed in order to share their stories and hear their voices.

5.1. Context and Participants

To best align with our operationalization of mobile learning, mobile computing devices in this study included the following characteristics: (a) persistent access to the Internet, (b) a variety of downloadable applications, (c) used as a communication device, specifically phone and SMS (text) messaging, and (d) small enough to carry in a pocket or handbag. Therefore, only handheld devices, including cell phones and smart phones, were used in this study.

This study implemented a criterion strategy with a maximum variation strategy to determine the purposeful sample. The criteria for inclusion were as follows: (1) The context of this research was both public and private four-year higher education institutions. (2) We sought instructors who had used and implemented mobile computing devices as operationalized above in their learning environment for at least two semesters and (3) had used mobile computing devices to facilitate teaching and learning (i.e., not the management of university related activities on a mobile computing device such as accessing university resources). Students were then invited after their instructor interview was completed to corroborate the instructor's comments.

5.2. Data Collection

The primary method of data collection for the students' perspectives was focus group interviews. After contacting the course

instructors, their students were invited via email. All focus group interviews were conducted using Skype, and all of the focus group interviews were recorded using a Skype recorder. While video conferencing sometimes inhibits the observation of non verbal behaviors, we were able to note cues related to body language, such as engagement (e.g., leaning into the camera), agreement (e.g., head nodding), and distancing or disinterest (e.g., cross arms) with the quality of the recording. Guidelines for focus group interviews were used to provide structure to the focus group interviews. A semi-structured interview protocol was used, because it allowed for the variation in the order and phrasing of the questions and any additions to the protocol, such as additional questions and probes to specific individuals, when appropriate. While the focus group interview protocol acted as a guide, the questions were flexible to represent the emergent nature of the interview conversation.

5.3. Data Analysis

Inductive analysis was used to abstract the data. The analysis required an iterative process of collecting data, open coding, and then working with the codes to reveal connections. Patterns within the data were developed, then collapsed into categories, and finally overarching themes evolved. This constant comparison of the data was conducted in three rounds of inductive analysis, which included open coding, a priori coding, and research/methodological coding.

6. Findings and Interpretations

Two specific themes emerged from the student focus group interviews depicting the impacts mobile computing devices had on student learning and social media's roles. These themes include: (a) advantages of mobile devices for student learning and (b) frustrations from learning with mobile computing devices. Quotations used within each theme indicate verbatim remarks by the participants, and pseudonyms are used to denote the participants and institutions.

6.1. Advantages of Mobile Devices for Student Learning

The student participants described many advantages in which the mobile devices assisted in their learning. These advantages are organized into (a) accessing information quickly, (b) communication and content collaboration, (c) variety of ways to learn, and (d) situated learning.

6.1.1. Accessing Information Quickly

One advantage mobile computing devices afforded students in their learning was the ability to access information quickly. Because of the convenience of constant connectivity — specifically the connectivity to the Internet — students felt that the devices allowed them to retrieve course content quickly, stating, “You can go to any source you want to within seconds.” The student held up his iPhone as if to remind me that the mobile device was always easily accessible and within reach. Therefore, capitalizing on the immediate access to information that the mobile devices offered. Furthermore, students spoke positively about accessing course content such a discussion boards, course readings, and video clips they needed to watch for class on their mobile device. In addition to accessing content, they used their devices to upload and post content to their course sites.

6.1.2. Communication

Another advantage that stemmed from the constant connectivity available to students was the ability to communicate with fellow classmates and the instructor. Lakeshore University students felt that the constant communication made available through the mobile device was key in the success of the instruction and allowed them be “fully productive.” Additionally, one of the students shared a common sentiment: It was the whole new experience of having an out-of-class experience while still having instruction, instruction from the professor and it still being active communication…it was constant: Text

message, email. Learning occurred informally from small group collaboration while students were gathering information around campus. Students found themselves communicating more because of the mobile devices. They interacted with each other through applications, such as with Skype or Oovoo—both video conferencing tools—as well as engaged either through text messaging, the social networking tool Twitter, or the course website.

6.1.3. Variety of Ways to Learn

Students interacted with course content in a variety of ways using mobile computing devices. This included recording video or voice memos to be uploaded to the course site and then discussed by the entire class. The students also used these tools as they created their virtual history sites. Learners were able to communicate and collaborate about course content by using mobile computing devices to text message and email. Students also felt they had opportunities for reinforcement of the course material when using their mobile devices. For example, students were able to participate in polls using the devices as well as answer questions anonymously and then discuss the responses at length during the class session. One student described the honesty that came from responding anonymously. He said, “In a lot of my classes we've used the Quick Polls to answer questions and I found that sometimes that it helps people answer more honestly.” The anonymous discussion provided by the mobile devices allowed learners to engage in the discussion at a deeper level. The focus remained on the content and not on the concern of answering incorrectly. Furthermore, the immediate feedback received after taking a quiz on the mobile device also reinforced focus on the content.

6.1.4. Situated Learning

Mobile computing devices also allowed for interaction with the course content and other classmates in a highly situated and contextualized way. Situated learning proposes that learning takes place in the same context in which it is applied, typically in a real world setting. Learning is a social process situated in a specific context and embedded within a particular environment. Therefore, social interactions and learning in situ are critical components of situated learning. Admittedly, informal learning and situated cognition are not mutually exclusive. The relationships between situated learning and informal learning, where individuals are often unaware of their learning and that it occurs during the activities of their daily lives. While informal learning is mostly unstructured, situated learning is incumbent on the individual's interpretation and the authenticity of the context. “Situated learning methods attempt to induce everyday cognition by anchoring knowledge and skill in realistic contexts”. So, learning activities — whether formal or informal — that embed authentic problems and contexts can be considered situated.

6.2. Frustrations From Learning with Mobile Devices

Though the students considered mobile computing devices helpful, frustrations from learning with the mobile devices were evident. These included (a) anti-technology instructors in other classes, (b) device challenges, and (c) devices as a distraction.

6.2.1. Anti-Technology Instructor in the Class

Students were frustrated with instructors who were unwilling to effectively incorporate technology in their courses and felt that those instructors were not attempting to assist their students in interacting with and participating in the course content. One student explained: I have a professor, who is anti-technology, so… The technological advances that we have today, well, in this case I think the iPhone has extremely helped, with speed, with communication and the information, the speed of that processing and when a teacher doesn't take advantage of that, you are not using the full potential available to you to help your

students. However, even though the students were frustrated by the unwillingness they described in some instructors, they did offer a variety of potential reasons as to why instructors may choose not to use the technology available to them, including the instructors not knowing how to use the technology appropriately or even a generational difference in their use for learning.

This perceptive dialogue indicated that students were trying to reasonably understand why some instructors chose not to implement devices that were readily available and supported on campus in their teaching. Furthermore, the students described instructors that did not want to use mobile computing devices during class.

6.2.2. Device Challenges

Students identified a variety of reasons why they had some frustrations with the devices. This included applications that did not work as well as had been anticipated to collect information for class. Small mobile device keyboards made typing long responses difficult. For example, a student said, “I found it a little frustrating with the little keypad on the iPhone, it took me a lot longer to get everything out.” Additionally, even though some students described themselves as technologically savvy, some technologies still proved challenging to the students. The students also shared a scenario about a simple technology that proved challenging: A lot of the people in the class are very tech savvy, I've noticed. You know, a lot of people have mobile devices, smart phones, laptops, everything. Obviously, we are all wired in because we have to post online. But everyone sitting around me was having a really hard time figuring out how to do the poll online.

6.Discussions and Implications

Much of the current literature on mobile computing devices focuses on using the device to disseminate information or focuses on accessing university resources. Admittedly, these practices emphasize the transmission model of teaching and learning. In addition, some initial studies have stressed components of direct instruction, such as student practice with content. The current findings, however, provide examples of using mobile computing devices to create and interact with course content, collaborate, and learn during the course of their daily lives — often with Web 2.0 and social media tools. The advantages of learning with mobile computing devices the participants discussed both corroborate existing findings and extend these. The student participants were explicit in comparisons to previous learning experiences and other courses. The students found the participatory nature of their university course more beneficial than their high school experiences, because they felt the mobile devices helped them engage with the content. By quickly accessing course documents and uploading and posting course content anywhere, students highlighted the advantages of using mobile devices in learning and spoke of the value of mobile learning. Students described how they were able to communicate more with each other because of the mobile tools. Social media, such as Quick Polls and Twitter, allowed for immediate feedback about Vcourse content and interactions with subject matter experts. So, students’ perceptions highlighted and emphasized both formal and informal learning opportunities.

8. Conclusion

Mobile computing devices and the use of social media allow student interaction with content. Furthermore, potential learning occurs regardless of location. Educational literature focuses on a variety of places where learning happens including collaboratively in the work place and situated in a specific environment. Learning occurs wherever a learner is and is not tied to a space inside a brick and mortar building or even confined to a space inside an online course management. Learning happens regardless of location. The goal of this research was to add to the significance and the possibilities mobile computing devices and social media have in

higher education learning environments acknowledged that mobile learning offers much more educational potential than simply accessing resources. These findings and implications provide a basis of support for that belief.

The student participants in this study recognized change in their learning regardless of the identified limitations, including fear of the technology not working properly, small mobile device keyboards making typing difficult and potential device distractions. Still, it is important to note that the participants who volunteered to share their experiences did so because they felt the mobile devices did impact their learning — another story would have emerged if participants who did not see the benefits of the devices were captured. Continuous research on mobile learning and social media can determine if a true impact is being made on an instructor's teaching and the student's learning. It is important to note that even though mobile learning may look like web-based learning in that mobile computing devices connect different technologies to exchange information, the mobile device is "a contemporary paradigm for connecting, communicating and getting things done on mass-customized and yet personal relationship level that extends to the devices themselves". In the end, the potential long-term impact mobile computing devices have on the higher educational learning environment is yet to be determined.

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IoT-based Intelligent for Fire Emergency Response Systems

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Abstract

Modern buildings around the world have become complex and augmented. Given the structural characteristics of modern buildings, quick evacuation using emergency exits or evacuee guidance markers during blackouts due to fire, building collapse, earthquakes, or aging of buildings need to be possible.
This paper suggests an Internet of Things(IoT)-based intelligent fire emergency response system that can control directional guidance intelligently according to the time and location of a disaster and the design of an integrated control system using wireless sensor networks to address the problems with existing fire emergency response systems in times of fire or building collapse.

Keywords: *Detour Evacuation System, Wireless Sensor Network, Internet of Things, Fire Detection, Integrated Control System.*

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1. Introduction

Taking more than 20 minutes to evacuate from a fire, which is one of the most frequent disasters, greatly reduces survivability [1, 9, 12]. Uniform evacuation guidance such as exit lights are inadequate for guiding evacuees during a fire, which can create poisonous gases, or when buildings are collapsing [2-3, 8]. Because existing emergency exit guides do not consider the location of the fire and merely direct people to the nearest exit, this may create significant secondary casualties if a fire has occurred at the exit and the evacuees are guided towards it. This paper suggests an IoT-based intelligent fire emergency response system with decentralized control that can intelligently guide evacuees based on the location and time of a fire to minimize the loss of human life.

2. Relevant Research

2.1 Detection Sensors

Sensors such as smoke detectors, flame detectors, heat detectors, vibration sensors, ultrasonic sensors, pressure sensors, proximity sensors, and location control sensors convert and output the recognition of fire, information on the progression of a fire and poisonous gas, and the vibration state of the building into an electric signal [4, 13].

2.2 Wireless Sensor Network (WSN)

The network is composed of dispersed sensor nodes that measure the physical and environmental conditions such as the temperature and pressure, gateways that collect information from the nodes wirelessly and relay the information to the central server, and user interface software for storing, managing, analyzing, and utilizing the collected information [4-5]. As shown in Figure 1, ZigBee is generally used for wireless communication between sensor nodes. The observed data are relayed to the gateway through flooding.

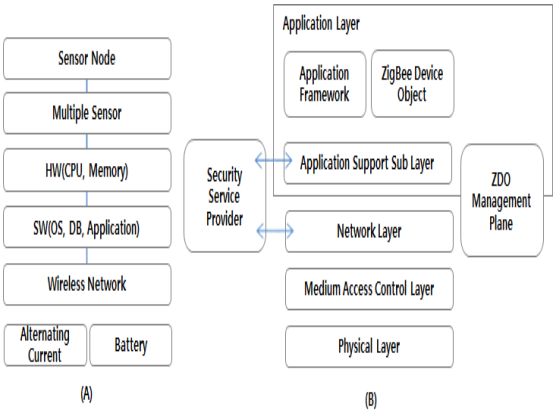

Figure 1. Sensor Network (a) and ZigBee Protocol Stack (b).

3. System Design

High-rise buildings have become complex and enlarged. Hence, the system needs to facilitate quick and safe evacuation out of the building exits during blackouts due to natural disasters such as fire, building collapse, or an earthquake when vision has been impeded (*e.g.*, by smoke) [7]. All evacuees within a building should be alerted and guided to an optimal evacuation point remote from the point of the disaster through pop-up notices based on analysis of the data received by detection sensors during disasters such as a fire [10-11].

3.1 System Composition

The proposed intelligent fire emergency response system is designed to improve the evacuation safety and reliability shown in Figure 2. Human cognitive characteristics and intelligent evacuation equipment concepts were utilized for the development of an effective detour evacuation system that alters the evacuation directions according to the situation and location of the fire.

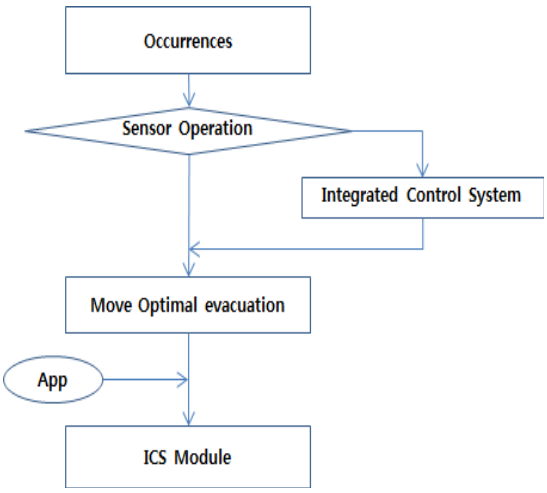

Figure 2. Fire Judge Module

- Figure 3 shows an intelligent optimal evacuation route where the processor controls the direction of the guidance lights based on various detectors and the evacuation guidance design.
- The fire emergency response system designs the path to evacuation locations through various detours depending on situational conditions such as fire, visibility, and the number of evacuees.
- Guide lights toward the optimal evacuation locations are lit during disasters through cooperation between the disaster prevention system of the relevant building and the government's central disaster prevention system; bidirectional data are integrated when fire or smoke is detected.
- The system environment composition modules are designed to comprise an Ember EM250 chipset, sensor modules, a CDD controller, a communication module, a power module, a CSD controller, an LED display, and buzzers.

3.2 Emergency Lights

The emergency lights are powered by cable wiring and batteries and contain detectors for smoke, flame, and heat. They are configured as bidirectional indicators that communicate via the WSN shown in Figure 4.

Figure 4. Emergency Lights

3.3 Smartphone Application Development

Figure 7 shows a smart phone app developed to alert evacuees of the building to a fire and allow evacuees who could not escape by following the emergency lights and whose visibility is obstructed by smoke to check their location and the evacuation path. The app provides the building blueprints and evacuation map necessary for evacuation (a) to 2G phones as text information and (b) to 3G phones as text information and in the form of an App. The information allows the approximate location of an evacuee to be assessed for a quick rescue based on the information on the time and location of the ignition, progression of the fire, direction of the evacuation route, and connection with the integrated control center through the App.

4. Conclusion

The proposed IoT-based intelligent fire emergency response system can reduce casualties by determining the point of occurrence of a disaster in a building to prevent directional confusion of the emergency lights and inappropriate evacuation guidance. The intelligent emergency evacuation system can also aid firefighting because it allows for a quick assessment of the exact location of the fire by integrating the intelligent and automated evacuation system with the central national emergency management agency. It reduces casualties and the time required for evacuation by guiding evacuees into dispersed detours that bypass the location of the fire.

Future studies will focus on expanding the applicability of this system to not only building disasters, but also various fields such as ocean vessels and evacuation within buildings, disaster safety through Web or mobile application services, and preventive actions for optimal disaster recovery.

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Quantum cryptography: Public key distribution and coin tossing

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Abstract
When elementary quantum systems, such as polarized photons, are used to transmit digital information, the un-certainty principle gives rise to novel cryptographic phenomena unachievable with traditional transmission media, e.g. a communications channel on which it is impossible in principle to eavesdrop without a high probability of disturbing the transmission in such a way as to be detected. Such a quantum channel can be used in conjunction with ordinary insecure classical channels to distribute random key information between two users with the assurance that it remains unknown to anyone else, even when the users share no secret information initially. We also present a protocol for coin-tossing by exchange of quantum messages, which is secure against traditional kinds of cheating, even by an opponent with unlimited computing power, but ironically can be subverted by use of a still subtler quantum phenomenon, the Einstein–Podolsky–Rosen paradox.

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1. Introduction

Conventional cryptosystems such as ENIGMA, DES, or even RSA, are based on a mixture of guesswork and mathematics. Information theory shows that traditional secret-key cryptosystems cannot be totally secure unless the key, used once only, is at least as long as the clear text. On the other hand, the theory of computational complexity is not yet well enough understood to prove the computational se-curity of public-key cryptosystems.
In this paper we use a radically different foundation for cryptography, viz. the uncertainty principle of quantum physics. In conventional information theory and cryptog-raphy, it is taken for granted that digital communications in principle can always be passively monitored or copied, even by someone ignorant of their meaning. However, when information is encoded in non-orthogonal quantum states, such as single photons with polarization directions 0, 45, 90, and 135 degrees, one obtains a communica-tions channel whose transmissions in principle cannot be read or copied reliably by an eavesdropper ignorant of certain key information used in forming the transmission. The eavesdropper cannot even gain partial information about such a transmission without altering it in a random and uncontrollable way likely to be detected by the channel's legitimate users.

Quantum coding was first described in [W], along with two applications: making money that is in principle impossible to counterfeit, and multiplexing two or three mes-sages in such a way that reading one destroys the others. More recently [BBBW], quantum coding has been used in conjunction with public key cryptographic techniques to yield several schemes for unforgivable subway tokens. Here we show that quantum coding by itself achieves one of the main advantages of public key cryptography by permitting secure distribution of random key information between parties who share no secret information initially, provided the parties have access, besides the quantum channel, to an ordinary channel susceptible to passive but not active eavesdropping. Even in the presence of active eavesdrop-ping, the two parties can still distribute key securely if they share some secret information initially, provided the eavesdropping is not so active as to suppress communi-cations completely. We also present a protocol for coin tossing by exchange of quantum messages. Except where otherwise noted the protocols are provably secure even against an opponent with superior technology and unlim-ited computing power, barring fundamental violations of accepted physical laws.

Offsetting these advantages is the practical disadvan-tage that quantum transmissions are necessarily very weak and cannot be amplified in

transit. Moreover, quantum cryptography does not provide digital signatures, or ap-plications such as certified mail or the ability to settle disputes before a judge.

2. Essential properties of polarized photons

Polarized light can be produced by sending an ordinary light beam through a polarizing apparatus such as a Po-laroid filter or calcite crystal; the beam's polarization axis is determined by the orientation of the polarizing appara-tus in which the beam originates. Generating single polar-ized photons is also possible, in principle by picking them out of a polarized beam, and in practice by a variation of an experiment [AGR]of Aspect etal.

Although polarization is a continuous variable, the un-certainty principle forbids measurements on any single photon from revealing more than one bit about its po-larization. For example, if a light beam with polarization axis αis sent into a filter oriented at angle β, the indi-vidual photons behave dichotomously and probabilistically, being transmitted with probability cos2(α−β)and ab-sorbed with the complementary probability sin2(α−β). The photons behave deterministically only when the two axes are parallel (certain transmission) or perpendicular (certain absorption).

If the two axes are not perpendicular, so that some pho-tons are transmitted, one might hope to learn additional information about αby measuring the transmitted pho-tons again with a polarizer oriented at some third angle; but this is to no avail, because the transmitted photons, in passing through the βpolarizer, emerge with exactly βpolarization, having lost all memory of their previous po-larizationα.

Another way one might hope to learn more than one bit from a single photon would be not to measure it di-rectly, but rather somehow amplify it into a clone of iden-tically polarized photons, then perform measurements on these; but this hope is also vain, because such cloning can be shown to be inconsistent with the foundations of quan-tum mechanics[WZ].

Formally, quantum mechanics represents the internal state of a quantum system (e.g. the polarization of a pho-ton) as a vector ψof unit length in a linear space *H*over the field of complex numbers (Hilbert space). The in-ner product of two vectors _φ|ψ_isdefined as _*j*φ∗*j*ψ*j*, where ∗indicates complex conjugation. The dimensionality of the Hilbert space depends on the system, being larger (or even infinite) for more complicated systems. Each phys-ical measurement *M*that might be performed on the sys-tem corresponds to a resolution of its Hilbert space into or-thogonal subspaces, one for each possible outcome of the measurement. The number of possible outcomes is thus limited to the dimensionality *d*of the Hilbert space, the most complete measurements being those that resolve the Hilbert space into *d*1-dimensional subspaces.

Let *Mk*represent the projection operator onto the *k*thsubspace of measurement*M*, so that the identity oper-ator on *H*can be represented as a sum of projections: *I*=*M*1+*M*2+.... When a system in state ψis subjected to measurement *M*, its behavior is in general probabilistic: outcome *k*occurs with a probability equal to |*Mk*ψ|2, the square of the length of the state vector's projection into subspace*Mk*. After the measurement, the system is left in a new state *Mk*ψ/|*Mk*ψ|, which is the normalized unit vec-tor in the direction of the old state vector's projection into subspace*Mk*. The measurement thus has a deterministic outcome, and leaves the state vector unmodified, only in the exceptional case that the initial state vector happens to lie entirely in one of the orthogonal subspaces charac-terizing the measurement.

The Hilbert space for a single polarized photon is 2-dimensional; thus the state of a photon may be com-pletely described as a linear combination of, for example, the two unit vectors *r*1=(1, 0)and *r*2=(0, 1), repre-senting respectively horizontal and vertical polarization. In particular, a photon polarized at angle αto the horizontal is described by the state vector (cosα, sinα). When sub-jected to a measurement of vertical-vs.-horizontal polariza-tion, such a photon in effect chooses to become horizontal with probability cos2αand vertical with probabilitysin2α. The two orthogonal vectors *r*1and *r*2thus exemplify the resolution of a 2-dimensional Hilbert space into 2 orthogo-nal 1-dimensional subspaces; henceforth *r*1and *r*2will be said to comprise the 'rectilinear' basis for the Hilbert space.

An alternative basis for the same Hilbert space is pro-vided by the two 'diagonal' basis vectors $d1$=(0.707, 0.707), representing a 45-degree photon, and $d2$=(0.707, −0.707), representing a 135-degree photon. Two bases (e.g. rectilinear and diagonal) are said to be 'con-jugate' [W]if each vector of one basis has equal-length projections onto all vectors of the other basis: this means that a system prepared in a specific state of one basis will behave entirely randomly, and lose all its stored informa-tion, when subjected to a measurement corresponding to the other basis. Owing to the complex nature of its coef-ficients, the two-dimensional Hilbert space also admits a third basis conjugate to both the rectilinear and diagonal bases, comprising the two so-called 'circular' polarizations $c1$=(0.707, 0.707i)and $c2$=(0.707i, 0.707); but the rec-tilinear and diagonal bases are all that will be needed for the cryptographic applications in this paper.

The Hilbert space for a compound system is constructed by taking the tensor product of the Hilbert spaces of its components; thus the state of a pair of photons is char-acterized by a unit vector in the 4-dimensional Hilbert space spanned by the orthogonal basis vectors $r1r1$, $r1r2$, $r2r1$, and $r2r2$. This formalism entails that the state of a compound system is not generally expressible as the carte-sian product of the states of its parts: e.g. the Einstein–Podolsky–Rosen state of two photons, 0.7071($r1r2$−$r2r1$), to be discussed later, is not equivalent to any product of one-photon states.

3. Quantum public key distribution

In traditional public-key cryptography, trapdoor func-tions are used to conceal the meaning of messages be-tween two users from a passive eavesdropper, despitethe lack of any initial shared secret information between the two users. In quantum public key distribution, the quan-tum channel is not used directly to send meaningful mes-sages, but is rather used to transmit a supply of random bits between two users who share no secret information initially, in such a way that the users, by subsequent con-sultation over an ordinary non-quantum channel subject to passive eavesdropping, can tell with high probability whether the original quantum transmission has been dis-turbed in transit, as it would be by an eavesdropper(it is the quantum channel's peculiar virtue to compel eaves-dropping to be active). If the transmission has not been disturbed, they agree to use these shared secret bits in the well-known way as a *one-time pad*to conceal the meaning of subsequent meaningful communications, or for other cryptographic applications (e.g. authentication tags) requir-ing shared secret random information. If transmission has been disturbed, they discard it and try again, deferring any meaningful communications until they have succeeded in transmitting enough random bits through the quantum channel to serve as a one-time pad.

In more detail one user ('Alice') chooses a random bit string and a random sequence of polarization bases (rec-tilinear or diagonal). She then sends the other user ('Bob') a train of photons, each representing one bit of the string in the basis chosen for that bit position, a horizontal or 45-degree photon standing for a binary zero and a verti-cal or 135-degree photon standing for a binary1. As Bob receives the photons he decides, randomly for each pho-ton and independently of Alice, whether to measure the photon's rectilinear polarization or its diagonal polariza-tion, and interprets the result of the measurement as a binary zero or one. As explained in the previous section a random answer is produced and all information lost when one attempts to measure the rectilinear polarization of a diagonal photon, or vice versa. Thus Bob obtains meaning-ful data from only half the photons he detects—those for which he guessed the correct polarization basis. Bob's in-formation is further degraded by the fact that, realistically, some of the photons would be lost in transit or would fail to be counted by Bob's imperfectly-efficient detectors.

4. Quantum coin tossing

'Coin Flipping by Telephone' was first discussed by Blum [Bl]. The problem is for two distrustful parties, com-municating at a distance without the help of a third party, to come to agree on a winner and a loser in such a way that each party has exactly 50 percent chance of winning. Any attempt by either party to bias the outcome should be detected by the other party as cheating. Previous protocols for this

problem are based on unproved assumptions in computational complexity theory, whichmakes them vul-nerable to a breakthrough in algorithm design.

It is easy to see that things are even worse for Alice if she attempts to cheat in step 1 by sending a mixture of rectilinear and diagonal photons, or photons which are po-larized neither rectilinearly or diagonally.

5. Conclusion

Probably the simplest, but paradoxical-sounding, ver-bal explanation of the EPR effect is to say that the two photons are produced in an initial state of undefined po-larization; and when one of them is measured, the measur-ing apparatus forces it to choose a polarization (choosing randomly and equiprobably between the two character-istic directions offered by the apparatus) while simulta-neously forcing the other unmeasured photon, no matter how far away, to choose the opposite polarization. This implausible-sounding explanation is supported by formal quantum mechanics, which represents the state of a pair of photons as a vector in a 4-dimensional Hilbert space ob-tained by taking the tensor product of two 2-dimensional Hilbert spaces.

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CLOUD COMPUTING IN HEALTH CARE

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Abstract

Cloud computing describes a new supplement, consumption, and delivery model for IT services based on Internet protocols, and it typically involves provisioning of dynamically scalable and often virtualized resources. It is a byproduct and consequence of the ease-of-access to remote computing sites provided by the Internet. This may take the form of web-based tools or applications that users can access and use through a web browser as if the programs were installed locally on their own computers.

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1. Introduction

Cloud computing is a marketing term for technologies that provide computation, software, data access, and storage services that do not require end-user knowledge of the physical location and configuration of the system that delivers the services. A parallel to this concept can be drawn with the electricity grid, wherein end-users consume power without needing to understand the component. devices or infrastructure required to provide the service.

Cloud computing providers deliver applications via the internet, which are accessed from web browsers and desktop and mobile apps, while the business software and data are stored on servers at a remote location. In some cases, legacy applications (line of business applications that until now have been prevalent in thin client Windows computing) are delivered via a screen-sharing technology, while the computing resources are consolidated at a remote data center location; in other cases, entire business applications have been coded using web-based technologies such as AJAX.

2. What is Cloud Computing?

Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a metered service over a network (typically the Internet).

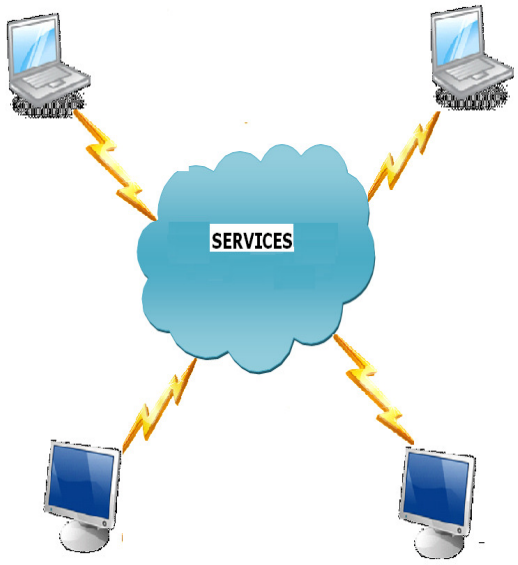
At the foundation of cloud computing is the broader concept of infrastructure convergence (or Converged Infrastructure) and shared services. This type of data center environment allows enterprises to get their applications up and running faster, with easier manageability and less maintenance, and enables IT to more rapidly adjust IT resources (such as servers, storage, and networking) to meet fluctuating and unpredictable business demand.

Most cloud computing infrastructures consist of services delivered through shared data-centers and appearing as a single point of access for consumers' computing needs. Commercial offerings may be required to meet service-level agreements (SLAs), but specific terms are less often negotiated by smaller companies.

The tremendous impact of cloud computing on business has prompted the federal United States government to look to the cloud as a means to reorganize their IT infrastructure and decrease their spending budgets. With the advent of the top government official mandating cloud adoption, many agencies already have at least one or more cloud systems online.

3. Infrastructure – Overview

Cloud computing is Internet based computing whereby services are provided to the end users on demand. In initial days, the computer was local, software and application was local and data was local to a user. As the internet technologies started to grow, the data was transmitted from server to local system, and finally the data ended up locally. Then, the few companies started architecting their site in order to use the capabilities of the browsers like Internet Explorer. The companies started to enhance the technologies and stared to provide the service through the Internet and hence evolved “Cloud computing”. Cloud computing in general, is a service such as software, operating system etc., is available to the end user on demand and the user has to pay only for what he is using.



Cloud Computing Conceptual Diagram.

4. Advantages of Cloud Computing

There are many advantage a user can leverage from cloud computing. They are listed below,

- Cloud computing user avoids capital expenditure on building up an infrastructure to support their application. Instead, they pay the provider only the amount they consume.
- The user need not invest on the maintenance of the Infrastructure of the application. The provider maintains the infrastructure for the user.
- The user can access the multiple data servers from any location at a go.
- Enhancement of the application is easy, as the user need not worry about the infrastructure enhancement.
- Cloud computing is an eco-friendly incentive which will replace the hardware components with services.
- Cloud computing is an industry transformation. Cloud computing enables businesses, of all sizes to deliver IT as a service, offering new possibilities to focus more on business success and less on operational costs and maintenance.

5. Cloud computing in Healthcare

In healthcare, cloud computing is applied in many places and there are still lot of space available for cloud computing to explore in healthcare. Many software applications, services, and data once maintained locally, has now slowly migrated to Internet and it is available to all the users globally.

A decade ago, all the patient records were maintained locally and incase of any reference to the patient records, a lot of time was spent to gather the information. In current trend, a hospital wants to maintain a patient record in such a way that the record is easily accessible for the administration, physician and patient. This demands the hospitals to migrate to cloud computing from traditional methods.

A physician expects to view his patient record on the go through mobile. An organization expects to view a centralized data. They want to view data from all the different hospitals in a single place for business analysis.

For example let us consider below case study, For a centralized Physician Sales infrastructure, a sales force automation application is to be used consistently by all staff, facilities and markets. Therefore, a sales force automation solution is required that features role-specific functionality for users, is scalable and can manage large volumes of data at the national or other levels.

The sales professional team usually meets directly with their customer base. Their customer base primarily comprises of physicians, and in some cases, employers/businesses. As a result, portability is an important factor – the ability to access application functionality via PDAs, laptops and other portable devices. Keeping all the above objectives in mind, SalesForce.com on Demand CRM is the product that can be selected to achieve this enterprise CRM application. Salesforce.com CRM is based on Software as a Service (SaaS) application model.

Salesforce.com sales application runs on the cloud, so the user can access it anywhere through an Internet-enabled mobile device or a connected computer. The Sales Cloud includes a real-time sales collaborative tool called the Chatter, provides sales representatives with a complete customer profile and account history, allows the user to manage marketing campaign spending and performance across a variety of channels from a single application, tracks all opportunity-related data including milestones, decision makers, customer communications, and any other information unique to the company's sales process. Automatic email reminders can be scheduled to keep teams up to date

on the latest information. Other activities can be done on the Salesforce.com cloud. These include using the Jigsaw business data to access over 20 million complete and current business contacts from right inside Sales force CRM, and designing and automating any process in Sales force CRM.

Like the above scenario, the Healthcare can leverage the advantage of the cloud computing. They enhance the current applications with portability and accessibility.

Security is only the major factor which, lot of them argues against cloud computing in Healthcare. A patient record is too personal and it is to be maintained with high security. In cloud based applications, the data will be maintained globally with the provider. As cloud based computing inherits the advantages of internet it also inherits the vulnerability of getting hacked by hackers. Since security is a threat in Cloud computing, the cloud computing providers like salesforce.com, Microsoft, Google, Amazon are providing higher level of security to the user data. The Cloud Security Alliance is a non-profit organization formed to promote the use of best practices for providing security assurance within Cloud Computing.

6. Conclusion

There is lot of advantages in cloud computing which overcomes its few disadvantages. With correct analysis of the requirement and implementing the hybrid of local and cloud computing applications, healthcare service providers can benefit improved outcomes. The Healthcare service providers can create integrated online environments where one user can create and store personal records, get information, find doctors, make medical appointments, communicate online, manage medications, share information with providers and more.

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Image Processing Techniques

M.Jaya Pradha* , Mr.S.Stephen**

Abstract

Nowadays image processing is becoming an important assisting tool in many branches of science such as computer science, electrical and electronic engineering, robotics, physics, chemistry, environmental science, biology, and psychology. Due to this importance it is good to increase your knowledge in image processing so that you can develop new ideas in that field or introduce a new application of computer vision in your research.
This paper is designed to give the people who are interested in image processing the fundamental concepts in digital image processing with emphasis in sampling, quantization, interpolation, filtering, and spatial domain enhancement. At the end of this e-course, students will learn the signal processing algorithms and techniques in image enhancement. They will be able to conduct independent study and analysis of image processing problems and techniques.

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1. Introduction

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science disciplines too.
Image processing basically includes the following three steps:

- Importing the image via image acquisition tools;
- Analysing and manipulating the image;
- Output in which result can be altered image or report that is based on image analysis.

There are two types of methods used for image processing namely, analogue and digital image processing. Analogue image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. Digital image processing techniques help in manipulation of the digital images by using computers. The three general phases that all types of data have to undergo while using digital technique are pre-processing, enhancement, and display, information extraction.

2. Sampling and quantization

In order to become suitable for digital processing, an image function f(x,y) must be digitized both spatially and in amplitude. Typically, a frame grabber or digitizer is used to sample and quantize the analogue video signal. Hence in order to create an image which is digital, we need to covert continuous data into digital form. There are two steps in which it is done:

- Sampling
- Quantization

The sampling rate determines the spatial resolution of the digitized image, while the quantization level determines the number of grey levels in the digitized image. A magnitude of the sampled image is expressed as a digital value in image processing. The transition between continuous values of the image function and its digital equivalent is called quantization.
The number of quantization levels should be high enough for human perception of fine shading details in the image. The occurrence of false contours is the main problem in image which has been quantized with insufficient brightness levels.

3. Resizing image

Image interpolation occurs when you resize or distort your image from one pixel grid to another.

Image resizing is necessary when you need to increase or decrease the total number of pixels, whereas remapping can occur when you are correcting for lens distortion or rotating an image. Zooming refers to increase the quantity of pixels, so that when you zoom an image, you will see more detail.

Interpolation works by using known data to estimate values at unknown points. Image interpolation works in two directions, and tries to achieve a best approximation of a pixel's intensity based on the values at surrounding pixels. Common interpolation algorithms can be grouped into two categories: adaptive and non-adaptive. Adaptive methods change depending on what they are interpolating, whereas non-adaptive methods treat all pixels equally. Non-adaptive algorithms include: nearest neighbor, bilinear, bicubic, spline, sinc, lanczos and others. Adaptive algorithms include many proprietary algorithms in licensed software such as: Qimage, Photo Zoom Pro and Genuine Fractals.

Many compact digital cameras can perform both an optical and a digital zoom. A camera performs an optical zoom by moving the zoom lens so that it increases the magnification of light. However, a digital zoom degrades quality by simply interpolating the image. Even though the photo with digital zoom contains the same number of pixels, the detail is clearly far less than with optical zoom.

4. Aliasing and image enhancement

Digital sampling of any signal, whether sound, digital photographs, or other, can result in apparent signals at frequencies well below anything present in the original. Aliasing occurs when a signal is sampled at a less than twice the highest frequency present in the signal. Signals at frequencies above half the sampling rate must be filtered out to avoid the creation of signals at frequencies not present in the original sound. Thus digital sound recording equipment contains low-pass filters that remove any signals above half the sampling frequency.

Since a sampler is a linear system, then if an input is a sum of sinusoids, the output will be a sum of sampled sinusoids. This suggests that if the input contains no frequencies above the Nyquist frequency, then it will be possible to reconstruct each of the sinusoidal components from the samples. This is an intuitive statement of the Nyquist-Shannon sampling theorem.

Anti-aliasing is a process which attempts to minimize the appearance of aliased diagonal edges. Anti-aliasing gives the appearance of smoother edges and higher resolution. It works by taking into account how much an ideal edge overlaps adjacent pixels.

In this lecture we will talk about spatial aliasing and anti-aliasing. Also we will start to talk about image enhancement. Two main categories of image enhancement will be introduced. Point process and neighbor process will be defined. Finally we will give an introduction on definition of contrast.

5. Image enhancement: contrast enhancement

Image enhancement techniques have been widely used in many applications of image processing where the subjective quality of images is important for human interpretation. Contrast is an important factor in any subjective evaluation of image quality. Contrast is created by the difference in luminance reflected from two adjacent surfaces. In other words, contrast is the difference in visual properties that makes an object distinguishable from other objects and the background. In visual perception, contrast is determined by the difference in the colour and brightness of the object with other objects. Our visual system is more sensitive to contrast than absolute luminance; therefore, we can perceive the world similarly regardless of the considerable changes in illumination conditions.

Many algorithms for accomplishing contrast enhancement have been developed and applied to problems in contrast enhancement. Linear and non-linear transformation functions such as image negatives, logarithmic transformations, power-law transformations, and piecewise linear transformations will be discussed. Histogram process and histogram of four basic grey-level characteristics will be introduced.

6. Arithmetic and logic operations

Image arithmetic applies one of the standard arithmetic operations or a logical operator to two or more images. The operators are applied in a pixel-by-pixel way, i.e. the value of a pixel in the output image depends only on the values of the corresponding pixels in the input images. Hence, the images must be of the same size. Although image arithmetic is the most simple form of image processing, there is a wide range of applications. A

main advantage of arithmetic operators is that the process is very simple and therefore fast.
Logical operators are often used to combine two (mostly binary) images. In the case of integer images, the logical operator is normally applied in a bitwise way.

7. Spatial domain filtering

Filtering is a technique for modifying or enhancing an image. Spatial domain operation or filtering (the processed value for the current pixel processed value for the current pixel depends on both itself and surrounding pixels). Hence Filtering is a neighborhood operation, in which the value of any given pixel in the output image is determined by applying some algorithm to the values of the pixels in the neighborhood of the corresponding input pixel. A pixel's neighborhood is some set of pixels, defined by their locations relative to that pixel.
Mask or filters will be defined. The general process of convolution and correlation will be introduced via an example. Also smoothing linear filters such as box and weighted average filters will be introduced.
If the contrast of an image is highly concentrated on a specific range, e.g. an image is very dark; the information may be lost in those areas which are excessively and uniformly concentrated. The problem is to optimize the contrast of an image in order to represent all the information in the input image.
Histogram equalization will be introduced in details. Also the state-of-the-art techniques such as singular value equalization will be introduced and discussed.

8. Conclusion and Future Work

When your school friend visits your house, surveillance cameras will obviously alert you that there is a person at the door -- which is done today. "But the new system will also recognize that it is her. Image processing will drastically change the computer-human interface in five years, or even less," says Medioni.

Tools like Google Street View and automated vehicles like the Google car are just beginning to help us bypass traffic congestions. In the coming decades, these will speed up as drone aircraft start monitoring traffic and environmental conditions in our cities. The same drones could utilize image processing to take high resolution photographs and real time videos of earthquake, fire or other disaster-struck areas to hunt out those trapped and help save lives. "We will see more and more intelligent military robots with greater visual sense. Consequently, there will be better human machine co-ordination both on and off battlefields, thereby allowing for more automated machines," says Medioni.

This is already starting to happen with medical robots like the Da Vinci system, which allow doctors to remotely perform delicate diagnoses and surgeries by "seeing" extremely high quality 3-D images of what they couldn't have seen otherwise. Rcadia, a start-up in Israel, has come up with its trademark image processing technology to detect fatty hard plaques in arteries and help doctors determine whether surgery is needed.

So-called "Social X-ray" glasses are being developed to help those suffering from autism decipher body language. In-built grain-sized cameras capture images of faces and use software to analyze and compare the various facial expressions (like confusion, anger, agreement) with the known expressions in a database.

The recognized information is then relayed to users through attached headphones. "Human beings tend to process visual information faster and more accurately than text. A picture after all speaks a thousand words. Image processing will move the world, just how text search did last decade," says Nainesh Rathod, CEO of Imagenistics. Using object recognition, Imagenistics has come up with a unique visual search engine for complicated industrial products -- which are hard to describe in words -- to connect buyers and sellers in the industrial workplace.
Experts expect the costs of hyper spectral sensors to drop from their current average cost of approximately $150,000 to hundreds of dollars. This would drive hyper spectral imaging -- instead of images in three primary colors, cameras will take images of all kinds of colors, with their various shades. So, in defense, for instance, cameras will be able to distinguish between a camouflaged tank and leaves. In agriculture, you can tell if crops are healthy or not, all remotely.

Given the infinite applications of image processing, and the various industries it is used in, it is

understandable why there are no stats on it. (Ten years back, there were no stats on Internet search either.) But given what Google has done, industry experts estimate the market to be at least 30% of the current traditional search market over the next three years. "With the proliferation of mobile devices and apps, it will accelerate at an even faster rate than traditional text search," says Rathod.

That pretty much is a sensor-data game. To realize its full potential, image processing needs billions of high-quality, cheaper sensors --which is already happening. But then, there's the consequence: how do you handle the humongous data captured by these sensors? If lawmakers are hunting for a particular globe-trotting terrorist for instance, they have to go through the images and videos of hundreds of thousands of people at airports. These images and their processing require huge amounts of storage and energy, and are not even useful.

"The amount of data is growing faster than the amount of digital storage. Image processing's biggest challenge is coping with this data deluge, while continuing to build sensors with newer modalities and perfect algorithms to handle all of this," says Barnauik. An answer has come in the form of a new field called compressed sensing, which Barnauik calls "an amazing miracle!".

Rather than storing all of the raw data generated by millions of cameras, the technology randomly recodes the data, storing only what is needed. Barnauik himself has developed a camera which deploys compressed sensing. It uses only a single pixel detector resulting in a 25-fold saving in the amount of data the camera needs.

The bigger issue though, is whether image processing is as adept as human vision. We are still at the infancy of image processing. What is simple for the human eye, like finding a face in a photograph full of faces and buildings, is still a major hurdle for image processing. Computer vision scans and then tries to find faces according to size and other parameters.
But we don't necessarily see in this way. "Human vision is extremely complex and we do not understand it completely ourselves," says Medioni. Scientists are still figuring out how the brain works.

Image processing has already begun to move our world. But for it to shift the axis, computers will have to see the way we do, and as Medioni and Barnauik concur, we still need decades of research to get close to that vision. Meanwhile, next time your faucet leaks, try clicking a picture and your favorite search engine could tell you where to order a new one from.

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CLOUD COMPUTING

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Abstract – *The term "cloud computing" is a recent buzzword in the IT world. Behind this fancy poetic phrase there lies a true picture of the future of computing for both in technical perspective and social perspective. Though the term "Cloud Computing" is recent but the idea of centralizing computation and storage in distributed data centers maintained by third party companies is not new but it came in way back in 1990s along with distributed computing approaches like grid computing. Cloud computing is aimed at providing IT as a service to the cloud users on-demand basis with greater flexibility, availability, reliability and scalability with utility computing model. This new paradigm of computing has an immense potential in it to be used in the field of e-governance and in rural development perspective in developing countries like India.*

This paper explores some of the basics of cloud computing with the aim of introducing aspects such as:

- *Realities and risks of the model*
- *Components in the model*

The paper aims to provide a means of understanding the model and exploring options available for complementing your technology and infrastructure needs.

Key Words: *IBM, HP, Google, Microsoft, Amazon Web Services, Salesforce.com, NetSuite, VMware etc.*

I. INTRODUCTION

Cloud Computing provides us a means by which we can access the applications as utilities, over the Internet. It allows us to create, configure, and customize applications online. Cloud computing is not a new concept. We have been using Cloud Computing for ages, in one form or other. In simple words, you can presume Cloud to be a very large server on which different services and data are stored and you access all those for your work. The software and data that you access for your work doesn't exist on your computer instead it's on the server. This concept of using services not stored on your system is called Cloud Computing.

Cloud Computing comprises everything from Google Apps to data centre services to virtualization to software. Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a metered service over a network.

Forrester defines cloud computing as:

"A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end-customer applications and billed by consumption."

From the architectural point of view cloud is naturally build on an existing grid based architecture and uses the grid services and adds some technologies like virtualization and some business models. In brief cloud is essentially a bunch of commodity computers networked together in same or different geographical locations, operating together to serve a number of customers with different need and workload on demand basis with the help of virtualization. Cloud services are provided to the cloud users as utility services like water, electricity, telephone using pay-as-you-use business model.

These utility services are generally described as XaaS (X as a Service) where X can be Software or Platform or Infrastructure etc. Cloud users use these services provided by the cloud providers and build their applications in the internet and thus deliver them to their end users. So the cloud users don't have to worry about installing, maintaining hardware and software needed. And they also can afford these services as they have to pay as much they use. So the cloud users can reduce their expenditure and effort in the field of IT using cloud services instead of establishing IT infrastructure themselves.

Cloud Computing is not an object in itself, rather it comprises services and database that are accessed via web or any private network. Examples of Cloud Computing services include Google Docs, Office 365, DropBox, SkyDrive etc.

What is Cloud?

The term Cloud refers to a Network or Internet. In other words, we can say that Cloud is something, which is present at remote location. Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN.

Applications such as e-mail, web conferencing, customer relationship management (CRM), all run in cloud.

What is Cloud Computing?

Cloud Computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application.

We need not to install a piece of software on our local PC and this is how the cloud computing overcomes platform dependency issues. Hence, the Cloud Computing is making our business application mobile and collaborative.

Cloud Computing architecture is divided into following two sections:

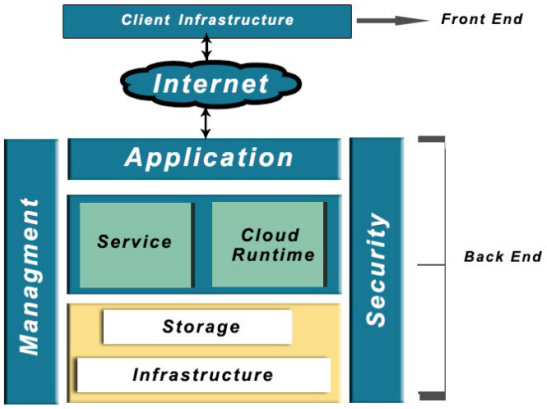
1. Interface- Software used to access cloud service and data
2. Infrastructure- Server that stores data and applications

Web browsers and mobile-apps are example of interface used to access the cloud services. Back-end applications and servers are the core of Cloud Computing.

II.CLOUD ARCHITECTURE

The cloud providers actually have the physical data centers to provide virtualized services to their users through Internet. The cloud providers often provide separation between application and data. The underlying physical machines are generally organized in grids and they are usually geographically distributed. Virtualization plays an important role in the cloud scenario. The data center hosts provide the physical hardware on which virtual machines resides. User potentially can use any OS supported by the virtual machines used.

Black Diagram:-

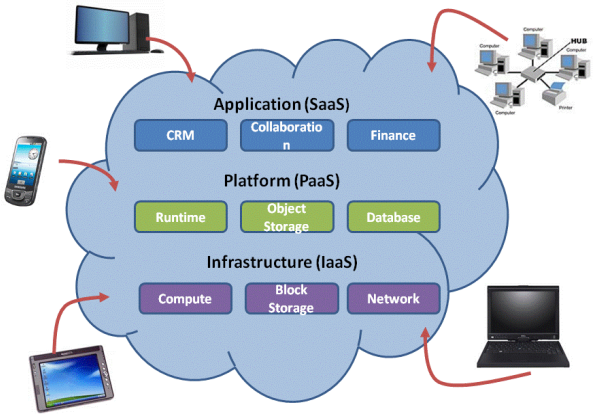


III. SERVICE MODELS

Service Models are the reference models on which the Cloud Computing is based. These can be categorized into three basic service models as listed below:

1. Infrastructure as a Service (IaaS)
2. Platform as a Service (PaaS)
3. Software as a Service (SaaS)

There are many other service models all of which can take the form like XaaS, i.e., anything as a Service. This can be Network as a Service, Business as a Service, Identity as a Service, Database as a Service or Strategy as a Service. The Infrastructure as a Service (IaaS) is the most basic level of service. Each of the service models make use of the underlying service model, i.e., each inherits the security and management mechanism from the underlying model, as shown in the following diagram:



INFRASTRUCTURE AS A SERVICE (IAAS)

IaaS provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

The IaaS layer offers storage and infrastructure resources that are needed to deliver the Cloud services. It only comprises of the infrastructure or physical resource. Prominent IaaS Cloud Computing Companies

• Amazon (EC2) • Rackspace • GoGrid • Microsoft •Terremark • AT&T • Google • Softlayer • HP • OpSource

PLATFORM AS A SERVICE (PAAS)

PaaS provides the runtime environment for applications, development & deployment tools, etc.

PaaS provides the combination of both, infrastructure and application. Hence, organisations using PaaS don't have to worry for infrastructure nor for services. Prominent PaaS Cloud Computing Companies

• Salesforce.com • Google • Concur Technologies

• Ariba • Unisys • Cisco

SOFTWARE AS A SERVICE (SAAS)

SaaS model allows to use software applications as a service to end users.

In the SaaS layer, the Cloud service provider hosts the software upon their servers. It can be defined as a in model in which applications and softwares are hosted upon the server and made available to customers over a network. Prominent SaaS Cloud Computing Companies

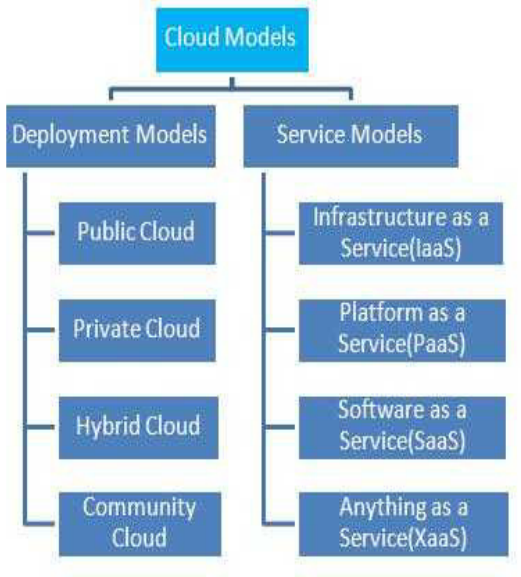
• Amazon Web Services • AppScale • CA Technologies •Engine Yard • Salesforce • Windows Azure • Open Stack.

CLOUD COMPUTING DEPLOYMENT MODELS

1. Private Cloud
2. Public Cloud
3. Hybrid Cloud
4. Community Cloud

Private Cloud: The cloud infrastructure is operated solely for an organisation. In simple words we can say that such cloud models are dedicated to a third party who wish to use. It may be managed by the Cloud Computing provider or any other third party.

The Public Cloud allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness, e.g., e-mail.



Public Cloud: The cloud infrastructure is made available to the general public or a large industry group and is owned by the Cloud providers.

The Private Cloud allows systems and services to be accessible within an organization. It offers increased security because of its private nature.

Hybrid Cloud: It's a combination of two or more clouds (private, community or public).

The Hybrid Cloud is mixture of public and private cloud. However, the critical activities are performed using private cloud while the non-critical activities are performed using public cloud.

Community Cloud: This cloud infrastructure is shared by several organizations. The Community Cloud allows systems and services to be accessible by group of organizations.

Cloud Storage is a service that allows to save data on offsite storage system managed by third-party and is made accessible by a web services API. Storage Devices

ADVANTAGES OF USING CLOUD:-

The advantages for using cloud services can be of technical, architectural, business etc

1. Cloud Providers' point of view

(a) Most of the data centers today are under utilized. They are mostly 15% utilized. These data centers need spare capacity just to cope with the huge spikes that sometimes get in the server usage. Large companies having those data centers can easily rent those computing power to other organizations and get profit out of it and also make

the resources needed for running data center (like power) utilized properly.

(b) Companies having large data centers have already deployed the resources and to provide cloud services they would need very little investment and the cost would be incremental.

2. Cloud Users' point of view

(a) Cloud users need not to take care about the hardware and software they use and also they don't have to be worried about maintenance. The usersare no longer tied to some one traditional system.

(b) Virtualization technology gives the illusion to the users that they are having all the resources available.

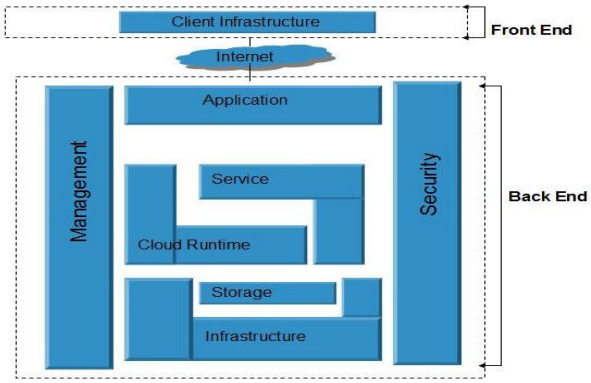
(c) Cloud users can use the resources on demand basis and pay as much as they use. So the users can plan well for reducing their usage to minimize their expenditure.

(d) Scalability is one of the major advantages to cloud users. Scalability is provided dynamically to the users. Users get as much resources as they need. Thus this model perfectly fits in the management of rare spikes in the demand.

3. Motivation towards Cloud in recent time

Cloud computing is not a new idea but it is an evolution of some old paradigm of distributed computing. The advent of the enthusiasm about cloud computing in recent past is due to some recent technology trend and business models.

CLOUD COMPUTING-ARCHITECTURE



FRONT END

Front End refers to the client part of cloud computing system. It consists of interfaces and applications that are required to access the cloud computing platforms, e.g., Web Browser.

BACK END

Back End refers to the cloud itself. It consists of all the resources required to provide cloud computing services. It comprises of huge data storage, virtual machines, security mechanism, services, deployment models, servers, etc.

IMPORTANT POINTS

- It is the responsibility of the back end to provide built-in security mechanism, traffic control and protocols.

- The server employs certain protocols, known as middleware, helps the connected devices to communicate with each other.

COMPARISON BETWEEN CLOUD COMPUTING AND GRID COMPUTING

Most of the cloud architectures are built on Grid architecture and utilizes its service. Grid is also a form of distributed computing architecture where organizations owning data centers collaborate with each other to have mutual benefit. Although if apparently seen it seems that cloud computing is no different from its originator in the first look but there are substantial difference between them in spite of so many similarities.

RELATION BETWEEN CLOUD COMPUTING AND UTILITY COMPUTING

The cloud users enjoy utility computing model for interacting with cloud service providers.

This Utility computing is essentially not same as cloud computing. Utility computing is the aggregation of computing resources, such as computation and storage, as a metered service similar to a traditional public utility like electricity, water or telephone network. This service might be provided by a dedicated computer cluster specifically built for the purpose of being rented out, or even an under-utilized supercomputer. And cloud is one of such option of providing utility computing to the users.

CLOUD COMPUTING DATA STORAGE

Storage devices can be broadly classified into two categories:

- Block Storage Devices
- File Storage Devices

BLOCK STORAGE DEVICES

Block Storage Devices offer raw storage to the clients. This raw storage can be partitioned to create volumes.

FILE STORAGE DEVICES

File Storage Devices offers storage to clients in form of files, maintaining its own file system. This storage is in the form of Network Attached Storage (NAS).

CLOUD STORAGE CLASSES

Cloud Storage can be broadly classified into two categories:

- Unmanaged Cloud Storage
- Managed Cloud Storage

UNMANAGED CLOUD STORAGE

Unmanaged Cloud Storage means that the storage is preconfigured for the consumer. The consumer cannot format nor the consumer can install own file system or change drive properties.

MANAGED CLOUD STORAGE

Managed Cloud Storage offers online storage space on demand. Managed cloud storage system presents what appears to the user to be a raw disk that the user can partition and format**.**

Cloud Computing Applications:-

Cloud Computing has its applications in almost all the fields such as business, entertainment, data storage, social networking, management, entertainment, education, art and global positioning system, etc. Some of the widely famous cloud computing applications are discussed here in this tutorial:

Business Applications

Cloud computing has made businesses more collaborative and easy by incorporating various apps such as MailChimp, Chatter, Google Apps for business, and Quickbooks.

1. MailChimp It offers an e-mail publishing platform. It is widely employed by the businesses to design and send their e-mail campaigns.
2. Chatter Chatter app helps the employee to share important information about organization in real time. One can get the instant feed regarding any issue.
3. Google Apps for Business Google offers creating text documents, spreadsheets, presentations, etc., on Google Docswhich allows the business users to share them in collaborating manner.
4. Quickbooks It offers online accounting solutions for a business. It helps in monitoring cash flow, creating VAT returns and creating business reports.

Data Storage and Backup

Box.com, Mozy, Joukuu are the applications offering data storage and backup services in cloud.

1. Box.com Box.com offers drag and drop service for files. It just required to drop the files into Box and access from anywhere.
2. Mozy Mozy offers online backup service for files during a data loss.
3. Joukuu

CLOUD COMPUTING APPLICATION IN INDIAN CONTEXT:

Today most of the studies in cloud computing is related to commercial benefits. But this idea can also be successfully applied to non-profit organizations and to the social benefit. In the developing countries like India cloud computing can bring about a revolution in the field of low cost computing with greater efficiency,
availability and reliability.

Recently in these countries e-governance has started to flourish. Experts envisioned that utility

based computing has a great future in e-governance. Cloud computing can also be applied to the development of rural life in India by building information hubs to help the concerned people with greater access to required information and enable them to share their experiences to build new knowledge bases.

V. FUTURE ENHANCEMENTS

Rural development can be in the form of education, agriculture, health, culture or in any other fields. Now a days most of th e villages have some access to electricity and cellular phone. So there is technical feasibility of establishing computer systems. But the mentality of the people haven't been changed that much and that's why the spread of personal computer is not that much significant in the villages.

We think this growth rate can be enhanced if the computing system is really cheap, easy to operate with minimum level of knowledge, without upfront commitment and more essentially if the system is helpful to enhance their life style. The main aim of the system is to make the people in rural areas to have access to recent technology and with the help of the computing system enhance their standard of living and also this would lead to a greater good of developing the nation.

VI. CONCLUSION

Cloud computing is a newly developing paradigm of distributed computing. Virtualization in combination with utility computing model can make a difference in the IT industry and as well as in social perspective. Though cloud computing is still in its infancy but it's clearly gaining momentum. Organizations like Google, Yahoo, and Amazon are already providing cloud services. The products like Google App-Engine, Amazon EC2, and Windows Azure are capturing the market with their ease of use, availability aspects and utility computing model. Users don't have to be worried about the hinges of distributed programming as they are taken care of by the cloud providers.

They can devote more on their own domain work rather than these administrative works. Business organizations are also showing increasing interest to indulge themselves into using cloud services. In developing counties like India cloud computing can be applied in the e-governance and rural development with great success. Although as we have seen there are some crucial issues to be solved to successfully deploy cloud computing for these social purposes. But they can be addressed by detailed study in the subject.

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NANOTECHNOLOGY

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ABSTRACT

A basic definition of Nanotechnology is the study manipulation and manufacture of extremely minute machines or devices. These devices are so small to the point of manipulating the atoms themselves to form materials. By this Nanotechnology we can make computers billions of times more full than todays and new medical capabilities that will heal and cure in cases that are now viewed as utterly hopelessly. The properties of manufactured products depend on how those atoms are arranged.

This paper mainly contains about Nanotechnology and its 'various' applications. And this tells about the history of Nanotechnology and its necessity. This also discusses how it will improve our lives and about the applications in expansive range. Today engineered nano-materials have attracted a great deal of attention due to their important properties which have given birth to vast technological and economic growth in a number of industrial sectors.

Nano-materials are indeed expected to become the cornerstone of a number of sectors such as microelectronics, materials, textiles, energy, healthcare and cosmetic goods. Nanotechnology applications will give rise to cleaner energy production, lighter and more durable materials, inexpensive clean water production and will benefit medical applications such as smart drugs and diagnostics.

Nanotechnology is very useful to human body and every body movement and just huge buildings and machines having the capability to repair and adjust themselves to the vagaries of the environment, so Thanks to nanotechnology, all of these wonders, and many more, are possible.

II. INTRODUCTION

Nanotechnology is a three dimensional structural control of material and devices at molecular level. The nanoscale structures can be prepared, characterized, manipulated, and even visualized with tools. **"Nanotechnology is a tool-driven field."**

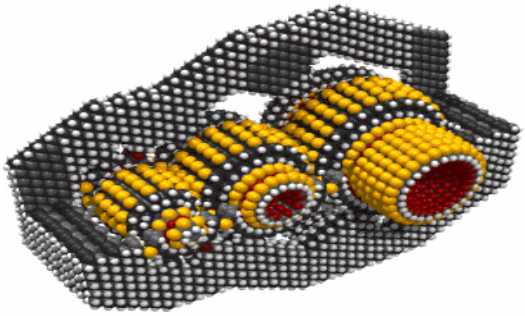
Scientists have been trying to understand the nature and through research in various disciplines such as physics, chemistry, Botany, Zoology etc. deciphering the secrets to evolve appropriate technologies to improve the quality of life. For most the 20th century, scientists have practised what can be called "top-down science". The goal has been to simplify our understanding of matter by breaking it in to its basic building blocks ranging from atom, nuclei, nucleons, quarks and beyond. Starting from the understanding of the basic interactions in elementary particles, attempt is made to explain the structure and properties of materials and all possible phenomena.

It is the study of properties of a few tens of atoms in a space of less than say 50 nm. "It is amazing what one can do by just putting atoms where you want them" says Richard Smalley, co-discoverer of Buck ball in 1985 winner of a Nobel Prize. It has revolutionized the basic sciences and has given rise to a new discipline, called Nanoscience, which is gradually proving to be the nucleus around which all existing sciences will prosper. Nanotechnology is the study and use of materials, devices and systems on the scale of a nanometer.

As small as a nanometer is, it's still large compared to the atomic scale. An atom has a diameter of about 0.1 nm. An atom's nucleus is much smaller -- about 0.00001 nm. Atoms are the building blocks for all matter in our universe. You and everything around you are made of atoms. Nature has perfected the science of manufacturing matter molecularly. For instance, our bodies are assembled in a specific manner from millions of living cells. Cells are nature's nanomachines. At the atomic scale, elements are at their most basic level. On the nanoscale, we can potentially put these atoms together to make almost anything.

Despite unprecedented government funding and public interest in nanotechnology, few can accurately define the scope, range or potential applications of this technology. One of the most pressing issues facing nanoscientists and technologists today is that of communicating with the non-scientific community. As a result of decades of speculation, a number of myths have grown up around the field, making it difficult for the general public, or indeed the business and financial communities, to understand what is a fundamental shift in the way we look at our interactions with the natural world. This article attempts to address some of these misconceptions, and explain why scientists, businesses and governments are spending large amounts of time and money on nanoscale research.

Definition of Nano Technology



With 15,342 atoms, this parallel-shaft speed reducer gear is one of the largest nano mechanical devices ever modelled in atomic detail.

- A Nano meter is a unit of length in the metric system, equal to one billionth of meter(10^{-9}).
- Technology is making, usage and knowledge of tools, machines and techniques, in order to solve a problem or perform a specific function.

- "Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications.

Encompassing nanoscale science, engineering and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale.

A basic definition: **Nanotechnology is the engineering of functional systems at the molecular scale**. This covers both current work and concepts that are more advanced. In its original sense, 'nanotechnology' refers to the projected ability to construct items *from the bottom up*, using techniques and tools being developed today to make complete, high performance products.

III. HISTORY OF NANOTECHNOLOGY:-

Any advanced research carries inherent risks but nanotechnology bears a special burden. The field's bid for respectability is colored by the association of the word with a cabal of futurist who foresee nano as a pathway to a techno-utopia: unparalleled prosperity, pollution-free industry, even something resembling eternal life. In 1986-five years after IBM researchers Gerd Binnig and Heinrich Rohrer invented the scanning tunneling microscope, which garnered them the Nobel Prize-the book Engines of Creation, by K. Eric Drexler, created a sensation for its depiction of god like control over matter. The book describes self-replicating nanomachines that could produce virtually any material good, while reversing global warming, curing disease and dramatically extending life spans. Scientists with tenured faculty positions and NSF grants ridiculed these visions, noting that their fundamental improbability made them an absurd projection of what the future holds.

But the visionary scent that has surrounded nanotechnology ever since may provide some unforeseen benefits. To many nonscientists, Drexler's projections for nanotechnology straddled the border between science and fiction in a compelling way. Talk of cell-repair machines that would eliminate aging as we know it and of home food-growing machines that could produce victuals without killing anything helped to create a fascination with the small that genuine scientists, consciously or not, would later use to draw attention to their work on more mundane but eminently more real projects. Certainly labeling a research proposal "nanotechnology" has a more alluring ring than calling it "applied mesoscale materials science." Less directly, Drexler's work may actually draw people into science. His imaginings have inspired a rich vein of science-fiction literature .

As a subgenre of science fiction-rather than a literal prediction of the future-books about Drexlerian nanotechnology may serve the same function as Star Trek does in stimulating a teenager's interest in space, a passion that sometimes leads to a career in aeronautics or astrophysics.

The danger comes when intelligent people take Drexler'spredictions at face value. Drexlerian nanotechnology drew renewed publicity last year when a morose Bill Joy, the chief scientist of Sun Microsystems, worried in the magazine Wired about the implications of nanorobots that could multiply uncontrollably. A spreading mass of self-replicating robots-what Drexler has labeled "gray goo"-could pose enough of a threat to society, he mused, that we should consider stopping development of nanotechnology. But that suggestion diverts attention from the real nano goo: chemical and biological weapons. meaning of the word. Nanotechnology, in its traditional sense, means building things from the bottom up, with atomic precision. This theoretical capability was envisioned as early as 1959 by the renowned physicist Richard Feynman

- The first ever concept was presented in 1959 by the famous professor of physics Dr.richard Feynman
- Invension of the scanning tunnelling microscope in 1981 and the discovery of fullerance (c60) in 1985 lead to the emergence of nano technology.
- The term nano technology had been coined by Norio Taniguchi in 1974.

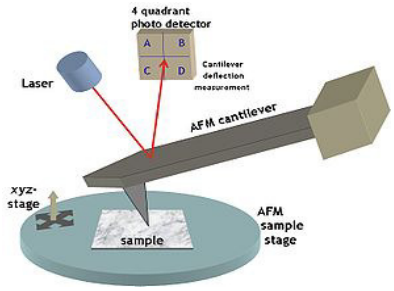
How small is nano scale?

A nano meter is one billionth of meter.

DNA Sample: Approx Human Hair: Approx. **$1x10^5$**

TOOLS AND TECHNIQUES

There are several important modern developments. The atomic force microscope (AFM) and the Scanning Tunneling Microscope (STM) are two early versions of scanning probes that launched nanotechnology. There are other types ofscanning probe microscopy. Although conceptually similar to the scanning confocal microscope developed by Marvin Minsky in 1961 and the scanning acoustic microscope (SAM) developed by Calvin Quate and coworkers in the 1970s, newer scanning probe microscopes have much higher resolution, since they are not limited by the wavelength of sound or light.



The tip of a scanning probe can also be used to manipulate nanostructures (a process called positional assembly). Feature-oriented scanning methodology may be a promising way to implement these nanomanipulations in automatic mode.[45][46]However, this is still a slow process because of low scanning velocity of the microscope.

Various techniques of nanolithography such as optical lithography, X-ray lithography dip pen nanolithography, electron beam lithography or nanoimprint lithography were also developed. Lithography is a top-down fabrication technique where a bulk material is reduced in size to nanoscale pattern.

Another group of nanotechnological techniques include those used for fabrication of nanotubes and nanowires, those used in semiconductor fabrication such as deep ultraviolet lithography, electron beam lithography, focused ion beam machining, nanoimprint lithography, atomic layer deposition, and molecular vapor deposition, and further including molecular self-assembly techniques such as those employing di-block copolymers. The precursors of these techniques preceded the nanotech era, and are extensions in the development of scientific advancements rather than techniques which were devised with the sole purpose

of creating nanotechnology and which were results of nanotechnology research.

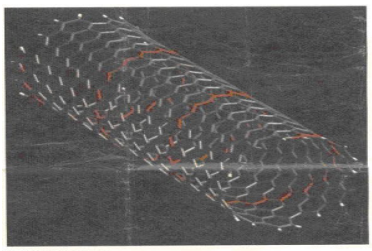
The various techniques of lithography such as:

- Optical lithography
- X-ray lithography
- Dip pen nanolithography
- Electron beam nanolithography were also be developed.

Lithography in MEMS context is typically the transfer of patterns into a photosensitive material by selective exposure to a radiation source such as light.

CARBON NANOTUBE

Carbon nanotube transistor, an electronic device based on a single rolled-up sheet of carbon atoms, has been built by researchers in the Netherlands providing a demonstration of room-temperature, carbon-based electronics at the single-molecule scale.



Carbon nanotube

Application:

- Easton Bell sports, Inc using CNT in making bicycle component.
- Zyvex technologies using CNT for manufacturing of light weight boats.
- Replacing transistors from the silicon chips as they are small and emits less heat.
- In electric cables and wires.
- In solar cells.
- In cloth.

NANOBOTS

- Close to the scale of (10-9)
- Largely in R&d phase
- Nanobots of 1.5 nanometer across capable of couting specific moleculs in a Chennai sample.
- Since nanobots would be microscope in size,it would,probably be necessary very large numbers of them to work together to perform microscope and microscopic tasks.

Application

- Detection of toxic components in environment.
- In drug delivery.
- Biomedical instrumentation.

APPLICATION OF NANOTECHNOLOGY

- ❖ Drugs
- ❖ Fabrics
- ❖ Mobile
- ❖ Electronics
- ❖ Computers
- ❖ Bio engineering
- ❖ Cosmetics
- ❖ Defence & security
- ❖ Optical Engineering
- ❖ Nano devices
- ❖ Nano biotechnology
- ❖ Energy

NANOTECHNOLOGY IN FABRICS

The properities of familiar materials are being chanhed by manufactures who are adding nano-sized components to conventional to improve performance.

For example, some clothing manufactures are making water and stain repellent clothing using nano-sized wiskers in the fabric that cause water to bead up on the surface.

The above 'smart shirt' is developed by Sensatex and monitors the vital signs of those involved in high-stress occupations. The parameters monitored are heart rate, respiration rate, body temperature, and calorie burn rate. Airbags in automobiles:

Safety has now become a mandatory feature specially in cars. There are devices intelligent enough to determine the rate of impact of collision and the amount of pressure and timing to be released for the air bag to be activated. They are fitted mostly over crash zones such as fenders, bumpers, and side impact beams on the car (vehicle).

At any given time, some goodwill cars have 60 to 70 microprocessors, each assigned a specific task. The intelligent sensors built on the car then take account of the speed, timing, and the other vital factors that make car traveling a bit safer. These high-profile cars also feature accelerometers that shift the balance of the car when it takes corner, providing better stability while driving on uncertain roads and its sure needs to do some intelligent calculations.

In order to increase the safety of two wheeler occupants, professionals have come up with a unique airbag, called the D-Air system, which inflates in about 30 milliseconds and maintains pressure for up to 20 seconds. The accelerometers present on the computer system of the airbag and on the bikes register the amount of impact and then swing into action.

Another system called STM (sensing, triggering, and memory) contains an electronic control unit that continuously monitors accelerations and decelerations of the motorcycle. It sends this information to a microprocessor, where an algorithm analyses the 'impact pulse'. A further analysis recognizes the pulse and sends an electrical current to the inflator initiator.

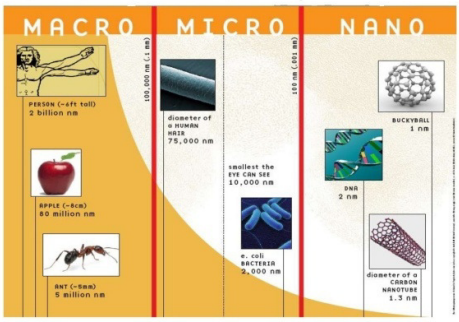
Nanotechnology in Electronics:-

- Electrodes made from nanowires enable flat panale displays to be fiexibel as well as thinner than current flat panel displays.
- Nanolithography is used for fabrication of chips.
- The transistors are made of nanowires,that are assembled on glass or thin filims of flexible plastic.
- E-paper,displays on sunglasses and map on car windshields.

Nanotechnology in Mobiles.

- Morph,a nanotechnology concept device developed by nokia research and the university of Cambridge.
- The Morph will be hydrophobic making it extremely dirt repellent.
- It will be able to charge itself from available light source using photovoltaic nanowire grass convercing it'surface.

Nanotechnology Size Concern



How will nanotechnology improve our lives?

One of the first obvious benefits is the improvement in manufacturing techniques. We are taking familiar manufacturing systems and expanding them to develop precision on the atomic scale. This will give us greater understanding of the building of things, and greater flexibility in the types and quantity of things we may build. We will be able to expand our control of systems from the macro to the micro and beyond, while simultaneously reducing the cost associated with manufacturing products. Some of the most dramatic changes are expected in the field of medicine.

Nanotechnology is expected to touch almost every aspect of our lives, right down to the water we drink and the air we breathe. Once we have the ability to capture, position, and change the configuration of a molecule, we should be able to create filtration systems that will scrub the toxin from the air or remove hazardous organisms from the water we drink. So we should be able to begin the long process of cleaning up our environment with its applications.

Nanotechnology will help by allowing us to deliver more machines of smaller size and greater functionality into space, paving the way for solar system expansion. Technologists have suggested that applications of medical nanotechnology might even go so far as to allow us to adapt our bodies for survival in space or on other extraterrestrial lands. While this is certainly a long way off, it provides a glimpse of the thorough control that nanotechnology may provide.

Taking all of this into account, it is clear that nanotechnology should improve our lives in any area that would benefit from the development of better, faster, stronger, smaller, and cheaper systems.

NANO TECHNOLOGY IN INDIA:-

- IIT Mumbai is the primies organization in the field of nanotechnology.
- Reserach in the field of helath,environment medicine are stillon.
- Starting in 2001 the government of india launched the nano science and technology initiate(NST).
- Then in 2007 the nanoscience and technology mission 2007 was initiated with an allocation of rupees 1000 crores for a period of 5 years.

Disadvantage of nanotechnology:-

Nano-Particles can get into the body through the skin,lungs and digestive system,thus creating free redicals that can cause cell damage.

Once nano-particals in the blood streem they will be able to cross the blood brain barrier.

The most dangerous nano application use for military purpose is the Nano-bomb that contain engineered self-multiplying leadly viruses that can continue to wibe out a community, country or even a civilization.

Nanobots because of their replicating behaviour can be big threat for gray goo.

IV.CONCLUSION

The work in nanotechnology is being carried out not just on the materials of the future, but also the tools that will allow us to use these ingredients to create products. Experimental work has already resulted in the production of scanning tunneling microscope, molecular tweezers, and logic devices. Theoretical work in the construction of nano-computers is progressing as well. Taking all of this into account, it is clear that the technology is feasible.

Nanotechnology is expected to have a profound impact on our economy and society in the 21st century, from the development of better, faster, stronger, smaller, and cheaper systems. Nanotechnology provides a far more powerful capability. We cannot make powerful computers, defence, environment and medicine, but also in a higher standard of living for everyone on the planet.

Nanotechnology- the science is good, the engineering is feasible, the paths of approach are many, the consequences are revolutionary-times-revolutionary, and the schedule is: in our lifetimes.

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GREEN COMPUTING

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ABSTRACT

Green computing, green IT or ICT Sustainability, refers to environmentally sustainable computing or IT. In the article Harnessing Green IT: Principles and Practices, San Murugesan defines the field of green computing as "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems — efficiently and effectively with minimal or no impact on the environment.

"The goals of green computing are similar to green chemistry; reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote the recyclability or biodegradability of defunct products and factory waste. Research continues into key areas such as making the use of computers as energy-efficient as possible, and designing algorithms and systems for efficiency-related computer technologies.

INTRODUCTION

A green computer or green IT system is one where the entire process from design, Manufacture,use,and disposal involves as little environmental impact as possible.In other words, a green initiative is taken in consideration of all facets of a computer's life, from design to disposal.A green computer is created to perform without a negative environmental impact.

What is green computing?

Green computing is the practice of using Computing resources efficiently.Designing, manufacturing and disposing computer, servers with no impact on the environment.To reduce the use of hazardous materials , maximize energy during product's lifetime.

Green manufacturing: popular for making casings for computers and peripherals.

- Recyclable plastics : computers are constructed from non-recyclable plastics (i.e.,) recyclable polycarbonate resin.
- Eco-friendly flame retardant: There are flame retardant silicone compounds available that are flame retardant and completely.
- Inventory management: reducing the quantity of both hazardous materials used in the process and the amount of excess raw materials.
- Volume reduction: Removes hazardous portion of waste from non hazardous portion.

Green disposal

Reuse donate your computer components to people who need.Reduce rather then discarding your computer upgrade it. Recycle recycle the printed circuit boards from the electronic wastes.

Disposal of components

Disposal of devices constituted 20-50 million tons per year (about 5% of the total Waste of the planet) called e-waste.Toxic chemicals in electronics products can reach into the land over time or are released Into the atmosphere.

How to save energy while working on the computer???

Sleep mode:

Sleep or standby mode conserves energy by cutting off power to your display , hard drives and peripherals.computer switches to a low power state.

Hibernate mode:

Saves energy and protects your work by copying system data to a reserved area on your hard

drive and then completely turning off your computer.

How to save energy while working on the internet???

Blackle save energy because the screen is predominantly black, blackle can be set as homepage.

NEEDS OF GREEN COMPUTING

Computer energy is often waste full: Learning the computer on when not in use.

Printing is often wastefull: How many of you print out your e-mail or meeting agendas

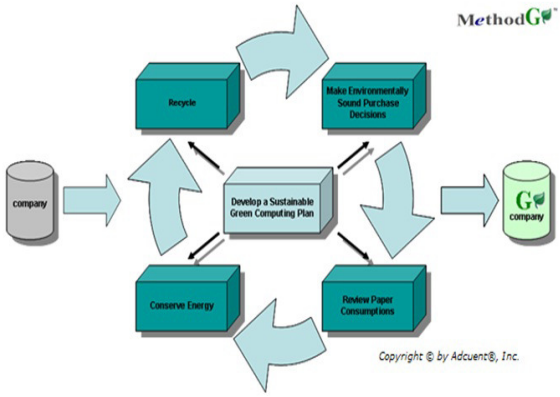
Pollution : Due to manufacturing, packing, disposal techniques.

ENERGY STAR

- One of the first manifestration of the green computing movements program back was the launch of Energy star program back in 1992.
- Energy star served as a kind of voluntary label awarded to computing products that succeeded in minimizing use of energy while maximizing effciency
- Energy star applied to products like computer moniters, television sets and temperature control devices like refrigerators ,air conditioners and similar items.

Green computing is the environmentally responsible use of computers and related resources. Such practices include the implementation of energy-efficient central processing units (CPUs), servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste). One of the earliest initiatives toward green computing in the United States was the voluntary labeling program known as Energy Star. It was conceived by the Environmental Protection Agency (EPA) in 1992 to promote energy efficiency in hardware of all kinds. The Energy Star label became a common sight, especially in notebook computers and displays. Similar programs have been adopted in Europe and Asia.

What is a thin client? A thin client (sometimes also called a lean or slim client) is a computer or a computer program which depends heavily on some other computer (its server) to fulfill its traditional computational roles. This stands in contrast to the traditional fat client, a computer designed to take on these roles by itself. The exact roles assumed by the server may vary, from providing data persistence (for example, for diskless nodes) to actual information processing on the client's behalf.



Thin clients occur as components of a broader computer infrastructure, where many clients share their computations with the same server. As such, thin client infrastructures can be viewed as the amortization of some computing service across several user-interfaces. This is desirable in contexts where individual fat clients have much more functionality or power than the infrastructure either requires or uses. This can be contrasted, for example, with grid computing.

Thin-client computing is also a way of easily maintaining computational services at a reduced total cost of ownership.

The most common type of modern thin client is a low-end computer terminal which concentrates solely on providing a graphical user interface to the end-user. The remaining functionality, in particular the operating system, is provided by the server.

Thin clients have their roots in multi-user systems, traditionally mainframes accessed by some sort of terminal computer. As computer graphics

matured, these terminals transitioned from providing a command-line interface to a full graphical user interface, as is common on modern thin clients. The prototypical multiuser environment along these lines, UNIX, began to support fully graphical X terminals, i.e., devices running X server software, from about 1984. X terminals remained relatively popular even after the arrival of other thin clients in the mid-late 1990s. Modern UNIX derivatives like BSD and GNU/Linux continue the tradition of the multi-user, remote display/input session. Typically, X server software is not made available on thin clients; although no technical reason for this exclusion would prevent it.

Windows NT became capable of multi-user operations primarily through the efforts of Citrix Systems, which repackaged NT 3.5.1 as the multi-user operating system Win Frame in 1995. Microsoft licensed this technology back from Citrix and implemented it into Windows NT 4.0 Terminal Server Edition, under a project codenamed "Hydra". Windows NT then became the basis of Windows 2000 and Windows XP. As of 2011 Microsoft Windows systems support graphical terminals via the Remote Desktop Services component.

The term thin client was coined in 1993 by Tim Negris, VP of Server Marketing at Oracle Corp., while working with company founder Larry Ellison on the launch of Oracle 7. At the time, Oracle wished to differentiate their server-oriented software from Microsoft's desktop-oriented products. Ellison subsequently popularized Negris's buzzword with frequent use in his speeches and interviews about Oracle products. Size comparison - traditional Desktop PC vs. Clientron U700

Client Simplicity:

Since the clients are made from low-cost hardware with few moving parts, they can operate in more hostile environments than conventional computers. However, they inevitably need a network connection to their server, which must be isolated from such hostile environments. Since thin clients are cheap, they offer a low risk of theft in general, and are easy to replace if stolen or broken. Since they do not have any complicated boot images, the problem of boot image control is centralized to the server.

On the other hand, to achieve this simplicity, thin clients sometimes lag behind thick clients (PC Desktops) in terms of extensibility. For example, if a local software utility or set of device drivers are needed in order to support a locally attached peripheral device (e.g. printer, scanner, biometric security device), the thin client operating system may lack the resources needed to fully integrate the needed dependencies. Modern thin clients attempt to address this limitation via port mapping or USB redirection software. However, these methods cannot address all use case scenarios for the vast number of peripheral types being put to use today.

Thin Clients has many advantages, so different people define thin clients in different way basing one of its advantage. Below are the few common definitions & sentences people often use to define thin client. Simply, Thin Client is nothing but a computer, but with very less configuration (specifications /capacity / power), still users can able to run all the latest Operating Systems and Applications (software), with the help of SERVER Computer which is connected to it through LAN Means, In Thin Clients you need not to install any OS or Applications, you have to install Only in SERVER where all thin clients are connected to it, all the OS and Applications will run on server and results are displayed in Thin Clients (user computers).

Several users can run the same program simultaneously, but the program only needs to be loaded once with a central server. In Traditional PC, We have to Install OS and Applications Locally and use its Local Resources (CPU, Ram, HDD) for its Processing and Storing, where as in Thin Client you

need not install any OS or Applications in Thin Client, but you can access OS and Applications from SERVER.

CHALLENGES

- Equipment power density/Power and cooling capacities
- Increase in energy requirement for Data Centers and growing energy cost
- Control on increasing requirements of heat removing equipment , which increasing because of increases in total power consumption by IT equipments
- Equipment life cycle management –Cradle to Grave
- Disposal of Electronic Wastes

FUTURE OF GREEN COMPUTING

- The future of Green computing is going to be based on efficiency, rather than reduction in consumption
- The secondary focus of Green IT needs to focus beyond energy use in the Data Center and the focus should be on innovation and improving alignment with overall corporate social responsibility efforts.

APPLICATION

- Reducing the use of environmentally hazardous material like CFC, lead and others.
- Promoting of use of recyclable materials and minimizing use of non-biodegradable components.
- Promoting practices such as energy cost accounting virtualization and e-waste recycling
- With a change in life habits aimed at energy conservation.

CONCLUSION

The greenest computer will not miraculously fall from the sky one day, it'll be the product of years of improvements. The features of a green computer of tomorrow would be like: efficiency, manufacturing& materials, recyclability, service model, self, powering and other trends .

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DATA MINING

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Abstract – *The term "Data Mining" is the basis for the emerging field of data science, which includes automated methods to analyze patterns and models for all kinds of data, with applications ranging from scientific discovery to business intelligence and analytics. The basic foundations of these tasks and also covers cutting-edge topics such as kernel methods, high-dimensional data analysis, and complex graphs and networks. The main parts are include exploratory data analysis, pattern mining, clustering, and classification.*

I. Introduction

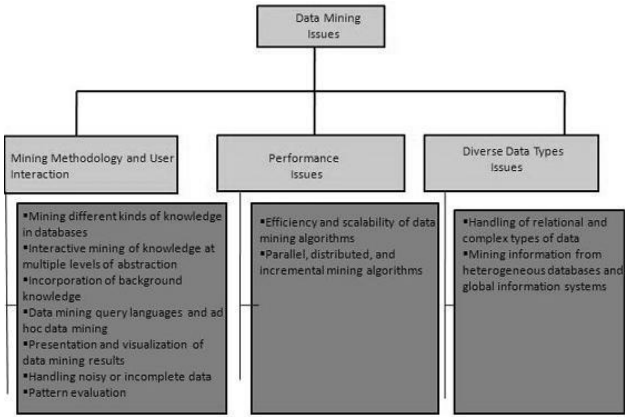
There is a huge amount of data available in the Information Industry. This data is of no use until it is converted into useful information. It is necessary to analyze this huge amount of data and extract useful information from it.

Extraction of information is not the only process we need to perform; data mining also involves other processes such as Data Cleaning, Data Integration, Data Transformation, Data Mining, Pattern Evaluation and Data Presentation. Once all these processes are over, we would be able to use this information in many applications such as Fraud Detection, Market Analysis, Production Control, Science Exploration, etc.

Data mining is not an easy task, as the algorithms used can get very complex and data is not always available at one place. It needs to be integrated from various heterogeneous data sources. These factors also create some issues. Here in this tutorial, we will discuss the major issues regarding:

- Mining Methodology and User Interaction
- Performance Issues
- Diverse Data Types Issues

The following diagram describes the major issues.



II. What is Data Mining?

Data Mining is defined as extracting information from huge sets of data. In other words, we can say that data mining is the procedure of mining knowledge from data. The information or knowledge extracted so can be used for any of the following applications:

- Market Analysis
- Fraud Detection
- Customer Retention
- Production Control
- Science Exploration

Data Mining Applications

Data mining is highly useful in the following domains:

- Market Analysis and Management
- Corporate Analysis & Risk Management
- Fraud Detection

Apart from these, data mining can also be used in the areas of production control, customer retention, science exploration, sports, astrology, and Internet Web Surf-Aid.

Market Analysis and Management

Listed below are the various fields of market where data mining is used:

 Customer Profiling - Data mining helps determine what kind of people buy what kind of products.

 Identifying Customer Requirements - Data mining helps in identifying the best products for different customers. It uses prediction to find the factors that may attract new customers.

 Cross Market Analysis - Data mining performs Association/correlations between product sales.

 Target Marketing - Data mining helps to find clusters of model customers who share the same characteristics such as interests, spending habits, income, etc.

 Determining Customer purchasing pattern - Data mining helps in determining customer purchasing pattern.

 Providing Summary Information - Data mining provides us various multidimensional summary reports.

Corporate Analysis and Risk Management
Data mining is used in the following fields of the Corporate Sector:
 Finance Planning and Asset Evaluation - It involves cash flow analysis and prediction, contingent claim analysis to evaluate assets.

 Resource Planning - It involves summarizing and comparing the resources and spending.

 Competition - It involves monitoring competitors and market directions.

Fraud Detection
Data mining is also used in the fields of credit card services and telecommunication to detect frauds. In fraud telephone calls, it helps to find the destination of the call, duration of the call, time of the day or week, etc. It also analyzes the patterns that deviate from expected norms.

III.MINING METHODOLOGY AND USER INTERACTION ISSUES

It refers to the following kinds of issues:
 Mining different kinds of knowledge in databases - Different users may be interested in different kinds of knowledge. Therefore it is necessary for data mining to cover a broad range of knowledge discovery task.

 Interactive mining of knowledge at multiple levels of abstraction - The data mining process needs to be interactive because it allows users to focus the search for patterns, providing and refining data mining requests based on the returned results.
 Incorporation of background knowledge - To guide discovery process and to express the discovered patterns, the background knowledge can be used. Background knowledge may be used to express the discovered patterns not only in concise terms but at multiple levels of abstraction.

 Data mining query languages and ad hoc data mining - Data Mining Query language that allows the user to describe ad hoc mining tasks, should be integrated with a data warehouse query language and optimized for efficient and flexible data mining.

 Presentation and visualization of data mining results - Once the patterns are discovered it needs to be expressed in high level languages, and visual representations. These representations should be easily understandable.

 Handling noisy or incomplete data - The data cleaning methods are required to handle the noise and incomplete objects while mining the data regularities. If the data cleaning methods are not there then the accuracy of the discovered patterns will be poor.

 Pattern evaluation - The patterns discovered should be interesting because either they represent common knowledge or lack novelty.

KNOWLEDGE BASE

This is the domain knowledge. This knowledge is used to guide the search or evaluate the interestingness of the resulting patterns.

KNOWLEDGE DISCOVERY

Some people treat data mining same as knowledge discovery, while others view data mining as an essential step in the process of knowledge discovery.

Some people don't differentiate data mining from knowledge discovery while others view data mining as an essential step in the process of knowledge discovery. Here is the list of steps involved in the knowledge discovery process:

 Data Cleaning - In this step, the noise and inconsistent data is removed.

 Data Integration - In this step, multiple data sources are combined.

 Data Selection - In this step, data relevant to the analysis task are retrieved from the database.

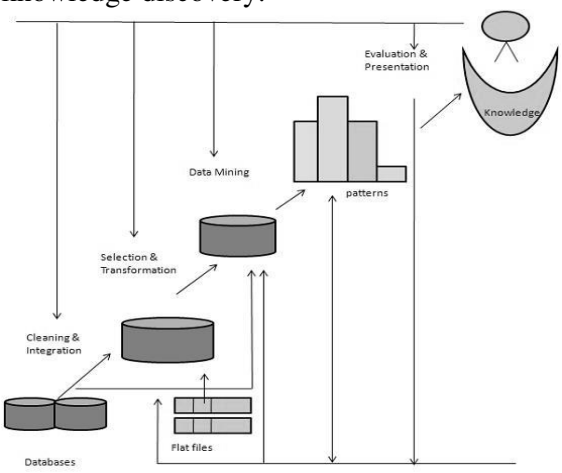
 Data Transformation - In this step, data is transformed or consolidated into forms appropriate for mining by performing summary or aggregation operations.

 Data Mining - In this step, intelligent methods are applied in order to extract data patterns.

 Pattern Evaluation - In this step, data patterns are evaluated.

 Knowledge Presentation - In this step, knowledge is represented.

The following diagram shows the process of knowledge discovery:



User Interface

User interface is the module of data mining system that helps the communication between users and the data mining system. User Interface allows the following functionalities:

 Interact with the system by specifying a data mining query task.

 Providing information to help focus the search.

 Mining based on the intermediate data mining results.

 Browse database and data warehouse schemas or data structures.

 Evaluate mined patterns.

 Visualize the patterns in different forms.

Data Integration

Data Integration is a data preprocessing technique that merges the data from multiple heterogeneous data sources into a coherent data store. Data integration may involve inconsistent data and therefore needs data cleaning.

Data Cleaning

Data cleaning is a technique that is applied to remove the noisy data and correct the inconsistencies in data. Data cleaning involves transformations to correct the wrong data. Data cleaning is performed as a data preprocessing step while preparing the data for a data warehouse.

Data Selection

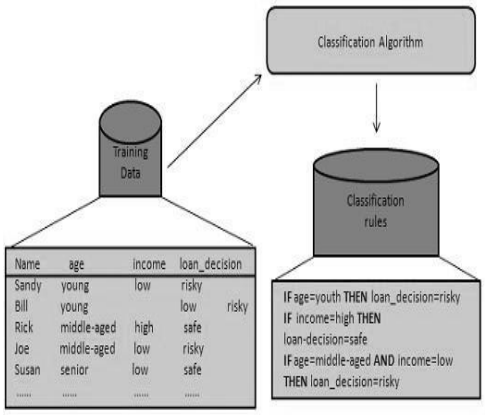
Data Selection is the process where data relevant to the analysis task are retrieved from the database. Sometimes data transformation and consolidation are performed before the data selection process.

Clusters

Cluster refers to a group of similar kind of objects. Cluster analysis refers to forming group of objects that are very similar to each other but are highly different from the objects in other clusters.

Data Transformation

In this step, data is transformed or consolidated into forms appropriate for mining, by performing summary or aggregation operations.



Trends in Data Mining

Data mining concepts are still evolving and here are the latest trends that we get to see in this field:

- Application exploration.
- Scalable and interactive data mining methods.
- Integration of data mining with database systems, data warehouse systems and web database systems.
- Standardization of data mining query language.
- Visual data mining.
- New methods for mining complex types of data.
- Biological data mining.
- Data mining and software engineering.
- Web mining.
- Distributed data mining.
- Real time data mining.
- Multi database data mining.
- Privacy protection and information security in data mining.

IV. CONCLUSION

Consumers today come across a variety of goods and services while shopping. During live customer transactions, a Recommender System helps the consumer by making product recommendations. The Collaborative Filtering Approach is generally used for recommending products to customers. These recommendations are based on the opinions of other customers.

Data Mining is defined as the procedure of extracting information from huge sets of data. In other words, we can say that data mining is mining knowledge from data. This overview and the terminologies involved in data mining and then gradually moves on to cover topics such as knowledge discovery, query language, classification and prediction, decision tree induction, cluster analysis, and how to mine the Web.

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WIRELESS NETWORK COMMUNICATION

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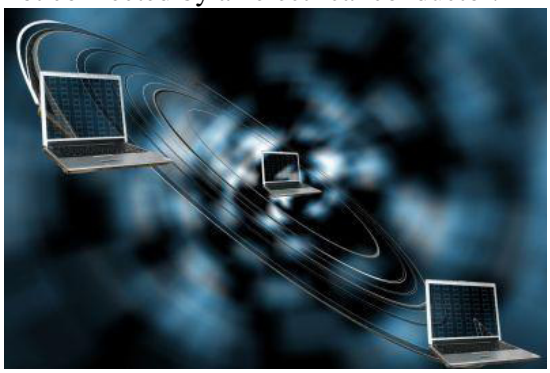
Abstract:

Wireless networks are nowadays the most popular means of data communication. A wireless network is defined as a content to be viewed and accessed via wireless devices such as cell phones, laptop and handheld devices. Bluetooth is a simple type of networking that allows the information of a small network with up to eight devices being at once. The advantages offered by wireless networks lure the users around the world to switch to wireless network. But users have to compromise with the speed limitation offered by wireless networks.

Introduction

Wireless communication is the transfer of information between two or more points that are not connected by an electrical conductor.



The most common wireless technologies use radio. With radio waves distances can be short, such as a few meters for television or as far as thousands or even millions of kilometers for deep-space radio communications.

It encompasses various types of fixed, mobile, and portable applications, including two-way radios, cellular telephones, personal digital assistants (PDAs), and wireless networking. Other examples of applications of radio wireless technology include GPS units, garage door openers, wireless computer mice, keyboards and headsets, headphones, radio receivers, satellite television, broadcast television and cordless telephones.

Somewhat less common methods of achieving wireless communications include the use of other electromagnetic wireless technologies, such as light, magnetic, or electric fields or the use of sound.

History of Wireless Communication

If we ignore optics, which fascinated early scientists over two thousand years ago, one might argue that the long trail of innovations that have brought us to the fast, cheap, and (mostly) reliable wireless products and services of today in fact began with Benjamin Franklin and his famous kite.

It is very unlikely that Franklin actually conducted the experiment as it is often described, with keys tied to a kite string - had he done so, he might never have survived to sign the Declaration of Independence! But Franklin did, in 1747, propose a model of electricity that proved surprising correct. And at that point it was evident that electricity could in fact move through the air.

In 1819, the Danish physicist Hans Christian Oersted noted that a compass needle would move in the presence of an electric field, thus establishing the fundamental relationship between electricity and magnetism. We call the entire field *electromagnetics* to this day.

In 1831, Michael Faraday demonstrated electromagnetic induction and built the first direct-current generator. While this wasn't useful for wireless communications, it did provide a way to generate electricity.

The next big leap forward was the result of theoretical work by James Clerk Maxwell, the great Scottish physicist. He published "On a Dynamical Theory of the Electromagnetic Field" in 1865, and in 1873 "A Treatise on Electricity and Magnetism," which became what are known Maxwell's Equations.

These are a series of very difficult differential equations which describe the movement of electromagnetic waves through

space. Remarkably, we use them to this day. I'm always amazed that someone working in a cold, damp building in Scotland, with little in the way of computational technology and probably nothing more than an oil lamp for light, devised something so fundamental and powerful that we still use it. Maxwell, by the way, had never seen a radio; they did not exist then, and he had no actual experience with radio waves themselves. But the theory he developed paved the way for the next set of critical inventions.

Building on Maxwell's work, Heinrich Hertz in 1887 invented the oscillator (an alternating-current generator) and created radio waves. By the way, this is the Hertz of *megahertz* and *gigahertz,* not the rental-car company. I should also note that Oersted, Faraday, and Maxwell all had units of physical measurement named in their honor as well.

Now, who exactly should get the credit for the radio is still a subject of debate. Many believe it was in fact Nikola Tesla who first sent information through the air.

However, I've never seen evidence that Tesla really communicated something of value - he just moved energy between two points without wire, demonstrating electromagnetic induction. The credit for the radio itself belongs, I think, to Guglielmo Marconi, who in 1895 sent a radio telegraph transmission across the English Channel, and in 1901 a transmission across the Atlantic. Public use of radio began in 1907. By the way, no physical unit was named for Marconi, but he did win the Nobel Prize in 1909 - not bad for a self-taught inventor!

There have been so many great contributions since then, from Edwin Armstrong (who created FM radio, among others), to Lee De Forest (who invented the electron tube), and Andrew Viterbi (who came up with digital decoding and CDMA) - and so many more that we can't list them all here.

There are now more people working in wireless communications than at any other time in history. So as the computer industry suffers, to some degree, from the pains of maturity, wireless shows no such trend towards slowing down.

"If I have seen further it is by standing on ye shoulders of Giants," Isaac Newton wrote that in a famous letter of his to Robert Hooke, the great English scientist and inventor.

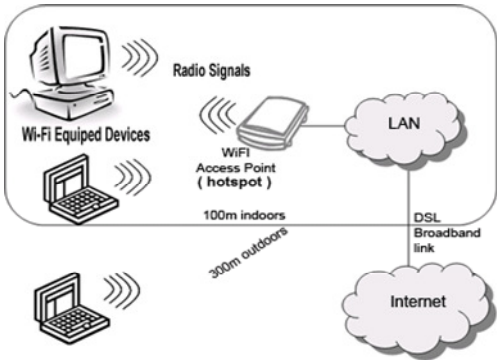
Today, after well over 200 years, we continue to build on the work of an amazing number of inspiring people who were fascinated with the concept of communication through the air. And the innovations, as regular readers of this column can attest, continue at a remarkable pace.

TYPES OF WIRELESS COMMUNICATION

Wi-Fi

Primarily associated with computer networking, Wi-Fi uses the IEEE 802.11 specification to create a wireless local-area network that may be secure, such as an office

network, or public, such as a coffee shop. Usually a Wi-Fi network consists of a wired connection to the Internet, leading to a wireless router that transmits and receives data from individual devices, connecting them not only to the outside world but also to each other.



Wi-Fi range is generally wide enough for most homes or small offices, and for larger campuses or homes, range extenders may be placed strategically to extend the signal. Over time the Wi-Fi standard has evolved, with each new version faster than the last.

Current devices usually use the 802.11n or 802.11ac versions of the spec, but backwards compatibility ensures that an older laptop can still connect to a new Wi-Fi routerHowever, to see the fastest speeds, both your computer and the router must use the latest 802.11 version, so when you upgrade your personal computer, consider a router upgrade to match its speed.

Bluetooth

While both Wi-Fi and cellular networks enable connections to anywhere in the world, Bluetooth is much more local, with the stated purpose of "replacing the cables connecting devices," according to the official Bluetooth website.

That's precisely what Bluetooth does; it connects iPods to car stereos, wireless keyboards and mice to laptops or cell phones to the ubiquitous hands-free earpieces.

Bluetooth uses a low-power signal with a maximum range of 50 feet, but with sufficient speedto enable transmission of high-fidelity music and streaming video. As with other wireless technologies, Bluetooth speed increases with each revision of its standard but requires up-to-date equipment at both ends to deliver the highest possible speed. Also, the latest Bluetooth revisions are capable of using maximum power only when it's required, preserving battery life.

NFC (Near Field Communication)

NFC is a short-range high frequency wireless communication technology that enables the exchange of data between devices over about a 10 cm distance.

NFC is an upgrade of the existing proximity card standard (RFID) that combines the interface of a smartcard and a reader into a single device. It allows users to seamlessly share content between digital devices, pay bills wirelessly or even use their cellphone as an electronic traveling

ticket on existing contactless infrastructure already in use for public transportation.

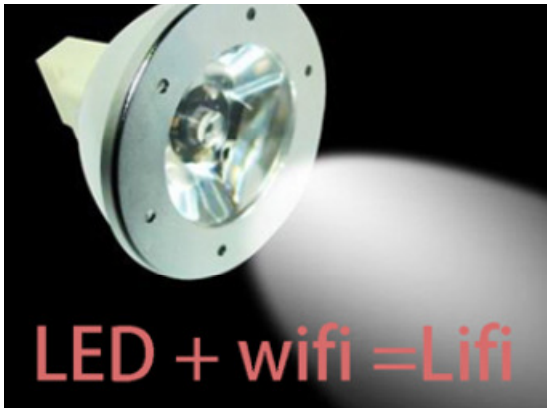
The significant advantage of NFC over Bluetooth is the shorter set-up time. Instead of performing manual configurations to identify Bluetooth devices, the connection between two NFC devices is established at once (under a 1/10 second).

Due to its shorter range, NFC provides a higher degree of security than Bluetooth and makes NFC suitable for crowded areas where correlating a signal with its transmitting physical device (and by extension, its user) might otherwise prove impossible.

NFC can also work when one of the devices is not powered by a battery (e.g. on a phone that may be turned off, a contactless smart credit card, etc.).

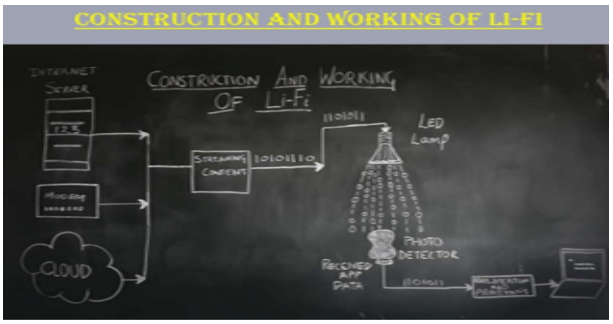
LIFI

LiFi is a wireless optical networking technology that uses light-emitting diodes (LEDs) for data transmission.



LiFi is designed to use LED light bulbs similar to those currently in use in many energy-conscious homes and offices. However, LiFi bulbs are outfitted with a chip that modulates the light imperceptibly for optical data transmission. LiFi data is transmitted by the LED bulbs and received by photoreceptors.

LiFi's early developmental models were capable of 150 megabits-per-second (Mbps). Some commercial kits enabling that speed have been released. In the lab, with stronger LEDs and different technology, researchers have enabled 10 gigabits-per-second (Gbps), which is faster than 802.11ad.



Benefits of LiFi:

- Higher speeds than Wi-Fi.
- 10000 times the frequency spectrum of radio.
- More secure because data cannot be intercepted without a clear line of sight.
- Prevents piggybacking.
- Eliminates neighboring network interference.
- Unimpeded by radio interference.
- Does not create interference in sensitive electronics, making it better for use in environments like hospitals and aircraft.

By using LiFi in all the lights in and around a building, the technology could enable greater area of coverage than a single WiFi router. Drawbacks to the technology include the need for a clear line of sight, difficulties with mobility and the requirement that lights stay on for operation.

Applications of Wireless Communication

- **Broadcasting services**: including short wave, AM and FM radio as well as terrestrial television

- **Mobile communications of voice and data**: including maritime and aeronautical mobile for communications between ships, airplanes and land; land mobile for communications between a fixed base station and moving sites such as a taxi fleet and paging services, and mobile communications either between mobile users and a fixed network or between mobile users, such as mobile telephone services

- **Fixed Services**: either point to point or point to multipoint services

- **Satellite**: used for broadcasting, telecommunications and internet, particularly over long distances .

- **Amateur radio;**Professional LMR (Land Mobile Radio) and SMR (Specialized Mobile Radio) typically used by business, industrial and Public Safety entities

- Consumer Two Way Radio including FRS (Family Radio Service), GMRS (General Mobile Radio Service) and Citizens band ("CB") radios Consumer and professional Marine VHF radios.

- **Cellular telephones and pagers**: provide connectivity for portable and mobile applications, both personal and business.

- **Global Positioning System** (GPS): allows drivers of cars and trucks, captains of boats and ships, and pilots of aircraft to ascertain their location anywhere on earth.

- **Cordless computer peripherals**: the cordless mouse is a common example; keyboards and printers can also be linked to a computer via wireless.

- **Cordless telephone sets**: these are limited-range devices, not to be confused with cell phones.

- **Satellite television**: allows viewers in almost any location to select from hundreds of channels.

- **Wireless gaming**: new gaming consoles allow players to interact and play in the same game regardless of whether they are playing on different consoles. Players can chat, send text messages as well as record sound and send it to their friends.

- **Security systems**: Wireless technology may supplement or replace hard wired implementations in security systems for homes or office buildings.

- **Television remote control**: Modern televisions use wireless (generally infrared) remote control units. Now radio waves are also used.

- **Cellular telephony** (phones and modems): These instruments use radio waves to enable the operator to make phone calls from many locations world-wide. They can be used anywhere that there is a cellular telephone site to house the equipment that is required to transmit and receive the signal that is used to transfer both voice and data to and from these instruments.

- **Wi-Fi**: Wi-Fi (for wireless fidelity) is a wireless LAN technology that enables laptop PC's, PDA's, and other devices to connect easily to the internet. Technically known as IEEE 802.11 a,b,g,n, Wi-Fi is less expensive and nearing the speeds of standard Ethernet and other common wire-based LAN technologies

- **Wireless energy transfer**: Wireless energy transfer is a process whereby electrical energy is transmitted from a power source to an electrical load thatdoes not have a built-in power source, without the use of interconnecting wires.

FUTURE SCOPE

By the year 2013, nearly one-third of the world's population will have access to high speed mobile networks, namely, 3G and 4G.
4G is the fourth generation in mobile communication networks and is aimed at fulfilling the ever-growing business and consumer needs of customers across Europe, North America and Asia. Mobile manufacturers will be gearing up to design and develop mobiles capable of supporting 4G technology.

Wireless communication will play a major role in the medical domain. Doctors will be able to monitor and diagnose patients who are thousands of miles away thanks to wireless communication.

The current generation of youngsters finds it difficult to believe that their elders used a phone tied to the wall for most of their lives. Similarly, the next generation will find it amusing that we once had to stick something up to our heads to talk.

Researchers have put forth the theory of embedded intelligence through implantation, where asimple thought is enough to wirelessly communicate with another individual anywhere in the world.

ADVANTAGES

- **Anywhere, Anytime Work**

Through wireless communication, working professionals and mobile workers can work and access the Internet just about anywhere, anytime without the hassles of wires and network cables.

- **Enhanced Productivity**

Workers, students, professionals and others need not be constrained by wired Internet connections or dial-up connectivity. Wireless Internet connectivity options ensures that work and assignments can be completed anywhere and enhance overall productivity of all concerned.

- **Remote Area Connectivity**

Workers, doctors and other professionals working in remote-location hospitals and medical centers can keep in touch with anyone through wireless communication. Non-profit organization volunteers working in remote and underserved areas can stay connected to the outside world with the help of wireless communication.

- **On-Demand Entertainment Bonanza**

For those unable to keep away from their daily soap operas, reality-programs, online TV shows and Internet surfing or download activities, wireless communication ensures an entertainment bonanza on--demand and anytime.

- **Emergency Alerts**

Through wirelesscommunication, many emergency situations and crisis situations can be addressed quickly. Help and other assistance can reach affected areas quickly through early alerts and warnings provided with the help of wireless communication.

DISADVANTAGES

 Wireless communications are limited by the range of the transmitter

Cost of wireless communication system and components are high

 When transmitting data, users must sometimes send smaller bits of data so the information moves more quickly. The size of the device that's accessing the information is also still an issue.

 Many applications need to be reconfigured if they are going to be used through wireless connections.

 Most client/server applications rely on a persistent connection, which is not the case with wireless.
 Since radio waves travel through the atmosphere they can be disturbed by electrical interferences (such as lightning) that cause static.

CONCLUSION

Wireless communication is the transfer of information over a distance without the use of electrical conductors or "wires". It encompasses various types of fixed, mobile, and portable two-way radios, cellular telephones, personal digital assistants (PDAs), and wireless networking.

Wireless communications begin with a message that is converted into an electronic signal by a device called a transmitter. The encoded electronic signal is then sent as a radio wave. Devices known as receivers decode or demodulate the radio waves and reproduce the original message over a speaker.

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WIRELESS NETWORKING SECURITY

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ABSTRACT

wireless network is a one type of computer network. wireless network is easy to handled by wireless communication is among technology's biggest contributions to mankind. Wireless communication involves the transmission of information from one device to another devices and then without help of wires cables or any other electronic conductors the transmitted distances can be anywhere between a few meters there are many divides used for wireless communication like mobile, cordless, telephones, zigbee wireless technology, GPS units.

The different types of wireless communication IR, satellite, broadcast, microwave radio, Bluetooth. Infrared communication is electromagnetic energy at a wavelength that is longer than, that of red-light. It is a used for security control, tv remote control and short range communication. Satellite communication components are space and ground segment. these network needed to be protected with password for the purpose of security, otherwise it will access by others.

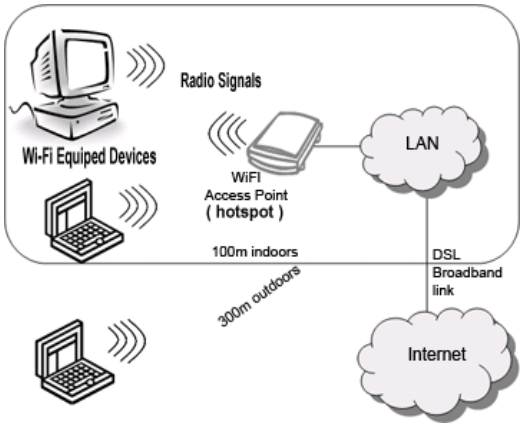
Key words: *TKIP,SSID, WEP, ad hoc and WPA.*

I.INTRODUCTION

Wireless Internet access technology is being increasingly deployed in both office and public environments, as well as by the Internet users at home. We begin by outlining some of the basic technologies of wireless network systems.

Wireless connection without an access point (ad hoc)

An ad hoc network is a simple wireless connection without an access point. For information, see Connect to a wireless network without an access point.

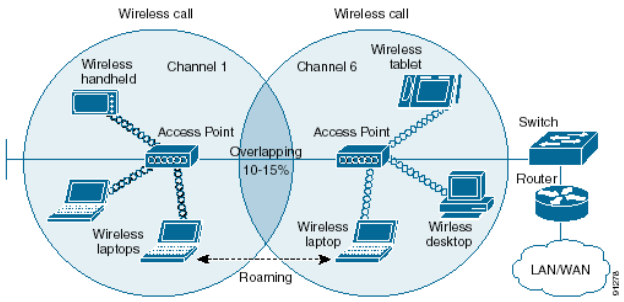


Ad-hoc mode is one of the networking topologies provided in the 802.11 standard. It consists of at least two wireless stations where no access point is involved in their communication. Ad-hoc mode WLANs are normally less expensive to run, as no APs are needed for their communication. However, this topology cannot scale for larger networks and lack of some security features like MAC filtering and access control.

WIRELESS LOCAL AREA NETWORK

A Wireless Local Area Network (WLAN) is a type of local area network that uses high frequency radio waves rather than wires to communicate between network-enabled devices.

Figure 1-3 Typical WLAN



ACCESS POINT

A wireless access point (AP) is a hardware device that allows wireless communication devices, such as PDAs and mobile computers, to connect to a wireless network. Usually, an AP connects to a wired network, and provides a bridge

for data communication between wireless and wired devices.

SERVICE SET IDENTIFIER

station ID and an authentication response containing success or failure data. Upon successful authentication, both stations are considered mutually authenticated. It can be used with WEP (Wired Equivalent Privacy) protocol to provide better communication security, however it is important to note that the authentication management frames are still sent in clear text during authentication process. WEP is used only for encrypting data once the client is authenticated and associated. Any client can send its station ID in an attempt to associate with the AP. In effect, no authentication is actually done.A Service Set Identifier (SSID) is a configurable identification that allows wireless clients to communicate with an appropriate access point.

With proper configuration, only clients with correct SSID can communicate with the access points. In effect, SSID acts as a single shared password between access points and clients.

II. SHARED KEY AUTHENTICATION

Shared Key Authentication is a standard challenge and response mechanism that makes use of WEP and a shared secret key to provide authentication. Upon encrypting the challenge text with WEP using the shared secret key, the authenticating client will return the encrypted challenge text to the access point for verification. Authentication succeeds if the access point decrypts the same challenge text.

INFRASTRUCTURE MODE

Infrastructure mode is another networking topology in the 802.11 standard, in addition to ad-hoc mode. It consists of a number of wireless stations and access points. The access points usually connect to a larger wired network. This network topology can scale to form large-scale networks with arbitrary coverage and complexity.

WI-FI PROTECTED ACCESS AND WI-FI PROTECTED ACCESS 2

Wi-Fi Protected Access (WPA) is a wireless security protocol designed to address and fix the known security issues in WEP.

WPA provides users with a higher level of assurance that their data will remain protected by using Temporal Key Integrity Protocol (TKIP) for data encryption. 802.1x authentication has been introduced in this protocol to improve user authentication.

III. SECURITY THREATS AND RISKS

Low deployment costs make wireless networks attractive to users. However, the easy availability of inexpensive equipment also gives attackers the tools to launch attacks on the network. The design flaws in the security mechanisms of the 802.11 standard also give rise to a number of potential attacks, both passive and active. These attacks enable intruders to eavesdrop on, or tamper with, wireless transmissions.

"PARKING LOT" ATTACK

Access points emit radio signals in a circular pattern, and the signals almost always extend beyond the physical boundaries of the area they intend to cover. Signals can be intercepted outside buildings, or even through the floors in multi-storey buildings. As a result, attackers can implement a "parking lot" attack, where they actually sit in the organisation's parking lot and try to access internal hosts via the wireless network.

IV. APPLICABILITY OF WIRELESS NETWORKS FOR INFORMATION PROCESSING IN A CORPORATE ENVIRONMENT

Many small and medium enterprises (SMEs) have switched to wireless networks, due to the low cost of wireless devices and convenience of using such networks. Even large corporations have also considered enterprise wide deployment of wireless networks2.

Keep Track of Development for Wi-Fi Standards

Since the 802.11 standard was first introduced, enhancements have continuously been made to strengthen data rates, signal range, and security of wireless networks. Therefore, it is a good idea to keep track of the development of new standards as they appear, in particular when procuring new equipment or acquiring new wireless network services.

In any new purchase, protection by one of the stronger wireless security protocols such as WPA/AES or WPA2/AES should be considered, but by no means should such wireless security protocols be solely relied upon to protect data confidentiality and integrity, as new weaknesses in protocols may be discovered in the future.

Perform Security Risk Assessments and Audits to Identify Security Vulnerabilities

Security assessments and audits are essential means for checking the security status of a wireless network and identifying any corrective action necessary to maintain an acceptable level of security. These assessments can help identify loopholes in the wireless network, such as poorly configured access points using default or easily guessed passwords and SNMP community words, or the presence or absence of encryption.

However, a security risk assessment can only give a snapshot of the risks to information systems at a given time. As a result, it is important to perform assessments and audits regularly once the wireless network is up and running.

Perform Site Surveys

Due to the nature of radio frequency (RF) propagation, radio signal emissions cannot generally be contained within a particular building or location. Excessive coverage by the wireless signal could pose significant threat to the organisation, opening it to parking lot attacks on the network. Therefore, it is necessary to have a good understanding of the coverage requirements for the desired wireless network during the network-planning phase. By performing a site survey, one can identify:

1. The appropriate technologies to apply;

2. Obstacles to avoid, eliminate, or work around;

3. Coverage patterns to adopt; and

4. Amount of capacity needed.

How Do I Locate My Wireless Broadband Router Securely?

1. Avoid placing the router against an outside wall or window, or against a common wall with an adjacent home to ensure that the signal does not extend beyond the required area.

2. To ensure that unauthorized people cannot tamper with your router, try to place it in a physically secure location.

3. Some routers allow you to reduce the output power of the device. To minimize leakage outside the coverage area the wireless network is meant to service, turn down the broadcast power, if possible. This is one way to prevent too strong a signal from extending beyond the desired wireless broadcast area and being accessible to the “outside” world.

How to Configure My Wireless Broadband Router Securely?

User name and Password

Change the default user name and password because they are often easily guessed. Some manufacturers might not allow you to change the username, but at least the password should be changed.

Whenever possible, WEP should be avoided. Instead, use WPA2/AES or WPA/AES if it is supported on the device.

The shared key mechanism should never be used. Instead, a stronger mutual authentication as

defined in the 802.11i standard should be considered.

The default SSID should be changed. The new SSID should not be named to refer the network products being used, reflect your name or other personal information, otherwise the information could aid an attacker in collecting reconnaissance information about you and your wireless network.

V. TIPS ON INTERNET SURFING VIA PUBLIC WIRELESS SERVICES

Once you have a wireless device such as a notebook computer or a hand-held device connected to public wireless hotspots, you are exposing yourself to potential attacks from remote attackers. Nonetheless, the following security tips may prevent you from falling into the traps laid by attackers:

1. Don't leave your wireless device unattended;

2. Protect Your Device with Passwords: Enable your device's power-on login, system login authentication, and password-protected screen saver.

3. Disable Wireless Connection When It Is Not In Use: Wi-Fi, infrared, and Bluetooth devices are constantly announcing their presence if they are enabled. That means they are waving hands to attackers, even though you may be unaware of it.

4. Keep Your Wireless Network Interface Card Drivers Up-to-date: A network interface card driver is just a piece of software. It is not immune to software bugs. Keeping the drivers up-to-date assures that wireless devices have the latest protection and support from product vendors.

5. Protect your device with anti-virus software using the latest virus definitions. This can minimise the risk of infection by computer viruses or spyware.

6. Encrypt Sensitive / Personal Data on the Device: Even when an unauthorised user gains access to your device, encryption will keep your data away from an opportunistic thief.

7. Turn off Resource Sharing Protocols for Your Wireless Interface Card: When you share files and folders, your shared resources may attract attackers attempting to manipulate them.

8. Remove Your Preferred Network List When Using Public Wireless Service: Some operating systems offer a feature for you to build your own list of preferred wireless networks. Once you have this list defined, your system will keep searching for a preferred network and try to connect to the preferred network automatically. By capturing this information sent out from your system, an attacker could set up a fake wireless access point, which meets the settings of a wireless network on your Preferred Network List. In doing so, your device would automatically connect to the attacker's fake wireless network.

9. Turn off Ad-Hoc Mode Networking: "Ad-hoc" mode networking enables your wireless device to communicate with other computers or devices through a wireless connection directly with minimal security against unauthorised incoming connections. This should be disabled to prevent attackers from easily gaining access to information and resources on your device.

10. Do Not Enable Both Wireless and Wired Network Interface Cards at the Same Time: When a device is connected to a wired LAN with the wireless network interface card still enabled, there is a possibility that attackers can sneak into the wired LAN through an open wireless network if network bridging is enabled.

11. Check the Authenticity of a Captive Portal: Captive portal web pages are commonly used in public hotspots as a means of user authentication and for deterrent protection. When connecting to a public hotspot, the user will be redirected to a captive portal page. However, attackers could also set up fake captive portals to harvest personal information. Therefore, when using public hotspots, it is important to check the authenticity of a captive portal by verifying the server certificate from the website.

12. Don't Send Sensitive / Personal Information When Using Public Wireless Networks: Public wireless networks are generally considered to be insecure. You should not transmit sensitive or personal information over a public hotspot without proper security controls.

13. Encrypt Your Wireless Traffic Using a Virtual Private Network (VPN): If transmission of sensitive or personal information over a public wireless network is unavoidable, a VPN solution can help ensure the confidentiality of communications using cryptographic technologies. If you want to learn more about VPN technologies, please refer to the paper on "Virtual Private Network Security".

14. Disable Split Tunnelling When Using VPN: It is possible to connect to the Internet or other insecure networks while at the same time holding a VPN connection to a private network using split tunnelling, but this may pose a risk to the connecting private network.

15. Remove All Sensitive Configuration Information Before Disposal: If you are disposing old wireless components, it is important to erase all sensitive.

BEST PRACTICES ON USING WIRELESS NETWORKS:

A wireless network can be operated using three different topologies; infrastructure mode, ad-hoc mode and bridging mode. When a wireless network operates in ad-hoc mode, client stations are connected directly and no access point is required. Using this mode, a potential attacker can gain access to a client station easily if the client station is improperly configured. Unless there is a specific business need, the ad-hoc mode should be disabled on wireless devices.

VI. CONCLUSION

Wireless communications begin with a message that is converted into an electronic signal by a device called a transmitter. The encoded electronic signal is then sent as a radio wave. Devices known as receivers decode or demodulate the radio waves and reproduce the original message over a speaker.

Therefore wireless communication is advantageous over the wired communication as we can work without the hassles of wires and network cables and enhance overall productivity and also at a higher speed.

VII.REFERENCE

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DATA MINING

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ABSTRACT

Data mining is a powerful and a new field having various techniques. It converts the raw data into useful information in various research fields. The paper discusses few of the data mining techniques, algorithms and some of the organizations which have adapted data mining technology to improve their businesses and found excellent results. Data mining also can be defined as the computer-aid process that digs and analyzes enormous sets of data and then extracting the knowledge or information out of it. By its simplest definition, data mining automates the detections of relevant patterns in database.

Keywords— *Data mining Techniques, Data mining applications.*

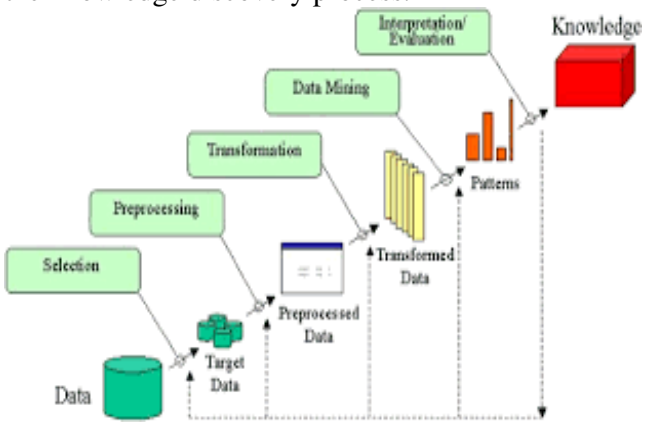
I. INTRODUCTION

The research in databases and information technology has given rise to an approach to store and manipulate this precious data for further decision making. The essential difference between the data mining and the traditional data analysis (such as query, reporting and on-line application of analysis) is that the data mining is to mine information and discover knowledge on the premise of no clear assumption. To take complete advantage of data; the data retrieval is simply not enough, it requires a tool for automatic summarization of data, extraction of the essence of information stored, and the discovery of patterns in raw data.

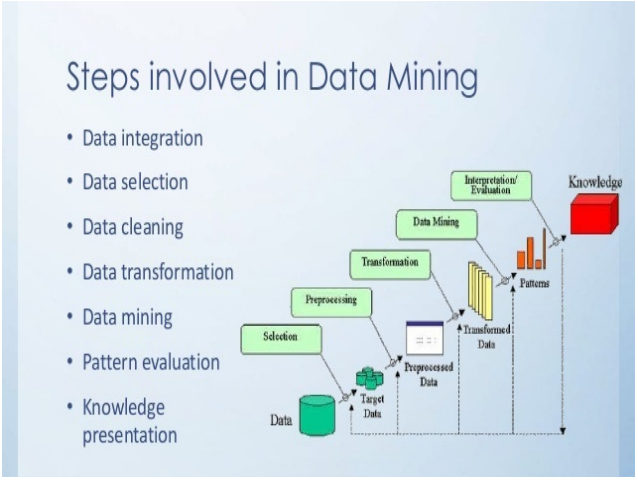
With the enormous amount of data stored in files, databases, and other repositories, it is increasingly important, to develop powerful tool for analysis and interpretation of such data and for the extraction of interesting knowledge that could help in decision-making. The only answer to all above is 'DataMining'.

II. DATA MINING PROCESS

Data Mining, also popularly known as *Knowledge Discovery in Databases* (KDD),refers to the nontrivial extraction of implicit, previously unknown and potentially useful information from data in databases. The Knowledge Discovery in Databases process comprises of a few steps leading from raw data collections to some form of new knowledge. While data mining and knowledge discovery in databases (or KDD) are frequently treated as synonyms, data mining is actually part of the knowledge discovery process.



III. DATA MINING STEPS



Data cleaning: also known as data cleansing, it is a phase in which noise data and irrelevant data are removed from the collection.

Data integration: at this stage, multiple data sources, often heterogeneous, may be combined in a common source.

Data selection: at this step, the data relevant to the analysis is decided on and retrieved from the data collection.

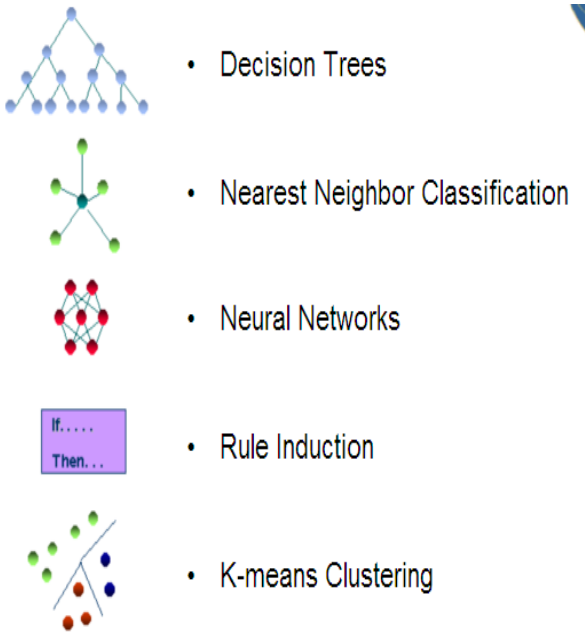
Data transformation: also known as data consolidation, it is a phase in which the selected data is transformed into forms appropriate for the mining procedure.

Data mining: it is the crucial step in which clever techniques are applied to extract patterns potentially useful.

Pattern evaluation: in this step, strictly interesting patterns representing knowledge are identified based on given measures.

Knowledge representation: is the final phase in which the discovered knowledge is visually represented to the user. This essential step uses visualization techniques to help users understand and interpret the data mining results.

DATA MINING PROCESS.



IV. DATA MINIG TECHNIQUE

There are several major data mining techniques have been developed and used in data mining projects recently including association, classification, clustering, prediction and sequential patterns etc., are used for knowledge discovery from databases.

Association

Association is one of the best known data mining technique. In association, a pattern is discovered based on a relationship of a particular item on other items in the same transaction.

Applications: market basket data analysis, cross-marketing, catalog design, loss-leader analysis.

Types of association rules: Different types of association rules based on

- Types of values handled
  - Boolean association rules
  - Quantitative association rules
- Levels of abstraction involved
  - Single-level association rules
  - Multilevel association rules
- Dimensions of data involved
  - Single-dimensional association rules
  - Multidimensional association rules

Clustering

Clustering is "the process of organizing objects into groups whose members are similar in some way". A *cluster* is therefore a collection of objects which are "similar" between them and are "dissimilar" to the objects belonging to other clusters.

Prediction

The prediction as it name implied is one of a data mining techniques that discovers relationship between independent variables and relationship between dependent and independent variables.

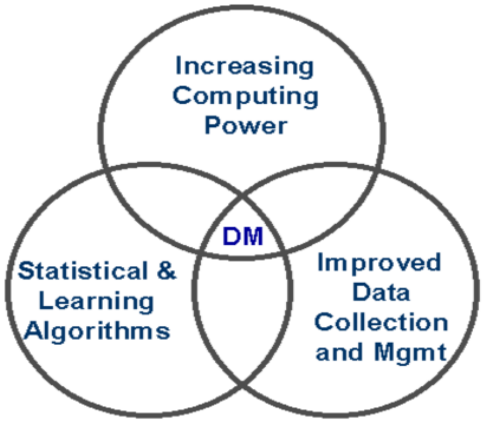
For instance, prediction analysis technique can be used in sale to predict profit for the future if

we consider sale is an independent variable, profit could be a dependent variable.

Sequential Patterns

Sequential patterns analysis in one of data mining technique that seeks to discover similar patterns in data transaction over a business period. The uncover patterns are used for further business analysis to recognize relationships.

V. THREE CONVERGENCE



Increasing Computing Power

- Powerful workstations became common
- Cost effective servers (SMPs) provide parallel processing to the mass market
- Interesting tradeoff
- Small number of large analyses vs. large number of small analyses

Improved Data Collection

- Data Collection
  - Access
  - Navigation
  - Mining
- The more data the better (usually).

Improved Algorithms

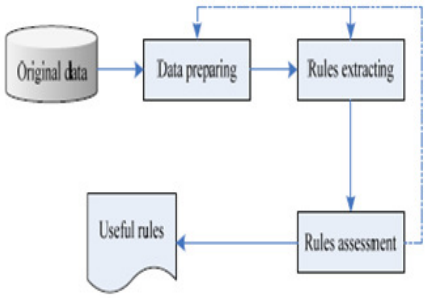
Techniques have often been waiting for computing technology to catch up.

- Statisticians already doing "manual data mining"
- Good machine learning is just the intelligent application of statistical processes
- A lot of data mining research focused on tweaking existing techniques to get small percentage gains

DATA MINING BASED ON NEUTRAL NETWORK:

The data mining based on neural network is composed by data preparation, rules extracting and rules assessment three phases.

- Neural network method is used for classification, clustering, feature mining, prediction and pattern recognition.
- It imitates the neurons structure of animals, bases on the M-P model and Hebbien learning rule, so in essence it is a distributed matrix structure.
- Through training data mining, the neural network method gradually calculates (including repeated iteration or cumulative calculation) the weights the neural network connected.



Data mining: K means clustering:

K-means clustering is a data mining/machine learning algorithm used to cluster observations into groups of related observations without any prior knowledge of those relationships. The k-means algorithm is one of the simplest clustering techniques and it is commonly used in medical imaging, biometrics and related fields.

The k-means Algorithm:

The k-means algorithm is an evolutionary algorithm that gains its name from its method of operation. The algorithm clusters observations into k groups, where k is provided as an input parameter. It then assigns each observation to clusters based upon the observations proximity to

the mean of the cluster. The clusters mean is then recomputed and the process begins again.

Heres how the algorithm works:
1. The algorithm arbitrarily selects k points as the initial cluster centers ("means").
2. Each point in the dataset is assigned to the closed cluster, based upon the Euclidean distance between each point and each cluster center.
3. Each cluster center is recomputed as the average of the points in that cluster.

VI. DATA MINIG APPLICATION

- Data Mining in Agriculture
- Surveillance / Mass surveillance
- National Security Agency
- Quantitative structure-activity relationship
- Customer analytics
- Police-enforced ANPR in the UK
- Stellar wind (code name)
- Educational Data Mining

Advantages of Data Mining

Marketing / Retail

Data mining helps marketing companies to build models based on historical data to predict who will respond to new marketing campaign such as direct mail, online marketing campaign and etc. Through this prediction, marketers can have appropriate approach to sell profitable products to targeted customers with high satisfaction.

Data mining brings a lot of benefit s to retail company in the same way as marketing.

Finance / Banking

Data mining gives financial institutions information about loan information and credit reporting. By building a model from previous customers data with common characteristics, the bank and financial can estimate what are the god and/or bad loans and its risk level. In addition, data mining can help banks to detect fraudulent credit card transaction to help credit card"s owner prevent their losses.

Manufacturing

By applying data mining in operational engineering data, manufacturers can detect faulty equipments and determine optimal control parameters.

Governments

Data mining helps government agency by digging and analyzing records of financial transaction to build patterns that can detect money laundering or criminal activity.

Disadvantages of data mining

Privacy Issues

The concerns about the personal privacy have been increasing enormously recently especially when internet is booming with social networks, e-commerce, forums, blogs…. Because of privacy issues, people are afraid of their personal information is collected and used in unethical way that potentially causing them a lot of trouble.

Misuse of information/inaccurate information

Information collected through data mining intended for marketing or ethical purposes can be misused. This information is exploited by unethical people or business to take benefit of vulnerable people or discriminate against a group of people.

Challenges of Data Mining

- Scalability
- Dimensionality
- Complex and Heterogeneous Data
- Data Quality
- Data Ownership and Distribution
- Privacy Preservation
- Streaming Data

Marketplace surveys

Several researchers and organizations have conducted reviews of data mining tools and surveys of data inrs. These identify some of the strengths and weaknesses of the software packages.

FUTURE SCOPE

Over recent years data mining has been establishing itself as one of the major disciplines in computer science with growing industrial impact.

Undoubtedly, research in data mining will continue and even increase over coming decades involve Mining complex objects of arbitrary type, fast, transparent and structured data pre-processing, Increasing usability.

VII. CONCLUSION

Data mining technology is an application oriented technology. It not only is a simple search, query and transfer on the particular database, but also analyzes, integrates and reasons these data to guide the solution of practical problems and find the relation between events, and even to predict future activities through using the existing data.

Data mining brings a lot of benefits to businesses, society, governments as well as individual. However privacy, security and misuse of information are the big problem if it is not address correctly.

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IMAGE PROCESSING

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Abstract:

The ultimate aim in a large number of image processing applications is to extract important features from image data, from which a description, interpretation ,or understanding of the scene can be provided by the machine. Image processing can be defined as the processing or altering image using printer routines and allows the user to stores screen image into the disk file using file format (bmp, jpg, gif).

Image processing in its general form pertains to the alteration and analysis of pictorial information. We find instances of image processing occurring all the time in our daily lives. Probably the most powerful image processing system is the human brain together with the eye. The system receives, enhances and stores images at enormous rates of speed.

KEYWORDS:

Pictorial, enormous, sophisticated, description, interpretation.

I. INTRODUCTION

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually **Image Processing** system includes treating images as two dimensional signals while applying already set signal processing methods to them.

It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too.

Image processing basically includes the following three steps:

- Importing the image with optical scanner or by digital photography.
- Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs.
- Output is the last stage in which result can be altered image or report that is based on image analysis.

Purpose of Image processing:

The purpose of image processing is divided into 5 groups. They are:

1. Visualization - Observe the objects that are not visible.
2. Image sharpening and restoration - To create a better image.
3. Image retrieval - Seek for the image of interest.
4. Measurement of pattern – Measures various objects in an image.
5. Image Recognition – Distinguish the objects in an image.

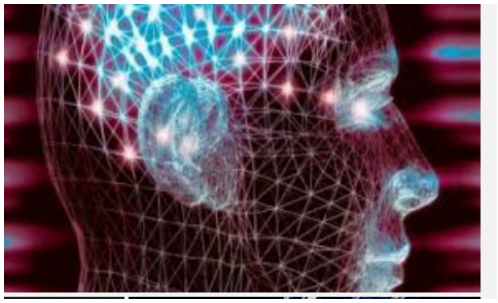
Types:

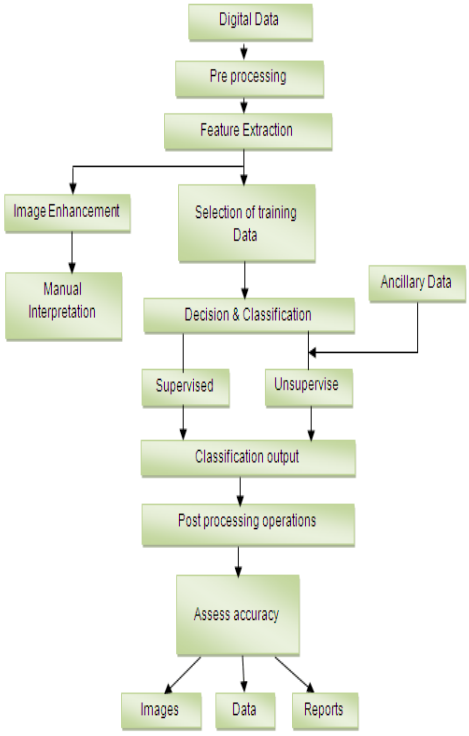
The two types of **methods used for Image Processing** are **Analog and Digital** Image Processing. Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst.

Association is another important tool in image processing through visual techniques. So analysts apply a combination of personal knowledge and collateral data to image processing.

Digital Processing techniques help in manipulation of the digital images by using

computers. As raw data from imaging sensors from satellite platform contain deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are Pre-processing, enhancement and display, information extraction.





OVERVIEW OF IMAGE PROCESSING:-

Image Processing is a technique to enhance raw images received from cameras/sensors placed on satellites, space probes and aircrafts or pictures taken in normal day-today life for various applications.

Various techniques have been developed in Image Processing during the last four to five decades. Most of the techniques are developed for enhancing images obtained from unmanned spacecrafts, space probes and military reconnaissance flights. Image Processing systems are becoming popular due to easy availability of powerful personnel computers, large size memory devices, graphics softwares etc.

IMAGE PROCESSING IS USED IN VARIOUS APPLICATIONS SUCH AS:

- Remote Sensing
- Medical Imaging
- Non-destructive Evaluation
- Forensic Studies
- Textiles

METHODS OF IMAGE PROCESSING

There are two methods available in Image Processing

. ANALOG IMAGE PROCESSING

Analog Image Processing refers to the alteration of image through electrical means. The most common example is the television image.

The television signal is a voltage level which varies in amplitude to represent brightness through the image. By electrically varying the signal, the displayed image appearance is altered. The brightness and contrast controls on a TV set serve to adjust the amplitude and reference of the video signal, resulting in the brightening, darkening and alteration of the brightness range of the displayed image.

Digital Image Processing In this case, digital computers are used to process the image. The image will be converted to digital form using a

scanner – digitizer [6] (as shown in Figure 1) and then process it. It is defined as the subjecting numerical representations of objects to a series of operations in order to obtain a desired result. It starts with one image and produces a modified version of the same. It is therefore a process that takes an image into another.

The term digital image processing generally refers to processing of a two-dimensional picture by a digital computer. In a broader context, it implies digital processing of any two-dimensional data. A digital image is an array of real numbers represented by a finite number of bits.

The principle advantage of Digital Image Processing methods is its versatility, repeatability and the preservation of original data precision.

The various Image Processing techniques are:

- Image representation
- Image preprocessing
- Image enhancement
- Image restoration
- Image analysis
- Image reconstruction
- Image data compression

Contrast and brightness because of the limitations of imaging sub systems and illumination conditions while capturing image. Images may have different types of noise. In image enhancement, the goal is to accentuate certain image features for subsequent analysis or for image display.

Examples include contrast and edge enhancement, pseudo-coloring, noise filtering, sharpening, and magnifying. Image enhancement is useful in feature extraction, image analysis and an image display. The enhancement process itself does not increase the inherent information content in the data. It simply emphasizes certain specified image characteristics. Enhancement algorithms are generally interactive and application dependent.

Some of the enhancement techniques are:

- Contrast Stretching
- Noise filtering
- Histogram modification

Contrast stretching:

Some images (eg. over water bodies, deserts, dense forests, snow, clouds and under hazy conditions over heterogeneous regions) are homogeneous i.e., they do not have much change in their levels. In terms of histogram representation, they are characterized as the occurrence of very narrow peaks. The homogeneity can also be due to the incorrect illumination of the scene.

IMAGE ANALYSIS

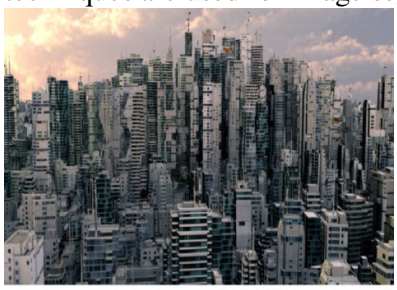
Image analysis is concerned with making quantitative measurements from an image to produce a description of it . In the simplest form, this task could be reading a label on a grocery item, sorting different parts on an assembly line, or measuring the size and orientation of blood cells in a medical image. More advanced image analysis systems measure quantitative information and use it to make a sophisticated decision, such as controlling the arm of a robot to move an object after identifying it or navigating an aircraft with the aid of images acquired along its trajectory.

IMAGE SEGMENTATION

Image segmentation is the process that subdivides an image into its constituent parts or objects.

The level to which this subdivision is carried out depends on the problem being solved, i.e., the segmentation should stop when the objects of interest in an application have been isolated e.g., in autonomous air-toground target acquisition, suppose our interest lies in identifying vehicles on a road, the first step is to segment the road from the image and then to

segment the contents of the road down to potential vehicles. Image thresholding techniques are used for image segmentation.



High-Definition Composite Image Created with Photorealistic CG Technology

CLASSIFICATION

Classification is the labeling of a pixel or a group of pixels based on its grey Classification is one of the most often used methods of information extraction. In Classification, usually multiple features are used for a set of pixels i.e., many images of a particular object are needed. In Remote Sensing area, this procedure assumes that the imagery of a specific geographic area is collected in multiple regions of the electromagnetic spectrum and that the images are in good registration. Most of the information extraction techniques rely on analysis of the spectral reflectance properties of such imagery and employ special algorithms designed to perform various types of 'spectral analysis'.

IMAGE RESTORATION

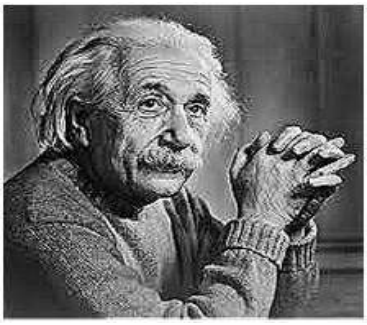


Image restoration refers to removal or minimization of degradations in an image. This includes de-blurring of images degraded by the limitations of a sensor or its environment, noise filtering, and correction of geometric distortion or non-linearity due to sensors.

CONCLUSION:

You have seen few of the features of a good introductory image processing program. There arte many more complex modifications you can make to the images. For example, you can apply a variety of filters to the image.

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GREEN COMPUTING

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ABSTRACT:

In past a few years computer paradigm is shifted to remote data centres and the software and hardware services available on the basis of pay for use .This is called Cloud Computing, In which user have to pay for the services .Cloud provide the services – Software as a service ,platform as a service and infrastructure as a service .These services provided through the remote data centers. (since the data is scattered /distributed over the web.), as Software application and other services migrated on the remote data centre ,management of these data centre in important.

Data centre management faces the problem of power consumption. At present cloud computing based system waste a great amount of power and produces co2. Since many servers don't have a good quality cooling system. Green computing can enable more energy efficient use of computing power .This survey paper show the requirement of green computing and techniques to save the energy by different approaches.

Keywords— *Green computing, Cloud Computing, Virtualization, Iaas, SaaS, Paas.*

INTRODUCTION:

Today's computing vision is utility based Consumers only need to pay provider only when and how they access, they need not to invest much and there is no need to develop an complex and costly infrastructure, this model of computing is cloud computing .Cloud means a user can access application as a service from anywhere in the world on demand cloud computing services are supported by a state of data centre (data server) which uses the virtual machines for isolation purpose. Data centre management faces the problem of power consumption and application's quality of services. Cloud computing delivers infrastructure platform and software (application) as a service on demand as a subscription based services. To reduce the power consumption here the term green computing is used .When we introduced the term green computing we thought going green with computers.

Green computing concentrates on energy efficiency reducing recourse consumption. In many organization IT department is generally consumed a lot of power. Green computing is environmentally responsible use of computing. As computer system increasing so the amount of energy conservation and the carbon contents are increasing in atmosphere. Measure being taken to reduce the problem superficially called "green computing".

Green Computing:

Green Computing is practice of designing manufacturing, using and disposing of computer server and associated sub system such as monitors, printer's storage devices networking and communication system efficiently and effectively with no impact on environment. The technical processes adopted by the industries creates challenges in the management of the waste. Green computing shows how to use resources efficiently and how to reduce the waste Green computing is the requirement to save the energy with the expenses .Currently the implementation on green computing practice is going on, but firstly we have to know what kind of energy should be gained and how it is achieved. So analysis of the gap what are the resources we have and what we are going to do to achieve the benefits of green computing.

"Green computing" represents environmentally responsible way to reduce power and environmental e-waste. Virtualization, Green Data Center, Cloud computing, grid computing, Power optimization are the technologies of green computing. Main goals of green computing are to reduce the use of toxic and hazards materials and improve the energy efficiency, recycling of factory waste. Such practice includes the efficient implementation of server and peripherals as well as reduces the power consumption.

II. NEED FOR GREEN COMPUTING

Green computing is a new technology whose goal is to design better computer system means their processing is better and consume less amount of energy. Many studies already show that power cost has a more percentage of the total management cost of data center. Use of computer system and IT services makes life easier and work faster, it increase resulting of greater power consumption, which increase emission of green house gas like CO2. Since the computer system consume power and its peripherals also consume power even when these are not in use. Data center needed a lot of power and cooling system, if the required power and cooling capacities are insufficient then it will result in loss of energy. Study shows that most of data centers don't have sufficient cooling capacity this is the cause of environmental pollution. Green computing is deals with concepts reduce energy consumption, recycling eliminate hazardous elements but it also deals with reduce in the business travel sharing the resources (cloud computing) and optimization.

There are a lot of fundamental steps that can be taken to significantly decrease the power consumption and impact on environment. Lower Power hardware: computer systems are made up of hardware i.e. processor onboard graphics, disk, fan etc these hardware should be consumed less power. Malviya et al., International Journal of Advanced Research in Computer Science and Software Engineering 3(6), June - 2013, pp. 790-794 © 2013, IJARCSSE All Rights Reserved Page | 791 Virtualization: It is the use of software to simulate hardware.

In the data center stand alone server system replaced with virtual server that run as software on a small number of larger computer via a virtualized server we can efficiently use computer resources.

Cloud computing:

It has many benefits it enables anybody to obtain environmental benefits of virtualization. It also remove the need for the user to run high power PCs since it provide infrastructure as a service. Wireless Network Sensor: Sensor employed in different parts area in a data center to determine the temperature of each area, this will tell which area need to be more cool and where to reduce cooling. Recycle: Through recycling the waste or equipment we can reduce the environmental pollution.

Green Computing Climate Change:

Researches done in past shows that CO2 and emission of others affect the global climate and⎪ responsible for damage of our environment .Preserve the planet is main goal. Planet like earth is rare. There is no mclass planet in our solar system and no other star system have m-class planet as we know. Savings: Green computing can lead to serious cost savings. Reductions in energy costs from servers cooling and⎪ lighting.

Reliability of Power:

As the energy demands increasing day by day and supply is declining. Energy efficient system ensures healthy power system. Many industries generate their own electricity which motivates to keep the consumption low. Computing Power Consumption has Reached a Critical Point: Data centers have run out of usable power and cooling due to high densities.

III. APPROACHES TO GREEN COMPUTING

Data centers or computer center has a computer system and its associated system such as telecommunication system data storage system. It needs backup power supply, some cooling system and security system. A green data center is a data center which has a efficient management of the system and associated system less power consumed environment.

Practical requirement of data centers are as follows:

Provide a physical secure location for server.

- Should provide all-time network connectivity in data center.
- Should provide necessary power to operate all equipment.
- Characteristics Design must be simple
- Design must be scalable.
- The design should be scalable because once it finalize must work for any size of computer center. Design must be modular.
- Design must be flexible.

Virtualization: -

Virtualization, a term that used to the various techniques, methods or approaches to create a virtual environment, such as a virtual hardware platform, virtual operating system (OS), storage device, or network resources. i. Challenges: - Complexities of licensing are the issue with virtualization. For example a Linux based server offers a virtualized windows server must satisfy licensing requirements. Because of this licensing issue flexibility of virtualization and benefits of on demand virtualization is hampered.

Some venders of proprietary software have attempted to update licensing scheme to address the virtualization but flexibility and cost issues are opposing requirements. Virtualized desktop results in dependence on centralized servers (for computing and SAN storage) and the network (and higher-bandwidth requirements). Dependency on centralized server and network leaves the end users vulnerable to server. The user able to operating locally through an outage, but when user logs off or reboots the machine Malviya et al., International Journal of Advanced Research in This is in contrast with thick clients where the user operate locally continue until the connectivity can be restored.

Cloud Computing:

Cloud computing name comes from the cloud shaped symbol in which the complex infrastructure is hidden as it contain in its system diagram. Cloud computing delivered the computing resources as a service over the internet. Cloud computing provide user's data, software remotely End user can use the cloud services or cloud application through a web browser or a mobile app while the software and user's data is stored on remote data server.

As well as Cloud computing allows companies to avoid infrastructure cost, and focus on projects that differentiate their business. Cloud computing allows enterprises to get their application up running faster with improved man power and less maintenance and enable IT to more rapidly adjust resources to meet the unpredictable business demand.

i. Infrastructure as a service (IaaS):

Infrastructure as a service: - In the cloud service model providers offers Physical or more often virtual machine. A hypervisor such as Xen or KVM runs the virtual machine. Hypervisors pools within a cloud support system can support large number of virtual machine and can maintain the saleability of services according to customer requirements.

IaaS clouds offer other additional resources such as virtual machine disk, image library, IP address, and firewalls etc, Iaas providers supply these resources on demand from their data centres.

ii. Platform as a service:-

In the Paas model, Cloud provider offers computing platform including operating system, execution environment, database and web server. Developer can develop and run their software on a cloud platform without any complexity and cost of

buying and managing the hardware and software layer.

iii. Software as a service: -

In the SaaS model providers install application software in the cloud and users can access the software from clients. Cloud users do not manage the infrastructure and platform. SaaS eliminates the need to install the software and run the application on the user's own computer which simplifies maintenance and support. Cloud application are different from others in their scalability, scalability can be achieved by cloning onto multiple VM's at run time to meet work demands.

IV. FEW REASERCHES TO REDUCE THE POWER CONSUMPTION A. POWER AWARE HYBRID DEPLOYMENT

To deal with challenges like trade off power consumption and QoS, a lot of efforts ongoing on the power aware and Qos aware application deployment based on the work researcher Zhiwu Liu ma, Fanfu Zhou Yindong Yang and researcher Zhengwei Qi Habing Guan presented a I/O and power CPU intensive application hybrid deployment to optimize resource utilization within virtualization environments.

In this they investigate the resource allocation between virtual machines where 1/0 and CPU-Intensive applications reside, to realize power-aware applications hybrid deployment. To demonstrate the problem of I/0 and CPU resource in virtualization environment, They use Xen as the Virtual Machine Monitor for experiments. Under different resource allocation configurations, they evaluate power efficiency up to 2 % - 12 %, compared to the default deployment. They also conclude the more CPU resource that the CPU-Intensive applications in the hybrid deployment applications need to satisfy QoS.

They get that server virtualization techniques provide a smooth mechanism for powerperformance tradeoffs in modem data centers running heterogeneous applications. Virtual Machine Monitors (VMMs) are gaining popularity in enterprise data centers. But traditionally, VMM schedulers have focused on fairly sharing the processor resources among domains while leaving the scheduling of I/O resources as a secondary concern. This can result in unpredictable 1/0 behavior, and poor and/or unpredictable application performance and power efficiency. They focus on the unpredictable 1/0 behavior under current VMM schedulers.

In order to implement motivation and achieve CPU Intensive and I/O-Intensive applications hybrid deployment within virtualization environments, we face some challenges to explore the unpredictable 1/0 behavior. Before expressing these challenges, they make some additional introductions. Their work will focus on Xen VMM, which is an open source virtual machine monitor based on the Linux kernel. Also we need to give a demonstration on virtual 1/0 implementation in Xen in the next paragraph. Organization of Xen effectively consists of two elements: the hypervisor and the driver domain. One of the major functions of the driver domain is to provide access to the actual hardware I/0 devices.

The hypervisor grants the driver domain direct access to the devices and does not allow the guest domain to access them directly. Therefore, all I/0 traffic must pass through the driver domain. So the performance of server residing in guest domain will depend on CPU allocated to the driver domain.

They make the power model, which shows the relationship between power and server utilization within the test bed .In other sub section resource utilization under various workload is recorded and at the last they introduce power efficiency evaluation proposal which they used and the improvement of power efficiency under different configuration is shown. Firstly they calculated power consumption and calculate power efficiency.

Power and Utilization:

Power consumption is expressed as a percentage of peak power across the data center.• The model of wang rt.al [10] to estimate power consumption, for a fixed operating frequency, the

power consumption of the server is approximately linear functions of the server utilization. After completion of two other sections they conclude from the analysis, they obtain that CPU-Intensive and 1/0- Intensive applications hybrid deployment can improve power efficiency.

B. POWER MANGEMENT USING GREEN ALGORITHM

In this research study R.Yamini said that today's environmental challenge is global warming, which caused by emission of carbon .Energy crisis brings green computing and green computing needs algorithm and mechanism to be redesigned for energy efficiency. Various approaches to the green IT are virtualization, Power management, recycling and telecommunicating.

CONCLUSION:-

The basic principles of cloud computing is to make the computing be assigned in great number of distributed computer or remote server. Cloud computing is an extend of grid computing, distributed computing and parallel computing Currently, a large number of cloud computing systems waste a tremendous amount of energy and emit a considerable amount of carbon dioxide. Thus, it is necessary to significantly reduce pollution and substantially lower energy convention.

The analysis of energy consumption in cloud computing consider both private and public clouds. Cloud computing with green algorithm can enable more energy-efficient use of computing power. This paper concluded that task consolidation particularly in clouds has become an important approach to streamline resources usage and in turn improve energy efficiency.

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NANOTECHNOLOGY

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ABSTRACT:

A key issue before Congress regarding nanotechnology is how best to protect human health, safety, and the environment as nanoscale materials and products are researched, developed, manufactured, used, and discarded. While the rapidly emerging field of nanotechnology is believed by many to offer significant economic and societal benefits, some research results have raised concerns about the potential environmental, health, and safety (EHS) implications of nanoscale materials. Potential tools the Federal government might use to address these issues include research and development, regulation, and international engagement.

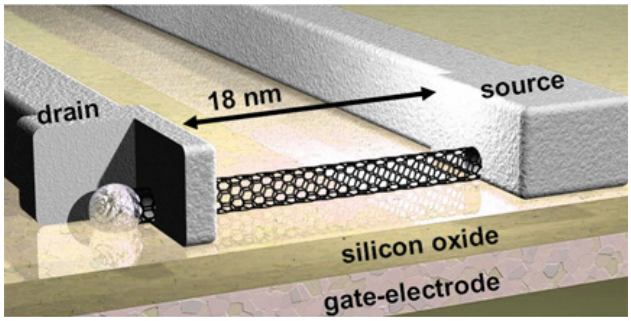
Some of the properties of nanoscale materials (e.g., small size, high surface area-to-volume ratio) that have given rise to great hopes for beneficial applications have also given rise to concerns about their potential adverse implications for the environment, and human health and safety.

I.INTRODUCTION

Nanotechnology—a term encompassing nano scale science, engineering, and technology—is focused on understanding, controlling, and exploiting the unique properties of matter that can emerge at scales of one to 100 nanometers. These properties are believed by many to offer substantial economic and societal benefits.

With more than 1,000 nanotechnology products reportedly commercially available, there is great interest in protecting the health and safety of the scientists working with nanoscale materials, workers who manufacture the products, consumers who use the products, and members of the general public who may be exposed to nanoparticles, as well as in understanding the environmental impact of nano manufacturing processes and the use and disposal of nanotechnology products.

Nevertheless, most stakeholders agree that these concerns about the potential detrimental effects of nanoscale materials and devices—both real and perceived—must be addressed. Among the issues these stakeholders have identified are characterizing the toxicity of nanoscale materials; developing methods for assessing and managing the risks of these materials; and understanding how these materials move in, and interact with, the environment.



This report identifies the potential environmental, health, and safety opportunities and challenges of nanotechnology; explains the importance of addressing nanotechnology EHS concerns; identifies and discusses nanotechnology EHS issues; and summarizes several options for congressional action, including the nanotechnology EHS-related provisions of selected legislation.

The **Appendix** provides an overview of selected federal agencies' roles in the regulation of nanotechnology.

II. Opportunities and Challenges

Many new technologies have delivered general societal benefits while presenting EHS challenges.

For example, automobiles increased personal mobility and provided faster, less

expensive transportation of goods, but soon became a leading cause of accidental deaths and injuries, as well as a source of emissions that can damage air quality and may affect the global climate. Similarly, genetically-modified (GM) plants have traits such as greater resistance to pests, pesticides, or cold temperatures that contribute to higher crop yields, while critics argue some GM foods contribute to food allergies and antibiotic resistance.

Proponents maintain that nanotechnology also offers the potential for significant EHS benefits, including:

- reducing energy consumption, pollution, and greenhouse gas emissions;
- cleaner, more efficient industrial processes;
- remediating environmental damage;
- curing, managing, or preventing deadly diseases;
- offering new materials that protect against impacts, self-repair to prevent catastrophic failure, or change in ways that protect or aid soldiers on the battlefield.

NANO:

"**Nano**" – From the Greek word for "dwarf" and means 10-9, or one-billionth. Here it refers to one billionth of a meter, or 1 nanometer (nm).

1 nanometer is about 3 atoms long.

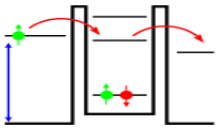
"**Nanotechnology**" – Building and using materials, devices and machines at the nanometer (atomic/molecular) scale, making use of unique properties that occur for structures at those small dimensions. Most consider **nanotechnology** to be technology at the sub-micron scale: 1-100's of nanometers.

II. Why might properties of materials/structures be different at the nanoscale?

Two of the reasons:

1. Ratio of surface area-to-volume of structure increases (most atoms are at or near the surface, which make them more weakly bonded and more reactive).

2. Quantum mechanical effects are important (size of structure is on same scale as the wavelengths of electrons, and quantum confinement occurs resulting in changes in electronic and optical properties).



Examples of Nanotechnology Applications

Supercomputer in your palm, perhaps made from silicon nanowires, carbon nanotubes, or organic materials such as DNA.

Very tiny motors, pumps, gyroscopes, and accelerometers; helicopters the size of flies or smaller

Tiny bio- and chemical-sensors; nanoparticles that track and destroy cancer cells; artificial body parts and implantable drug delivery systems.

Energy storage (batteries) and conversion (solar cells) using nanowires and nanotubes.

Enhanced consumer products using nano-whiskers, nanoparticles, and nanotubes for: stain and wrinkle resistant clothes, transparent zinc oxide sunscreen, fast-absorbing drugs and nutrients, extra-strong tennis racquets, and scratch-resistant paint.

Respirocytes and microbivores

The ability to build complex diamondoid medical nano robots to molecular precision, and the n to build the m cheaply enough in sufficiently large numbers to be useful therapeutically, will revolutionize the practice of medicine and surgery. The first theoretical de sign study of a complete medical nano robot ever published in a peer-reviewed journal (in 1998) described a hypothetical artificial mechanical red blood cell or ''reciprocate'' made of 18 billion precisely arranged structural atoms.

Stanford Nanofabrication Facility (SNF)

- 10,000 sq.ft. clean room, available to any researcher in the world.
- Includes state-of-the-art equipment for nano- and micro-fabrication and research.
- Over 600 users last year, working in all areas of nano (and larger) fabrication.
- Funded by user fees and by NSF grant. Part of National Nanotechnology Infrastructure Network (NNIN).

CONCLUSION

The work in nanotechnology is being carried out not just on the materials of the future, but also the tools that will allow us to use these ingredients to create products. Experimental work has already resulted in the production of scanning tunneling microscope, molecular tweezers, and logic devices. Theoretical work in the construction of nano-computers is progressing as well. Taking all of this into account, it is clear that the technology is feasible.

Nanotechnology is expected to have a profound impact on our economy and society in the 21st century, from the development of better, faster, stronger, smaller, and cheaper systems. Nanotechnology provides a far more powerful capability. We cannot make powerful computers, defence, environment and medicine, but also in a higher standard of living for everyone on the planet.

Nanotechnology- the science is good, the engineering is feasible, the paths of approach are many, the consequences are revolutionary-times-revolutionary, and the schedule is in our lifetimes.

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INTERNET OF THINGS

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ABSTRACT:

The Internet of the Future will be an essential part of the knowledge society and will provide new information-based business. The usage of the Internet of Things for large-scale, partially mission-critical systems creates the need to address trust and security functions adequately.

The vision ofSMARTIE1 (Secure and sMArter ciTIEs data management) is to create a distributed framework for IoT based applications sharing large volumes of heterogeneous information. This framework is envisioned to enable end-to-end security and trust in information delivery for decision-making purposes following data owner's privacy requirements. New challenges identified

for privacy, trust and reliability are:

• Providing trust and quality-of-information in shared information models to enable re-use across many applications.

• Providing secure exchange of data between IoT devices and consumers of their information.

• Providing protection mechanisms for vulnerable device.

KEYWORDS: *IOT.*

INTRODUCTION

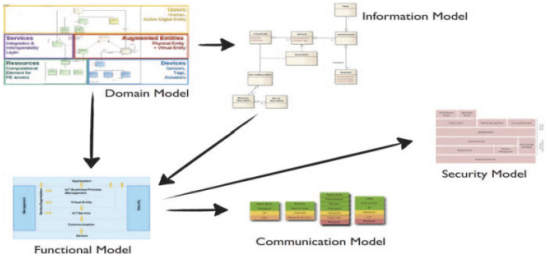
The internet of things represent a vision in which the internet extents into the real world embracing everyday objects.

- Internet of thingsThe bright future of the internet of things.
- "IOT will boost the economy while improving out citizens lives" .

- Mario campolargo
- ❖ Internet of things types
- ❖ Basis
- ❖ Technological challenges
- ❖ IP for things
- ❖ The web of things

Iot application benefits:

- ❖ Value form new type maintenance and lifetime approaches
- ❖ value form visibility identification location tracking
- ❖ Value enable by smart object connected aspects
- ❖ value from sustainability
- ❖ Social and political issues
- ❖ Iot model:
- ❖ Domain model
- ❖ Security model
- ❖ Function model
- ❖ Information model
- ❖ Communication model

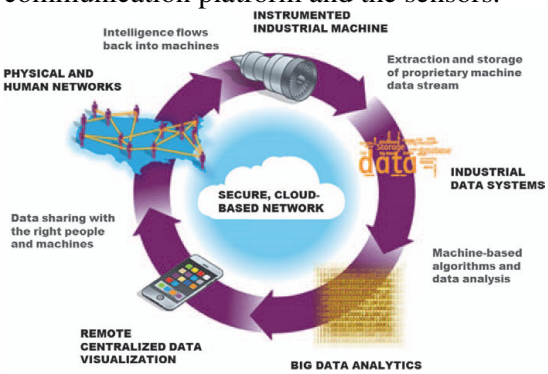


- ❖ **IoT Applications**
- ❖ Throughout the entire document the following pragmatic definition for IoT
- ❖ applications was used in order to focus the scope and to have a common
- ❖ understanding: IoT applications in the sense of this paper are solutions using
- ❖ IoT technologies capable to improve and easy adapt industrial manufacturing
- ❖ processes, enable new and efficient ways to do operate and interact in production
- ❖ plants, create new service or supervision means for industrial installations,
- ❖ offer an optimized infrastructure, reduce operational cost and energy
- ❖ consumption or improve human safety in industrial areas.
- ❖ Value, Benefit
- ❖ To start a project in industry environment the expected benefit, the expected value to

the company has to be estimated and later needs to be re-evaluated and proved during operation **Smart Objects, Smart Applications.**

In the Vision of an Internet of Things interconnected Smart Objects play an important role. Such a Smart Object is a bi-directional communicating object which observes its environment and is able to make decisions depending on the application and based on the information extracted from the physical world.

One approach to Smart Objects is basedonthe technology of wireless sensor networks, as they already provide the communication platform and the sensors.



The ISO/IEC JTC1/WG7 Working Group on Sensor Networks has designed reference architecture Figure 3.10, which separates the sensor node functionality into three layers:

• Communication as part of the basic functions layer: describes the communication protocol for the interaction of a smart object with other smart objects, an infrastructure or backbone networks.
• Service Layer: represents a set of functions commonly required, such as sensor information gathering, filtering by various policies and rules, data comparison and analysis, data mining, context modeling, context-aware processing, self-localization, context-aware decision and estimation.
• Application Layer: realizes the use case of a smart object by a set of functions to users to meet defined requirements.From an industry point of view value creation from IoT applications and sustainability are essential and will influence the use of IoT technologies in the industry, on a larger scale, in the coming years.

Internet of Things

Ten "critical" trends and technologies impacting IT for the next five years were laid out by Gartner in 2012 and among them the Internet of Things, which will benefit from cheap, small devices allowing that everything will have a radio and location capability. Self-assembling mesh networks, location aware
services will be provided. This all creates the always on society.

Opinions on IoT Application and Value for

Internet of things today

One year after the past edition of the Clusterbook 2012 it can be clearly stated that the Internet of Things (IoT) has reached many different players and gained further recognition. Out of the potential Internet of Things application areas, Smart Cities (and regions), Smart Car and mobility, Smart Home and assisted living, Smart Industries, Public safety, Energy & environmental protection,

Agriculture and Tourism as part of a future IoT Ecosystem have acquired high attention. In line with this development, the majority of the governments in Europe, in Asia, and in the Americas consider now the Internet of Things as an area of innovation and growth.

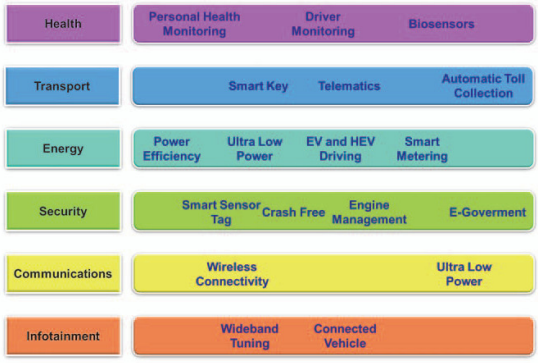
Although larger players in some application areas still do not recognise the potential, many of them pay high attention or even accelerate the pace by coining new terms for the IoT and adding additional components to it. Moreover, end-users in the private and business domain have nowadays acquired a significant competence in dealing with smart devices and networked applications.

Application Areas

In the last few years the evolution of markets and applications, and therefore their economic potential and their impact in addressing societal trends and challenges for the next decades has changed dramatically. Societal trends are grouped as: health and wellness, transport and mobility, security and safety, energy and environment, communication and e-society.

These trends create significant opportunities in the markets of consumer electronics, automotive electronics, medical applications, communication, etc. The applications in these areas benefit directly by the More- Moore and More-than-Moore semiconductor technologies, communications, networks, and software developments.

Potential applications of the IoT are numerous and diverse, permeating into practically all areas of every-day life of individuals (the so-called "smart life"), enterprises, and society as a whole.



The updated list presented below, includes examples of IoT applications in different domains, which is showing why the Internet of Things is one of the strategic technology trends for the next 5 years.

Security, Privacy & Trust

The Internet of Things presents security-related challenges that are identified in the IERC 2010 Strategic Research and Innovation Roadmap but some elaboration is useful as there are further aspects that need to be addressed by the research community. While there are a number of specific security, privacy and trust challenges in the IoT, they all share a number of transverse non-functional requirements:

- Lightweight and symmetric solutions, Support for resource constrained devices
- Scalable to billions of devices/transactions

CONCLUSIONS

IoT applications exist and are rapidly developing in the industrial sector too, and are very diverse. IoT industrial applications can create value for industry. Robustness, standardization, easy installation, configuration and servicing are essential to keep IoT systems operational and hence offering value for the industry operation and services.

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CLOUD COMPUTING

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ABSTRACT

Resource sharing in a pure plug and play model that dramatically simplifies infrastructure planning is the promise of „cloud computing". The two key advantages of this model are easeof- use and cost-effectiveness. Though there remain questions on aspects such as security and vendor lock-in, the benefits this model offers are many. This paper explores some of the basics of cloud computing with the aim of introducing aspects such as:

- *Realities and risks of the model*
- *Components in the model*
- *Characteristics and Usage of the model*

The paper aims to provide a means of understanding the model and exploring options available for complementing your technology and infrastructure needs.

Keywords: *Iaas, Paas and Saas.*

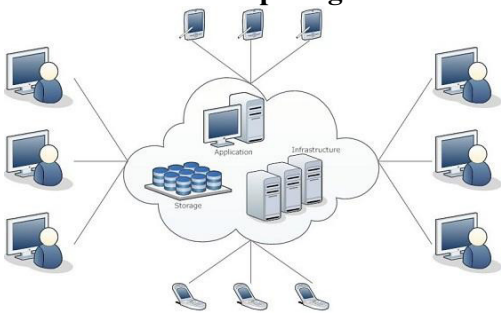
Introduction:

Cloud Computing provides us a means by which we can access the applications as utilities, over the Internet. It allows us to create, configure, and customize applications online.Cloud computing is a types of INTERNET based computing that provides shared computer processing resources and data to computers and other devices on demand.

What is Cloud?

The term Cloud refers to a Network or Internet. In other words, we can say that Cloud is something, which is present at remote location. Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN. Applications such as e-mail, web conferencing, customer relationship management (CRM),all run in cloud.

What is Cloud Computing?



Cloud Computing refers to manipulating, configuring, and accessing the applications only

SERVICE MODELS

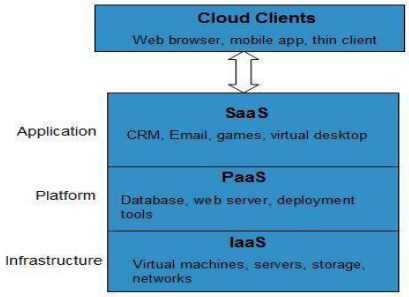
Service Models are the reference models on which the Cloud Computing is based. These can be categorized into three basic service models as listed below:

1. Infrastructure as a Service (IaaS)
2. Platform as a Service (PaaS)
3. Software as a Service (SaaS)

There are many other service models all of which can take the form like **XaaS**, i.e.,

Anything as a Service. This can be **Network as a Service, Business as a Service, Identity as a Service, Database as a Service** or **Strategy as a Service.**

The **Infrastructure as a Service (IaaS)** is the most basic level of service. Each of the service models make use of the underlying service model.



INFRASTRUCTURE AS A SERVICE (IAAS)

IaaSprovides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

PLATFORM AS A SERVICE (PAAS)

PaaSprovides the runtime environment for applications, development & deployment tools, etc.

SOFTWARE AS A SERVICE (SAAS)

SaaSmodel allows to use software applications as a service to end users.

Architecture

The Cloud Computing architecture comprises of many cloud components, each of them are loosely coupled. We can broadly divide the cloud architecture into two parts:

- Front End
- Back End

Each of the ends are connected through a network, usually via Internet. The following diagram shows the graphical view of cloud computing architecture.

Storage Devices

Storage devices can be broadly classified into two categories:

- Block Storage Devices
- File Storage Devices

BLOCK STORAGE DEVICES

Block Storage Devices offer raw storage to the clients. This raw storage can be partitioned to create volumes.

FILE STORAGE DEVICES

File Storage Devices offers storage to clients in form of files, maintaining its own file system. This storage is in the form of Network Attached Storage (NAS).

APPLICATIONS

Cloud Computing has its applications in almost all the fields such as business,social networking, management, entertainment, art.

Business Applications

Cloud computing has made businesses more collaborative and easy by incorporating various apps such as MailChimp, Chatter, Google Apps for business, and Quickbooks. SN Application Description

1. MailChimp It offers an e-mail publishing platform. It is widely employed by the businesses to design and send their e-mail campaigns.

2 Chatter Chatter app helps the employee to share important information about organization in real time. One can get the instant feed regarding any issue.

Management Applications

There are apps available for management task such as time tracking, organizing notes. Applications performing such tasks are discussed below: SN Application Description

1 Toggl It helps in tracking time period assigned to a particular project.

2 Evernote is an application that organizes the sticky notes and even can read the text from images which helps the user to locate the notes easily.

Social Applications There are several social networking services providing websites such as Facebook, Twitter, etc. SN Application Description

1 Facebook offers social networking service. One can share photos, videos, files, status and much more.

2 Twitter helps to interact directly with the public. One can follow any celebrity, organization and any person, who is on twitter and can have latest updates regarding the same.

Entertainment Applications

It offers streaming service, i.e., music can be stored online and can be played from cloud using service's own media player.

Art Applications

It offers art services such as designing and printing business cards, postcards and minicards.

FUTURE OF CLOUD COMPUTING

Opportunities in cloud are increasing day by day .IT architects with cloud computing skills can earn as high as INR 2,000,000 according to the survey by computer world 25% of the hirers interviewed would be looking out for individuals with cloud computing skills.

CONCLUSION

To summarize, the cloud provides many options for the everyday computer user as well as large and small businesses. It opens up the world of computing to a broader range of uses and increases the ease of use by giving access through any internet connection. However, with this increased ease also come drawbacks. You have less control over who has access to your information and little to no knowledge of where it is stored. You also must be aware of the security risks of having data stored on the cloud.

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CLOUD COMPUTING

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Abstract:

Cloud computing has formed the conceptual and infrastructural basis for tomorrow's computing. The global computing infrastructure is rapidly moving towards cloud based architecture. While it is important to take advantages of could based computing by means of deploying it in diversified sectors, the security aspects in a cloud based computing environment remains at the core of interest. Cloud based services and service providers are being evolved which has resulted in a new business trend based on cloud technology.

With the introduction of numerous cloud based services and geographically dispersed cloud service providers, sensitive information of different entities are normally stored in remote servers and locations with the possibilities of being exposed to unwanted parties in situations where the cloud servers storing those information are compromised. If security is not robust and consistent, the flexibility and advantages that cloud computing has to offer will have little credibility.

This paper presents a review on the cloud computing concepts as well as security issues inherent within the context of cloud computing and cloud.

KEYWORDS

Cloud computing, cloud service, cloud security, computer network, distributed computing, security.

1. INTRODUCTION

Recent developments in the field of could computing have immensely changed the way of computing as well as the concept of computing resources. In a cloud based computing infrastructure, the resources are normally in someone else's premise or network and accessed remotely by the cloud users (Petre, 2012; Ogigau-Neamtiu, 2012; Singh & jangwal, 2012).

Processing is done remotely implying the fact that the data and other elements from a person need to be transmitted to the cloud infrastructure or server for processing; and the output is returned upon completion of required processing. In some cases, it might be required or at least possible for a person to store data on remote cloud servers. These gives the following three sensitive states or scenarios that are of particular concern within the operational context of cloud computing:

- The transmission of personal sensitive data to the cloud server,
- The transmission of data from the cloud server to clients' computers and
- The storage of clients' personal data in cloud servers which are remote server not owned by the clients.

All the above three states of cloud computing are severely prone to security breach that makes the research and investigation within the security aspects of cloud computing practice an imperative one. There have been a number of different blends that are being used in cloud computing realm,
but the core concept remain same – the infrastructure, or roughly speaking, the resources

2. CLOUD COMPUTING INFRASTRUCTURE

The term cloud computing is rather a concept which is a generalized meaning evolved from distributed and grid computing. Cloud computing is described as the offspring of distributed and grid computing by some authors (Che, Duan, Zhang & Fan, 2011).

The straightforward meaning of cloud computing refers to the features and scenarios where total computing could be done by using someone else's network where ownership of hardware and soft resources are of external parties. In general practice, the dispersive nature of the resources that are considered to be the 'cloud' to the users are essentially in the form of distributed computing; though this is not apparent or by its definition of cloud computing, do not essentially have to be apparent to the users.

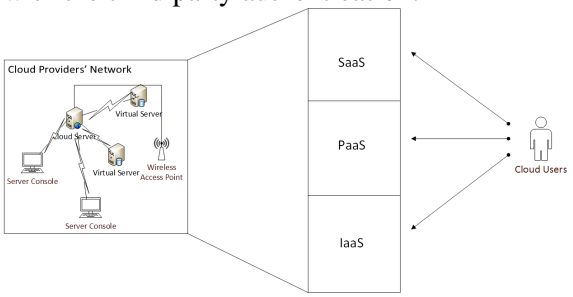
In recent years, the cloud has evolved in two broad perspectives – to rent the infrastructure in cloud, or to rent any specific service in the cloud. Where the former one deals with the hardware and software usage on the cloud, the later one is confined only with the 'soft' products or services from the cloud service and infrastructure providers. The computing world has been introduced with a number of terminologies like SaaS (Software as a Service), PaaS (Platform as a Service) and IaaS (Infrastructure as a Service) with the evolution of cloud computing.

As discussed earlier, the term 'cloud computing' is rather a concept, so are the terminologies to define different blends of cloud computing. At its core essence, cloud computing is nothing but a specialized form of grid International Journal of Network Security & Its Applications (IJNSA), Vol.6, No.1, January 2014

3. AUTHENTICATION IN CLOUD

Security is the most prioritized aspect for any form of computing, making it an obvious expectation that security issues are crucial for cloud environment as well. As the cloud computing approach could be associated with having users' sensitive data stored both at clients' end as well as in cloud servers, identity management and authentication are very crucial in cloud computing (Kim & Hong, 2012; Emam, 2013; Han, Susilo & Mu, 2013; Yassin, Jin, Ibrahim, Qiang & Zou, 2012). Verification of eligible users' credentials and protecting such credentials are part of main security issues in the cloud - violation in these areas could lead to undetected security breach (Kumar, 2012) at least to some extent for some period. A possible authentication scenario for a cloud infrastructure.

The authentication for the cloud users can be done either by the cloud service provider or the service provider can outsource the identity management and authentication service to third party specialists (Gonzalez, Miers, Redigolo, Simplicio, Carvalho, Naslund & Pourzandi, 2012; Sharma & Mittal, 2013). In the later case, the cloud service provider is required to have collaboration with the third party authentication.



The study presented in this paper is organized with a view to discuss and indentify the approach to cloud computing as well as the security issues and concerns that must be taken into account in the deployment towards a cloud based computing infrastructure. Discussion on the technological concepts and approaches to cloud computing including the architectural illustration has been taken into consideration within the context of discussion in this paper. Security issues inherent in cloud computing approach have been discussed afterwards. The exploration in the technological and security concerns of cloud computing has led to the concluding realization on the overall aspects of cloud computing.

The approaches to counter security issues inherent in cloud computing are numerous with diversified facets and applications which has been kept out of scope. A discussion on the authentication of cloud computing has been addressed as it forms the holistic basis to embed integrity in the context of cloud computing security.

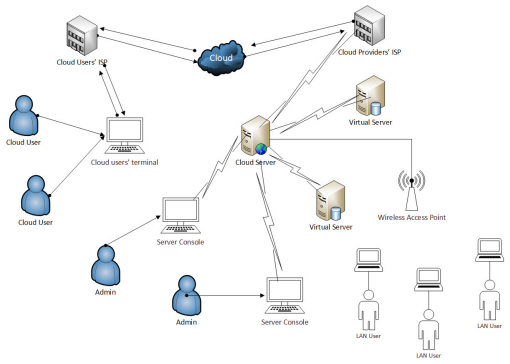
4. SECURITY ISSUES IN CLOUD

Cloud computing comes with numerous possibilities and challenges simultaneously. Of the challenges, security is considered to be a critical barrier for cloud computing in its path to success (Khorshed, Ali & Wasimi, 2012).

The security challenges for cloud computing approach are somewhat dynamic and vast. Data location is a crucial factor in cloud computing security (Teneyuca, 2011). Location transparency is one of the prominent flexibilities for cloud computing, which is a security threat at the same time – without knowing the specific location of data storage, the provision of data protection act for some region might be severely affected and violated.

Cloud users' personal data security is thus a crucial concern in a cloud computing environment (Joint, Baker & Eccles, 2009; Ismail, 2011; King & Raja, 2012). In terms of customers' personal or business data security, the strategic policies of the cloud providers are of highest significance (Joint & Baker, 2011) as the technical security solely is not adequate to address the problem. Trust is another problem which raises security concerns to use cloud service (Ryan & Falvy, 2012) for the reason that it is directly related to the credibility and authenticity of the cloud service providers.

Trust establishment might become the key to establish a successful cloud computing environment. The provision of trust model is essential in cloud computing as this is a common interest area for all stakeholders for any given cloud computing scenario. Trust in cloud might be dependent on a number of factors among which some are automation management, human factors, processes and policies (Abbadi & Martin, 2011).



CONCLUSIONS

Cloud computing has enormous prospects, but the security threats embedded in cloud computing approach are directly proportional to its offered advantages. Cloud computing is a great opportunity and lucrative option both to the businesses and the attackers – either parties can have their own advantages from cloud computing. The vast possibilities of cloud computing cannot be ignored solely for the security issues reason – the ongoing investigation and research for robust, consistent and integrated security models for cloud computing could be the only path of motivation.

The security issues could severely affect could infrastructures. Security itself is conceptualized in cloud computing infrastructure as a distinct layer (Dukaric & Juric, 2013). Security for cloud computing environment is a non-compromising requirement.

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WIRELESS NETWORK COMMUNICATION

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Abstract:

This paper presents an overview of wireless local-area networks (LANs) and wireless personal area networks (PANs), with emphasis on the two most popular standards: IEEE 802.1 1, and Bluetooth. While there are many such surveys in the current literature and online, we attempt here to present wireless LANs and PANS in a unified fashion as a viable alternative to wired LANs, while stressing the remaining challenges and limitations.

Keywords:. *Wireless local area networks; power control; land mobile radio data communications; personal communication*
networks: 802.1 1: Bluetooth.

INTRODUCTION

Wireless communications continue to enjoy exponential growth in the cellular telephony, wireless Internet, and wireless home networking arenas. The wireless networks reviewed in this paper include wireless local area networks (WLANs) and wireless personal area networks (WPANs) **[a** list of communications acronyms. WPANs are differentiated from the WLANs by their smaller area of coverage, and their ad-hoc-only topology.

The very first WPAN was probably the Body LAN, resulting from a DARF'A project in the mid-1990s. It was a small-size, low-power, inexpensive network, with modest bandwidth, which connected personal devices within a range of 2 m. Motivated by this project, a WPAN group started in 1997 as a part of the IEEE 802 standardization group.

This paper attempts to survey and compare the state of wireless networking (both WLANs and WPANs). It is organized as follows. The history of wireless communications and data. We discuss the challenges of mobility in communications systems, while discusses various network concepts and technologies.

HISTORY AND GENERAL CONCEPTS:

In this section, we present a brief overview of the history of wireless communication, and we describe the development of wireless local area networks and wide-area networks.

HISTORY OF WIRELESS TRANSMISSION

The history of modem wireless communications started in1896 with Marconi, who demonstrated wireless telegraphy by sending and receiving Morse code, based on long-wave (>> 1 km
wavelength) radiation, using high-power transmitters. In 1907, the first commercial trans-Atlantic wireless service was initiated, using huge ground stations and 30 m x 100 m antenna masts. World War I saw the rapid development of communications intelligence, intercept technology, cryptography, and other technologies that later became critical to the advent of a modem wireless system. In 1920, Marconi discovered shortwave (< 100 m wavelength) transmission.

Such waves undergo reflections, refractions, absorption, and bounce off the ionosphere, making for much more efficient transmission. The higher liequencies needed were made possible by vacuum tubes, which be8:ame available around 1906. In addition, cheaper, smaller, and bett er-quality transmitters became available.

In 1915, wireless voice trmsmission between NewYork and San Francisco was achieved, and in 1920, the first commercial radio broadcast took place in Pittsburgh, Pennsylvania. In 1921, police cars in Detroit, Michigan, were equipped with wireless dispatch radios. In 1935, the first telephone call around the world was made. During the World War I1 years, radio technology developed rapidly to assist with the war effort.

WIRELESS DATA

The original wireless networks were meant for voice traffic and, as such, are not particularly

suitable for data traffic. As an example, delays of less than 100 ms are required for voice traffic, in order to avoid undesirable echoing effects, but larger delays may be tolerated for most if not all data. On the other hand, packetized speech can tolerate some packet **loss,** and bit-error rates (BERs) of 0.001. This may result in a slight quality loss, but no major aftermath. A BER of < 0.00001 is required for data transmission, and no packet loss is allowed. Finally, telephone conversations last, on the average, between three and 20 minutes, so a setup time of a few seconds is acceptable. Data transmissions can vary from a few seconds for a short e-mail to minutes for a large data transfer, so the setup time should be very small. These differences greatly affect wireless LANs and PANS, as they are designed to accommodate both data and voice traffic.

WLANs

Wireless local-area networks use high-frequency electromag-netic waves, either infrared (IR) or radio frequency (RF), to transmit information from one point to another. It is generally agreed that RF will be more practical than IR in home and office networking, since it can propagate through solid obstacles. Traffic from multiple users is modulated onto the radio waves at the transmitter, and extracted at the receiver. Multiple radio carriers can coexist in the same physical space, and at the same time, without interfering with each other by transmitting at different frequencies (frequency-division multiple access or FDMA,) in different time slots, (time-division multiple access or TDMA), or using specific codes for each message (code-division multiple access or CDMA,).

WPANs

WPANs use RF technologies similar to those of WLANs, but are meant for smaller communication coverage areas (10s of meters versus 100s). In 1998, the WPAN group published the original functionality requirement. Also in 1998, the same group invited participation from several organizations, such **as** Bluetooth.

CHALLENGES OF MOBILITY IN COMMUNICATIONS SYSTEMS

The most desirable characteristic of wireless networks is their mobility. This desirable characteristic results in, and is influenced by, the many challenges encountered in a wireless medium. These challenges take place **at** V ~ ~ ~ DlaUyeSrs of the theoretical **OS1** communications model. The goal of reliable communication is, of course, to guarantee a certain quality of service *(QoS),* as measured, for example, by speedy and error-free transmission. This places various requirements on the various layers of the theoretical **OS1** communications model.

NETWORKS, CONCEPTS, AND TECHNOLOGIES

Today, two major technologies are used for wireless *LANs* and PANS. The first technology exists in the industrial ISM hands:
2.4-2.4835 GHz, 5.15-5.35 GHz, and 5.725-5.825 GHz.

The other technology, available in Europe, is the Digital European Cordless Telecommunications. (DECT) standard, ETS 300 ***175.*** We will focus in this paper on the ISM-band technologies. To use the ISM frequency hand, equipment must also be compliant with the European Telecommunication Standard, ETS 300 **328,** and FCC 15.247. Since the ISM band is used by otherequipment (such as garage-door openers and microwave ovens),avoiding interference from such equipment is important. The different standards stipulate that spread spectrum must be used. In a spread-spectrum system, users are

multiplexed by assigning them different spreading keys. Such a system is called a code-division multiple access (CDMA) system. However, most wireless LAN and PAN products are not technically CDMA systems, since users belonging to the same wireless network utilize the same spreading key. Instead, users are separated in time using a carriersense multiple access (CSMA) protocol, similar to that used in the Ethernet.

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IEEE 802.11

The IEEE 802 standards committee formed the 802.11 Wireless Local Area Networks Standards Working Group in 1987. The 802.11 working group - which contains members from intemational companies, universities, and organizations - first took on the task of developing a global standard for radio equipment and networks operating in the 2.4 GHz unlicensed frequency band, for data rates of **1** and 2 Mbps. The **802.1 1** final approval was obtained in 1997. The standard does not specify technology or implementation, but simply the specifications for the physical (PHY) layer and media-access-control (MAC) layer (see Table 3). The original standard called for a 2 Mbps data rate, using direct-sequence spread spectrum or frequency-hopping spread spectrum. In 1999. IEEE 802.1 lb - the high-rate standard, with data rates of up to 11 Mbps - using direct-sequence spread spectrum was adopted. Currently, IEEE 802.11a is looking into even faster rates (25 Mbps) in the 5 GHz band.

ARCHITECTURE

The IEEE 802.1 1 standard defines the protocol for two types of networks: ad hoc and clientfserver networks. ***An*** ad hoc network is a network where communications are established between multiple nodes, without the need for an access point or server. The client server network, on the other hand, uses an access point that controls the allocation of wireless-resources for all nodes, and allows mobile stations to roam from cell to cell. The access point is also used to interface the mobile radio to the wired or wireless backbone of the client server network.

MEDIA ACCESS CONTROL (MAC)

The access algorithm is based on carrier-sense multiple access (CSMA) with collision avoidance, or CSMMCA. The media-access control supports a variety of physical layers, data rates, and propagation characteristics, including infrared and radio
frequency. The media-access-control layer specification for 802.1 1 has similarities to the 802.3 Ethemet wired-line standard. The protocol for 802.1 1 uses carrier-sense multiple access, collision avoidance (CSMMCA). This protocol prevents collisions instead of detecting them, since collisions are bound to happen in a wireless network, unless the protocol attempts to avoid them a priori. The media-access-control layer, together with the physical layer,samples the energy over the wireless medium.

A common limitation with wireless LAN systems is the hidden- node problem. This can disrupt communication in a busy wireless environment. This problem occurs when there is a station that cannot detect the transmissions of another station, and thus assumes it is OK to transmit. As an example, assume that stations A and B are within communication range. Station C is also within communication range of station B, but not of A. Therefore, both stations A and C could try to transmit to station B at the same time. The use of request-to-send, clear-to-send, data, and acknowledge sequences helps to prevent the disruptions caused by this problem.

BLUETOOTH OR IEEE 802.15

Bluetooth (named after the Viking king who unified Denmark and Norway in the 10th century) is an open standard for short-range ad hoc wireless voice and data networks, operating in the unlicensed ISM 2.4 GHz frequency band. Bluetooth was originally conceived by Ericsson in **1994.** In 1998, Ericsson, Nokia, IBM, Intel, and Toshiba formed **a** special interest group (SIG) to expand the concept and to develop a standard under IEEE 802.15. Currently, over 2000 companies are participating in the Bluetooth SIG, and many are developing Bluetooth products. The Bluetooth SIG considers three application scenarios. The first is wire replacement, to connect a PC or laptop **to** its peripherals. The second is the ad hoc networking of several different users at short ranges in a small area, forming a "piconet," similar to but smaller than an IEEE 802.1 1 cell. The third is to use Bluetooth as an access point to wide-area voice and data services provided by a wired network or cellular system. The last two application scenarios arein direct competition with the intended use of IEEE 802.1 **1.**

Wi-Fi

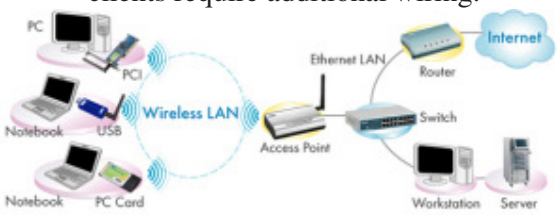
Wi-Fi is a form of low-power wireless communication used by many electronic devices such as laptops, systems, smart phones, etc. In a Wi-Fi setup, a wireless router serves as the communication hub. These networks are extremely limited in range due to low power of transmissions allowing users to connect only within close proximity to a router or signal repeater. Wi-Fi is common in home networking applications which provides portability without any need of cables. Wi-Fi networks need to be secured with passwords for security purposes in order not to be accessed by others.

Wi-Fi

Wireless Networking (Wi-Fi):

Advantages

- **Ease of Integration and Convenience** – The wireless nature of such networks allows users to access network resources from nearly any convenient location.
- **Mobility** – With the emergence of public wireless networks, users can access the internet even outside their normal working environment.
- **Expandability** – Wireless networks are capable of serving a suddenly-increased number of clients with the existing equipment. In a wired network, additional clients require additional wiring.



Wireless Networking WiFI

Disadvantages

- Wireless LANs may not be desirable for a number of reasons.
- Radio Frequency transmission and wireless networking signals are subjected to a wide variety of interference including the complex propagation effects that are beyond the control of the network administrator.
- Security Problems – Wireless networks may choose to utilize some of the various encryption technologies.
- Range will be insufficient for a larger structure – and, in order to increase its range, repeaters or additional access points have to be purchased.
- The speed on most wireless networks will be slower than the slowest common wired networks.
- Installation of an infrastructure-based wireless network is a complex to set up.

The underlying access method allows the formation of small, independent ad hoc cells, as well as the capability for connecting to existing large voice and data networks. Bluetooth also requires the interoperability of protocols (to accommodate heterogeneous equipment) and their re-use

Physical Or Baseband and RF Layers

The core, exclusively-Bluetooth-specific protocols are the baseband, the link-management-protocol, the logical-link control and adaptation protocol, and the service-discovery protocol. Protocols developed based on existing protocols include the RFCOMM and telephony-control protocol binary and AT commands. The third group consists of protocols adopted by the Bluetooth. The Bluetooth specification is open and other legacy protocols, such as HTTP (hypertext transfer protocol) and FTP (file transfer protocol) can be accommodated on top of the existing Bluetooth stack. The RF and baseband layers of Bluetooth are located in the OS1 physical (PHY) layer. The Baseband layer contains the hardware that Tums received radio signals into a digital form that can be processed by the host application. It also converts digital or voice data into a form that can be transmitted using a radio signal.

CONCLUSIONS

In this paper, we have presented an overview of wireless LANs and PANS, stressing the two most-common standards, IEEE 802.1 1 and Bluetooth. While limited in scope, we have attempted to give the reader a quick comparison between the two technologies, stressing various problem:;, and solutions to wireless networking problems.

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MOBILE COMPUTING

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Abstract:

Mobile computing is becoming increasingly important due to the rise in the number of portable computers and the desire to have continuous network connectivity to the Internet irrespective of the physical location of the node. Mobile computing has fast become an important new paradigm in today's world of networked computing systems. Ranging from wireless laptops to cellular phones and WiFi/Bluetooth enabled PDA's to wireless sensor networks, mobile computing has become ubiquitous in its impact on our daily lives. The goal of this paper is to point out some of the limitations, characteristics, applications and issues of mobile computing.

KEYWORDS

Mobile, Mobile Computing.

I. INTRODUCTION

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link. The main concept involves:

- ❖ Mobile communication
- ❖ Mobile hardware
- ❖ Mobile software

The mobile communication in this case, refers to the infrastructure put in place to ensure that
seamless and reliable communication goes on. These would include devices such as Protocols, Services, Bandwidth, and Portals necessary to facilitate and support of the stated services. The data format is also defined at this stage. This ensures that there is no collision with other existing systems which offer the same service. Since the media is unguided/unbounded, the overlaying infrastructure is more of radio wave oriented. That is, the signals are carried over the air to intended devices that are capable of receiving and sending similar kinds of signals.

Mobile computing is human–computer interaction by which a computer is expected to be transported during normal usage, which allows for transmission of data, voice and video. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad hoc networks and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications.

Principles of Mobile Computing

- **Portability:** Facilitates movement of device(s) within the mobile computing environment.
- **Connectivity:** Ability to continuously stay connected with minimal amount of lag/downtime, without being affected by movements of the connected nodes

1. **Social Interactivity**: Maintaining the connectivity to collaborate with other users, at least within the same environment.
2. **Individuality:** Adapting the technology to suit individual needs.
3. **Portability:** Devices/nodes connected within the mobile computing system should facilitate mobility. These devices may have limited device capabilities and limited power supply, but should have a sufficient processing capability and physical portability to operate in a movable environment.
4. **Connectivity:** This defines the quality of service (QoS) of the network connectivity. In a mobile computing system, the network availability is expected to be maintained at a high level with the minimal amount of lag/downtime without being affected by the mobility of the connected nodes.

5. **Interactivity:** The nodes belonging to a mobile computing system are connected with one another to communicate and collaborate through active transactions of data.
6. **Individuality:** A portable device or a mobile node connected to a mobile network often denote an individual; a mobile computing system should be able to adopt the technology to cater the individual needs and also to obtain contextual information of each node.

II. DEVICES

Some of the most common forms of mobile computing devices are as given below:

- ✓ Portable computers, compact, lightweight units including a full character set keyboard and primarily intended as hosts for software that may be parameterized, as laptops, notebooks, notepads, etc.
- ✓ Mobile phones including a restricted key set primarily intended but not restricted to for vocal communications, as smartphones, cell phones, feature phones, etc.
- ✓ Smart cards that can run multiple applications but typically payment, travel and secure area access
- ✓ Wearable computers, mostly limited to functional keys and primarily intended as incorporation of software agents, as watches, wristbands, necklaces, keyless implants, etc.

The existence of these classes is expected to be long lasting, and complementary in personal usage, none replacing one the other in all features of convenience. Other types of mobile computers have been introduced since the 1990s including the:

- ➢ Portable computer (discontinued)
- ➢ Personal digital assistant/Enterprise digital assistant (discontinued)
- ➢ Ultra-Mobile PC (discontinued)
- ➢ Laptop
- ➢ Smartphone
- ➢ Robots
- ➢ Tablet computer
- ➢ Wearable computer

III. LIMITATIONS

RANGE AND BANDWIDTH: Mobile Internet access is generally slower than direct cable connections, using technologies such as GPRS and EDGE, and more recently HSDPA, HSUPA, 3G and 4G networks and also the upcoming 5G network. These networks are usually available within range of commercial cell phone towers. High speed network wireless LANs are inexpensive but have very limited range.

SECURITY STANDARDS:

When working mobile, one is dependent on public networks, requiring careful use of VPN. Security is a major concern while concerning the mobile computing standards on the fleet. One can easily attack the VPN through a huge number of networks interconnected through the line.

POWER CONSUMPTION:

When a power outlet or portable generator is not available, mobile computers must rely entirely on battery power. Combined with the compact size of many mobile devices, this often means unusually expensive batteries must be used to obtain the necessary battery life.

TRANSMISSION INTERFERENCES:

Weather, terrain, and the range from the nearest signal point can all interfere with signal reception. Reception in tunnels, some buildings, and rural areas is often poor.

POTENTIAL HEALTH HAZARDS:

People who use mobile devices while driving are often distracted from driving and are thus assumed more likely to be involved in traffic accidents. Cell phones may interfere with sensitive medical devices. Questions concerning mobile phone radiation and health have been raised.

HUMAN INTERFACE WITH DEVICE:

Screens and keyboards tend to be small, which may make them hard to use. Alternate input methods such as speech or handwriting recognition require training.

In-vehicle computing and fleet computing

Many commercial and government field forces deploy a rugged portable computer with their fleet of vehicles. This requires the units to be anchored to the vehicle for driver safety, device security, and ergonomics. Rugged computers are rated for severe vibration associated with large service vehicles and off-road driving and the harsh environmental conditions of constant professional

use such as in emergency medical services, fire, and public safety.

Visibility of standard screens becomes an issue in bright sunlight.

Touchscreen users easily interact with the units in the field without removing gloves.

High-temperature battery settings: Lithium ion batteries are sensitive to high temperature conditions for charging. A computer designed for the mobile environment should be designed with a high-temperature charging function that limits the charge to 85% or less of capacity.

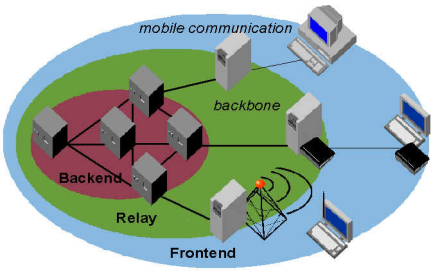
External antenna connections go through the typical metal cabins of vehicles which would block wireless reception, and take advantage of much more capable external communication and navigation equipment.

IV. SECURITY ISSUES INVOLVED IN MOBILE

Mobile security or mobile phone security has become increasingly important in mobile computing. It is of particular concern as it relates to the security of personal information now stored on the smartphone.

More and more users and businesses use smartphones as communication tools but also as a means of planning and organizing their work and private life. Within companies, these technologies are causing profound changes in the organization of information systems and therefore they have become the source of new risks. Indeed, smartphones collect and compile an increasing amount of sensitive information to which access must be controlled to protect the privacy of the user and the intellectual property of the company.

All smartphones, as computers, are preferred targets of attacks. These attacks exploit weaknesses related to smartphones that can come from means of communication like SMS, MMS, wifi networks, and GSM. There are also attacks that exploit software vulnerabilities from both the web browser and operating system. Finally, there are forms of malicious software that rely on the weak knowledge of average users.



CELLULAR NETWORK

A cellular network or mobile network is a communication network where the last link is wireless. The network is distributed over land areas called cells, each served by at least one fixed-location transceiver, known as a cell site or base station. This base station provides the cell with the network coverage which can be used for transmission of voice, data and others.

A cell might use a different set of frequencies from neighboring cells, to avoid interference and provide guaranteed service quality within each cell.

When joined together these cells provide radio coverage over a wide geographic area. This enables a large number of portable transceivers (e.g., mobile phones, pagers, etc.) to communicate with each other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission.

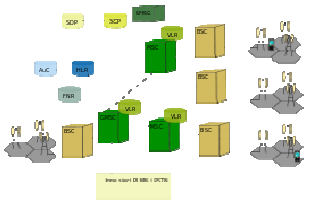
The drivers knew which frequency covered approximately what area. When they did not receive a signal from the transmitter, they would try other channels until they found one that worked. The taxi drivers would only speak one at a time, when invited by the base station operator (this is, in a sense, time division multiple access (TDMA)).

Mobile phone network

The most common example of a cellular network is a mobile phone (cell phone) network. A mobile phone is a portable telephone which receives or makes calls through a cell site (base station), or transmitting tower. Radio waves are used to transfer signals to and from the cell phone.

In cities, each cell site may have a range of up to approximately 1⁄2 mile (0.80 km), while in rural areas, the range could be as much as 5 miles (8.0 km). It is possible that in clear open areas, a user may receive signals from a cell site 25 miles (40 km) away.

Since almost all mobile phones use cellular technology, including GSM, CDMA, and AMPS (analog), the term "cell phone" is in some regions, notably the US, used interchangeably with "mobile phone". However, satellite phones are mobile phones that do not communicate directly with a ground-based cellular tower, but may do so indirectly by way of a satellite.



SMALL CELLS

Small cells, which have a smaller coverage area than base stations, are categorised as follows:

- Microcell, less than 2 kilometres
- Picocell, less than 200 metres
- Femtocell, around 10 metres

V. ADVANTAGES AND CATEGORIES OF MOBILE COMPUTING

Computers are one of the major inventions of the world. The invention of computer has changed the world. During these days every field of life seems to be computerized. Later in the 21st century a new technology was introduced in the world known as mobile computing. Now-a-days computers are modified into mobile computers known as laptops.

A small introduction of mobile computing is that you can do your work in motion. In simple words it means that you can do your work while sitting anywhere in the world. You do not have to sit at one place to do your work. The main challenge of Mobile computing is that, we can communicate with other people's while sitting anywhere in the world. The name MOBILE is derived from the first letter in each of the six categories that make up the framework.

VI. CONCLUSION

Mobile computing offers significant benefits for organizations that choose to integrate the technology into their fixed organizational information system. Mobile computing is made possible by portable computer hardware, software, and communications systems that interact with a non-mobile organizational information system while away from the normal, fixed workplace. Mobile computing is a versatile and potentially strategic technology that improves information quality and accessibility, increases operational efficiency, and enhances management effectiveness.

Here in this paper we have in term identified some of the challenging issues, applications of mobile computing along with few of the characteristics of Mobile computing.

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[6]Srikanth Pullela,Department of ComputerScience.

DATA MINING

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Abstract:

Big data, which refers to the data sets that are too big to be handled using the existing database management tools, are emerging in many important applications, such as Internet search, business informatics, social networks, social media, genomics, and meteorology.

Big data presents a grand challenge for database and data analytics research. In this talk, I review the exciting activities in my group addressing the big data challenge. The central theme is to connect big data with people in various ways. Particularly, I will showcase our recent progress in user preference understanding, context-aware, on-demand data mining using crowd intelligence, summarization and explorative analysis of large data sets, and privacy preserving data sharing and analysis.

Keywords*: Mining, transformation and marketing.*

I. INTRODUCTION

There is a huge amount of data available in the Information Industry. This data is of no use until it is converted into useful information. It is necessary to analyze this huge amount of data and extract useful information from it.

Extraction of information is not the only process we need to perform; data mining also involves other processes such as Data Cleaning, Data Integration, Data Transformation, Data Mining, Pattern Evaluation and Data Presentation.

Once all these processes are over, we would be able to use this information in many applications such as Fraud Detection, Market Analysis, Production Control, Science Exploration, etc. Data mining is highly useful in the following domains:

- Market Analysis and Management
- Corporate Analysis & Risk Management
- Fraud Detection

Apart from these, data mining can also be used in the areas of production control, customer retention, science exploration, sports, astrology, and Internet Web Surf-Aid.

II. MARKET ANALYSIS AND MANAGEMENT

Listed below are the various fields of market where data mining is used:

- Customer Profiling - Data mining helps determine what kind of people buy what kind of products.
- Identifying Customer Requirements - Data mining helps in identifying the best products for different customers. It uses prediction to find the factors that may attract new customers.
- Cross Market Analysis - Data mining performs Association/correlations between product sales.
- Target Marketing - Data mining helps to find clusters of model customers who share the same characteristics such as interests, spending habits, income, etc.
- Determining Customer purchasing pattern - Data mining helps in determining customer purchasing pattern.
- Providing Summary Information - Data mining provides us various multidimensional summary reports.

III. RISK MANAGEMENT

Data mining is used in the following fields of the Corporate Sector:

- Finance Planning and Asset Evaluation - It involves cash flow analysis and prediction, contingent claim analysis to evaluate assets.
- Resource Planning - It involves summarizing and comparing the resources and spending.
- Competition - It involves monitoring competitors and market directions.

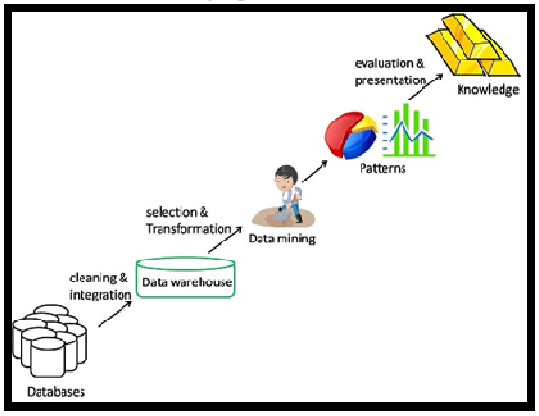
FRAUD DETECTION

Data mining is also used in the fields of credit card services and telecommunication to detect frauds. In fraud telephone calls, it helps to find the destination of the call, duration of the call, time of the day or week, etc. It also analyzes the patterns that deviate from expected norms.

STEPS INVOLVED IN DATA MINING

- *Data cleaning*
- *Data integration*
- *Data selection*
- *Data transformation*
- *Data mining*
- *Pattern evaluation*

❖ *Knowledge presentation*



DATA CLEANING

It is a phase in which noise data and irrelevant data are removed from the collection.

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DATA INTEGRATION

Multiple data sources, often heterogeneous, may be combined in a common source.

DATA SELECTION

The data relevant to the analysis is decided on and retrieved from the data collection.

DATA TRANSFORMATION

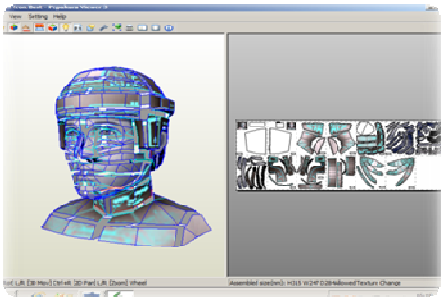
It is known as data consolidation, it is a phase in which the selected data is transformed into forms appropriate for the mining procedure.

DATA MINING

It is the crucial step in which clever techniques are applied to extract patterns potentially useful.

PATTERN EVALUVATION

In this step, strictly interesting patterns representing knowledge are identified based on given measures.



DATA MINING TECHNIQUE

- Data mining techniques have been developed and used in data mining projects
  - ✓ ASSOCIATION

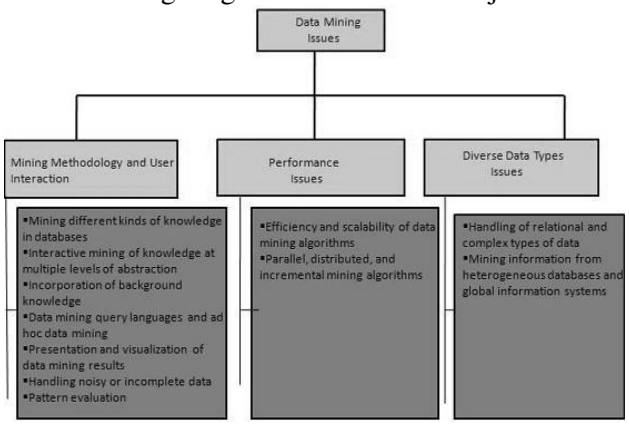
- ✓ PREDICTION
- ✓ SEQUENTIAL PATTERNS

IV. ISSUES

Data mining is not an easy task, as the algorithms used can get very complex and data is not always available at one place. It needs to be integrated from various heterogeneous data sources. These factors also create some issues. Here in this tutorial, we will discuss the major issues regarding:

- Mining Methodology and User Interaction
- Performance Issues
- Diverse Data Types Issues

The following diagram describes the major issues.



MINING METHODOLOGY AND USER INTERACTION ISSUES

It refers to the following kinds of issues:

- Mining different kinds of knowledge in databases - Different users may be interested in different kinds of knowledge. Therefore it is necessary for data mining to cover a broad range of knowledge discovery task.
- Interactive mining of knowledge at multiple levels of abstraction - The data mining process needs to be interactive because it allows users to focus the search for patterns, providing and refining data mining requests based on the returned results.
- Incorporation of background knowledge - To guide discovery process and to express the discovered patterns, the background knowledge can be used. Background knowledge may be used to express the discovered patterns not only in concise terms but at multiple levels of abstraction.
- Data mining query languages and ad hoc data mining - Data Mining Query language that allows the user to describe ad hoc mining tasks, should be integrated with a data warehouse query language and optimized for efficient and flexible data mining.
- Presentation and visualization of data mining results - Once the patterns are discovered it needs to be expressed in high level languages, and visual representations. These representations should be easily understandable.
- Handling noisy or incomplete data - The data cleaning methods are required to handle the noise and incomplete objects while mining the data regularities. If the data cleaning methods are not there then the accuracy of the discovered patterns will be poor.
- Pattern evaluation - The patterns discovered should be interesting because either they represent common knowledge or lack novelty.

PERFORMANCE ISSUES

There can be performance-related issues such as follows:

- Efficiency and scalability of data mining algorithms - In order to effectively extract the information from huge amount of data in databases, data mining algorithm must be efficient and scalable.
- Parallel, distributed, and incremental mining algorithms - The factors such as huge size of databases, wide distribution of data, and complexity of data mining methods motivate the development of parallel and distributed data mining algorithms. These algorithms divide the data into partitions which is further processed in a parallel fashion. Then the results from the partitions is merged. The incremental algorithms, update databases without mining the data again from scratch.

DIVERSE DATA TYPES ISSUES

- ➢ Handling of relational and complex types of data - The database may contain complex data objects, multimedia data objects, spatial data, temporal data etc. It is not possible for one system to mine all these kind of data.

V. CONCLUSION

Data mining is a tool that is used by governments and corporations to predict and establish trends with specific purposes in mind. Consumers today come across a variety of goods and services while shopping. During live customer transactions, a Recommender System helps the

consumer by making product recommendations. The Collaborative Filtering Approach is generally used for recommending products to customers. These recommendations are based on the opinions of other customers.

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CLOUD COMPUTING

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Abstract:

The actual term cloud borrows from telephony. Cloud computing boasts several attractive benefits for business and end users. End user can spin-up compute resources for almost any type of workload on demand eliminates the traditional need for it administrators to provision and manage compute resources.Companies can scales up as computing needs increase and scale down again as demands decrease. This eliminates the need for massive investments in local infrastructure.

The cloud providers often provide separation between application and data. The underlying physical machines are generally organized in grids and they are usually geographically distributed .There are many service models This can be Network as a Service, Business as a Service, Identity as a Service ,Database as a Service or Strategy as a Service. Infrastructure as a service refers to online Service that abstract the user from the detail of infrastructure like physical computing resources, cloud providers delivers a computing platform, typically including operating system, programming-language execution environment, and database and web service.

The Cloud service provider hosts the software upon their servers. It can be defined as a model in which applications and software's are hosted upon the server The Service in private cloud delivered from business data centre to internal users . This offers versatility and convenience" when the services are rendered over a network that is open for public use .public cloud services may be free. The Hybrid Cloud is mixture of public and private cloud.

However, the critical activities are performed using private cloud while the non-critical activities are performed using public cloud. The Community Cloud allows systems and a service to be accessible by group of organizations. Scalability is one of the major advantages to cloud users. Scalability is provided dynamically to the users. The Front End consists of interfaces and applications that are required to access the cloud computing platforms. Back End consists of all the resources required to provide cloud computing services.

The responsibility of the back end to provide built-in security mechanism, traffic control and protocols. Most of the cloud architectures are built on Grid architecture and utilizes its service. Grid is also a form of distributed computing architecture.

This Utility computing is essentially not same as cloud computing. Utility computing is the aggregation of computing resources, such as computation and storage, as a metered service similar to a traditional public. And cloud is one of such option of providing utility computing to the users. Red hat has an end-to-end stack that is agile, responsive, reliable and cost effective .File Storage Devices offers storage to clients in form of files .Block Storage Devices offer raw storage to the clients.

Massively scalable storage open software defined storage platform are a perfect fit for enterprises deploying open stack. Unmanaged Cloud Storage means that the storage is preconfigured for the consumer Managed Cloud Storage offers online storage space on demand. Cloud Computing has its applications in almost all the fields such as business, entertainment, data storage, social networking, management, entertainment, education, art and global positioning system, etc. Mozy Mozy offers online backup service for files during a data loss.

Today most of the studies in cloud computing is related to commercial benefits. But this idea can also be successfully applied to non-profit organizations and to the social benefit. . In the developing countries like India cloud computing can bring about a revolution in the field of low cost computing with greater efficiency, availability and reliability.

Experts envisioned that utility based computing has a great future in e-governance. In India by building information hubs to help the concerned people with greater access to required information and enable them their experiences to build new knowledge bases. We think this growth rate can be enhanced if the computing system is

really cheap, easy to operate with minimum level of knowledge, without upfront commitment and more essentially if the system is helpful to enhance their life style.

Key Words: IBM, Google, Microsoft, Amazon Web Services, Salesforce.com, investopedia.com etc.

IV. INTRODUCTION

The actual term cloud borrows from telephony in that telecommunicating companies, who until the 1990 primarily offered dedicated point to point data circuits began offering virtual private networking services with comparable quality of service but at a much lower cost.

Cloud computing boasts several attractive benefits for business and end users. there are three main benefits of cloud computing are

a) Self-service provisioning
b) Flexibility
c) Pay-as-you-go

Self-service provisioning:

End user can spin-up compute resources for almost any type of workload on demand. this eliminates the traditional need for it administrators to provision and manage compute resources.

Flexibility:

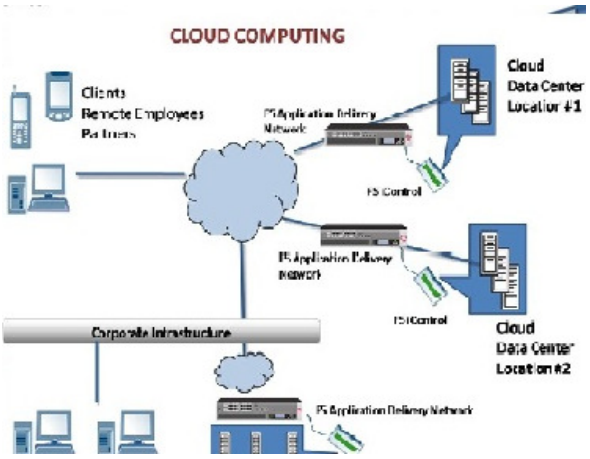
Companies can scales up as computing needs increase and scale down again as demands decrease. This eliminates the need for massive investments in local infrastructure which may or may not remain active.

Pay-as-you-do:

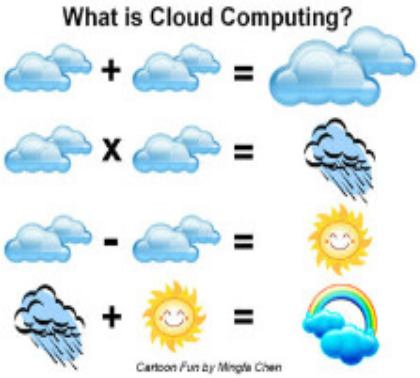
Compute resources are measured at a granular level, allowing users to pay only for the resources and workload they use.

What is Cloud?

Moving to the cloud. Running to the cloud, accessed from the cloud: "these days is seems like everything is happening"in the cloud. but the exact nebulous concept is that it's somewhere at the other end of your internet connection-a place where you can access and store .



What is Cloud Computing?



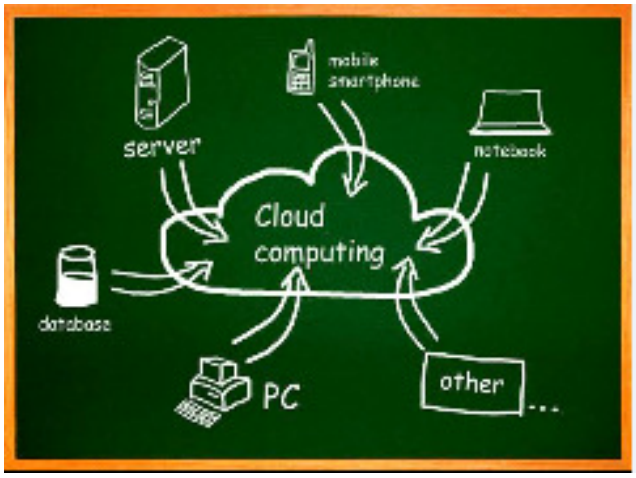
Cloud Computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application.

We need not to install a piece of software on our local PC and this is how the cloud computing overcomes platform dependency issues. Hence, the Cloud Computing is making our business application mobile and collaborative.

II.CLOUD ARCHITECTURE

The cloud providers actually have the physical data centers to provide virtualized services to their users through Internet. The cloud providers often provide separation between application and data. The underlying physical machines are generally organized in grids and they are usually geographically distributed. Virtualization plays an important role in the cloud scenario. The data center hosts provide the physical hardware on

which virtual machines resides. User potentially can use any OS supported by the virtual machines used.



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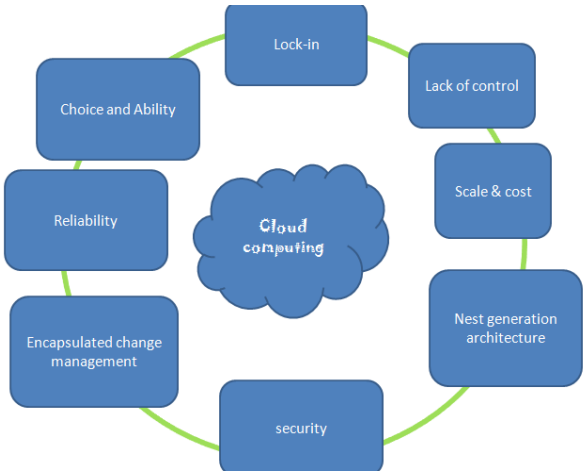


III.SERVICE CATEGORIES

Although cloud computing has changed over time, it has been divided into three broad service categories

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

There are many other service models all of which can take the form like XaaS, i.e., anything as a Service. This can be Network as a Service, Business as a Service, Identity as a Service, Database as a Service or Strategy as a Service. The Infrastructure as a Service (IaaS) is the most basic level of service. Each of the service models makes use of the underlying service model, i.e., each inherits the security and management mechanism from the underlying model, as shown in the following diagram:

INFRASTRUCTURE AS A SERVICE (IAAS)

Infrastructure as a service refers to online Service that abstract the user from the detail of infrastructure like physical computing resources, location, data partitioning, scaling, security, backup etc. a hypervisor , such as Xen , oracle virtual box , oracle VM,KVM,VMware ESX/ESXi or hyper-V , runs the virtual machine as guests . Pools of hypervisors within the cloud operational system can support large numbers of virtual machines and their ability to scale services up and down according to customers varying requirement.

Iaas clouds often offer additional resources such as virtual machine disk-image library, raw block storage, file or object storage, firewalls, load balancers

- host firewalls
- Amazon (EC2)
- Racks pace
- Go Grid
- Microsoft
- Terre mark
- AT&T
- Google
- Soft layer
- HP
- OpSource

PLATFORM AS A SERVICE (PAAS)

PaaS in the paas models, cloud providers delivery a computing platform, typically including operating system, programming-language execution environment, database and web service.

Application developers can develop and run their software solution on a cloud platform without the cost and complexity buying and managing underlying hardware and software layers .some integration and management providers have also embraced specialized applications of paas as delivery models for data solution .

Examples include iaas(integration platform as a service) and dpaas(data platform as a service) paas cloud computing companies

- Salesforce.com
- Google
- Concur Technologies
- Avriba
- Unisys
- Cisco

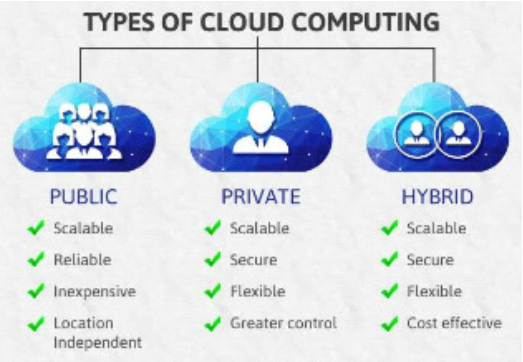
SOFTWARE AS A SERVICE (SAAS)

SaaS model allows using software applications as a service to end users.

In the SaaS layer, the Cloud service provider hosts the software upon their servers. It can be defined as in model in which applications and software's are hosted upon the server and made available to customers over a network. Prominent SaaS Cloud Computing Companies

- Amazon Web Services
- AppScale
- CA Technologies
- Engine Yard
- Salesforce
- Windows Azure
- Open Stack

CLOUD COMPUTING DEPLOYMENT MODELS



1. Private Cloud
2. Public Cloud
3. Hybrid Cloud
4. Community Cloud

Private cloud:

Delivered from business data center to internal users. This offers versatility and convenience while preserving the managing control and security common to local data centers.

Internet users may or may not be billed for services through it chargeback. e.g., e-mail.

Public Cloud:

The cloud is called a "public cloud" when the services are rendered over a network that is open for public use .public cloud services may be free. Generally, public cloud service providers like Amazon Web Services (AWS), Microsoft and Google own and operate the infrastructure at their data center and access is generally via the internet.

Hybrid Cloud:

It's a combination of two or more clouds (private, community or public).

The Hybrid Cloud is mixture of public and private cloud. However, the critical activities are performed using private cloud while the non-critical activities are performed using public cloud.

Community Cloud:

This cloud infrastructure is shared by several organizations. The Community Cloud allows systems and services to be accessible by group of organizations.

Cloud Storage is a service that allows saving data on offsite storage system managed by

third-party and is made accessible by a web services API. Storage Devices.

ADVANTAGES OF USING CLOUD:-

The advantages for using cloud services can be of technical, architectural, business etc

1. Cloud Providers' point of view

(a) Most of the data centers today are underutilized. They are mostly 15% utilized. These data centers need spare capacity just to cope with the huge spikes that sometimes get in the server usage. Large companies having those data centers can easily rent those computing power to other organizations and get profit out of it and also make the resources needed for running data center (like power) utilized properly.

(b) Companies having large data centers have already deployed the resources and to provide cloud services they would need very little investment and the cost would be incremental.

2. Cloud Users' point of view

(a) Cloud users need not to take care about the hardware and software they use and also they don't have to be worried about maintenance. The users are no longer tied to someone traditional system.

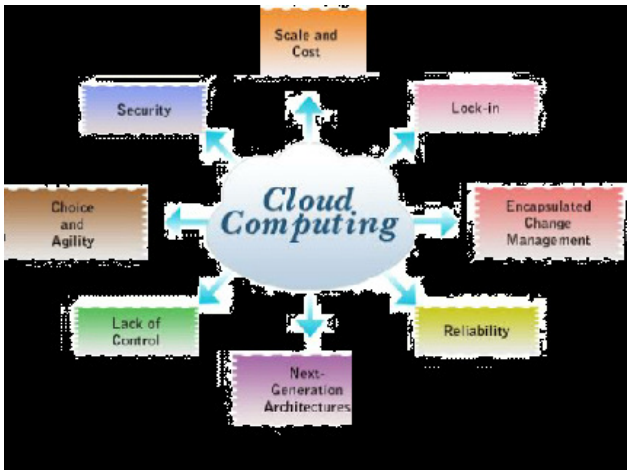
(b) Virtualization technology gives the illusion to the users that they are having all the resources available.

(c) Cloud users can use the resources on demand basis and pay as much as they use. So the users can plan well for reducing their usage to minimize their expenditure.

(d) Scalability is one of the major advantages to cloud users. Scalability is provided dynamically to the users. Users get as much resources as they need. Thus this model perfectly fits in the management of rare spikes in the demand.

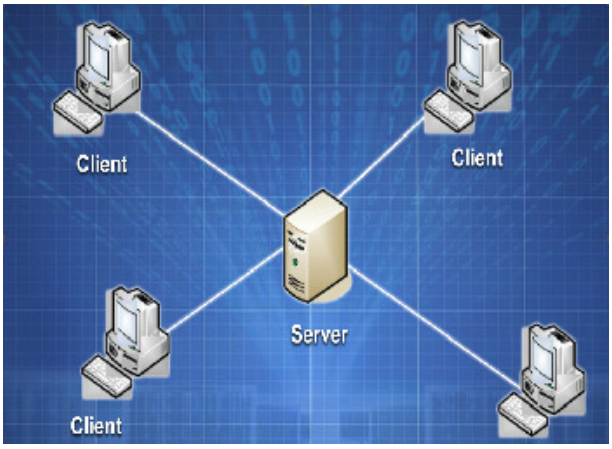
3. Motivation towards Cloud in recent time

Cloud computing is not a new idea but it is an evolution of some old paradigm of distributed computing. The advent of the enthusiasm about cloud computing in recent past is due to some recent technology trend and business models.



ADVANTAGES:

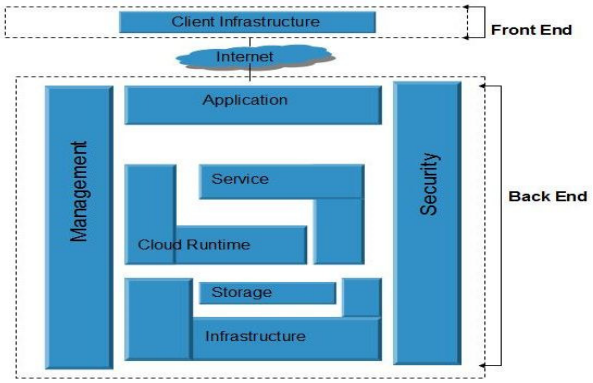
- ♣ Low software cost
- ♣ Improve performance
- ♣ Fewer maintenance issues
- ♣ Instant software update
- ♣ Increased data safety



DISADVANTAGES:

- ♣ Requires a constant internet connections
- ♣ Doesn't work well in low speed connections
- ♣ May be slow
- ♣ Limited features

CLOUD COMPUTING-ARCHITECTURE



FRONT END

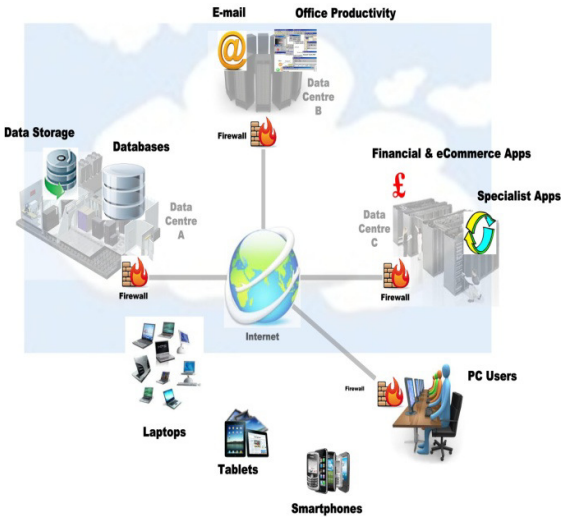
Front End refers to the client part of cloud computing system. It consists of interfaces and applications that are required to access the cloud computing platforms, e.g., Web Browser.

BACK END

Back End refers to the cloud itself. It consists of all the resources required to provide cloud computing services. It comprises of huge data storage, virtual machines, security mechanism, services, deployment models, servers, etc.

IMPORTANT POINTS

 It is the responsibility of the back end to provide built-in security mechanism, traffic control and protocols.



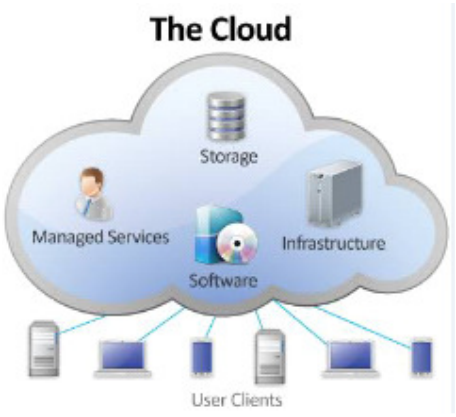
 The server employs certain protocols, known as middleware, helps the connected devices to communicate with each other.

COMPARISON BETWEEN CLOUD COMPUTING AND GRID COMPUTING

Most of the cloud architectures are built on Grid architecture and utilizes its service. Grid is also a form of distributed computing architecture where organizations owning data centers collaborate with each other to have mutual benefit. Although if apparently seen it seems that cloud computing is no different from its originator in the first look but there are substantial difference between them in spite of so many similarities.

RELATION BETWEEN CLOUD COMPUTING AND UTILITY COMPUTING

The cloud users enjoy utility computing model for interacting with cloud service providers. This Utility computing is essentially not same as cloud computing. Utility computing is the aggregation of computing resources, such as computation and storage, as a metered service similar to a traditional public utility like electricity, water or telephone network. This service might be provided by a dedicated computer cluster specifically built for the purpose of being rented out, or even an under-utilized supercomputer. And cloud is one of such option of providing utility computing to the users.



Databases:

There are several databases

Xeround:

Xeround(pronounced Zech-round)is a management tool for deploying easily scalable mySQL databases across a variety of cloud providers and platforms .it allows high availability and scalability and it includes aws , rack space ,

joyent and HP ,as well as open stack, citrixplateforms .

Storm:

Unlike other databases in the cloud , storm runs its fully distributed , relational database on bare-metal servers , meaning there is no virtualization of machines . this db officials claim this leads to better performance and easier management . Users can choose the size of virtual machine instances their database runs on.

SAP:

Enterprise software giant SAP is now in the cloud with HANA, a platform built on it's memory technology. its cloud database from HANA COMPLEMENTS the company's other non-database tools , including Sybase , and is available in Amazon web services cloud.it available at other apps too. Sap stroge network and it's based on an open stack platform.

Rack space:

Rackspace's comes in either a cloud or managed hosted offering via cloud databases. Rack space emphasizes the container-based virtualization of its cloud DB , which allows high performance of a DB service compared to if it was run entirely on virtualized infrastructure . nosql in its cloud .

Mongolab:

Mongolab gives users access to MongoDB on a variety of major cloud providers , including AWS , Azure and joyent in this noSQL and service at a platform .

Microsoft Azure:

IT USES SQL server technology to provide a relational database , allowing customers to either access a SQL database on its cloud or hosted SQL server instances o virtual machines .it also emphasizes hybrid databases . Microsoft has a cloud hosted NoSQL database service named tables, blobs (binary large object storage)for audio and video .

Google cloud SQL:

Google cloud SQL database service is centered on two major products: Google cloud SQL which Google describe as a MySQL-like relational database infrastructure and Google big query, an analysis tool for running on large data sets storage in its cloud.

Amazon web services:

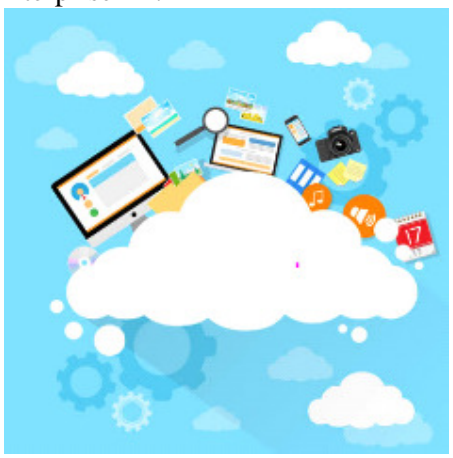
Amazon web service has a variety of cloud-based database services , including both relational database(RDS)run either MYSQL , oracle or SQL server instances , while Amazon simpleDB is a schema-less database meant for smaller workloads .

Garantia data:

Garantia offers a gateway service for users to run open source redis and me cached in-memory NoSQL databases services in AWS's public cloud . using Garantia's software allows for automatic configuration of these open source data platforms by helping developers scale nodes , create clusters and architect for fault tolerance .

EnterpriseDB:

Enterprise focuses on the open source postgreSQL database , but its real claim to fame is its ability to work with oracle databases application . with EnterpriseDB's postgres plus advanced server , organizations can use applications written for on-premise oracle databases through EnterpriseDB.



CLOUD COMPUTING DATA STORAGE

Storage devices can be broadly classified into two categories:

- Block Storage Devices
- File Storage Devices
- Red hat openstack storage
- Massively scalable storage

❖ BLOCK STORAGE DEVICES

Block Storage Devices offer raw storage to the clients. This raw storage can be partitioned to create volumes.

a) FILE STORAGE DEVICES:

File Storage Devices offers storage to clients in form of files, maintaining its own file system. This storage is in the form of Network Attached Storage (NAS).

b) RED HAT OPENSTACK STORAGE :

Red hat has an end-to-end stack that is agile , responsive , reliable , and cost effective .

c) ASSIVELY SCALABLE STORAGE:

Massively scalable storage open software defined storage platform are a perfect fit for enterprises deploying open stack.

❖ **CLOUD STORAGE CLASSES**

Cloud Storage can be broadly classified into two categories:

- Unmanaged Cloud Storage
- Managed Cloud Storage

i. UNMANAGED CLOUD STORAGE

Unmanaged Cloud Storage means that the storage is preconfigured for the consumer. The consumer cannot format nor the consumer can install own file system or change drive properties.

ii. MANAGED CLOUD STORAGE

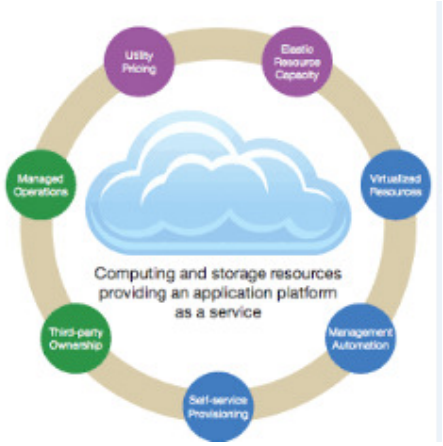
Managed Cloud Storage offers online storage space on demand. Managed cloud storage system presents what appears to the user to be a raw disk that the user can partition and format**.**

Cloud Computing Applications:-

Cloud Computing has its applications in almost all the fields such as business, entertainment, data storage, social networking, management, entertainment, education, art and global positioning system, etc. Some of the widely famous cloud computing applications are discussed here in this tutorial:

Business Applications

Cloud computing has made businesses more collaborative and easy by incorporating various apps such as MailChimp, Chatter, Google Apps for business, and Quickbooks.



5. MailChimp It offers an e-mail publishing platform. It is widely employed by the businesses to design and send their e-mail campaigns.
6. Chatter Chatter app helps the employee to share important information about organization in real time. One can get the instant feed regarding any issue.
7. Google Apps for Business Google offers creating text documents, spreadsheets, presentations, etc., on Google Docswhich allows the business users to share them in collaborating manner.
8. Quickbooks It offers online accounting solutions for a business. It helps in monitoring cash flow, creating VAT returns and creating business reports.

Data Storage and Backup

Box.com, Mozy, Joukuu are the applications offering data storage and backup services in cloud.

4. Box.com Box.com offers drag and drop service for files. It just required to drop the files into Box and access from anywhere.
5. Mozy Mozy offers online backup service for files during a data loss.
6. Joukuu

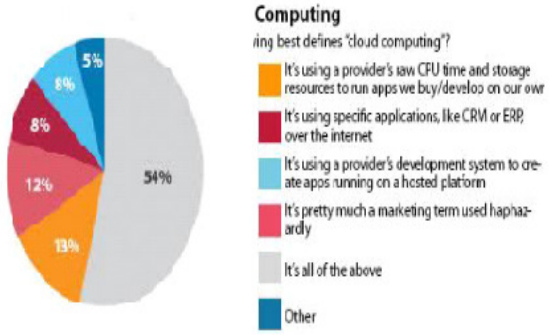
CLOUD COMPUTING IN INDIA:

Cloud computing in india is set to explore for 32-year- old Indian resident yogesh shah , founder & director of iresearch services , migrating to cloud computing was the best business decision he's made since starting his $2 million pune-based research company six years ago .

Today most of the studies in cloud computing is related to commercial benefits. But

this idea can also be successfully applied to non-profit organizations and to the social benefit. In the developing countries like India cloud computing can bring about a revolution in the field of low cost computing with greater efficiency,
availability and reliability.

Recently in these countries e-governance has started to flourish. Experts envisioned that utility based computing has a great future in e-governance. Cloud computing can also be applied to the development of rural life in India by building information hubs to help the concerned people with greater access to required information and enable them to share their experiences to build new knowledge bases.



V. FUTURE ENHANCEMENTS

Rural development can be in the form of education, agriculture, health, culture or in any other fields. Now a days most of the villages have some access to electricity and cellular phone. So there is technical feasibility of establishing computer systems. But the mentality of the people haven't been changed that much and that's why the spread of personal computer is not that much significant in the villages.

We think this growth rate can be enhanced if the computing system is really cheap, easy to operate with minimum level of knowledge, without upfront commitment and more essentially if the system is helpful to enhance their life style. The main aim of the system is to make the people in rural areas to have access to recent technology and with the help of the computing system enhance their standard of living and also this would lead to a greater good of developing the nation.

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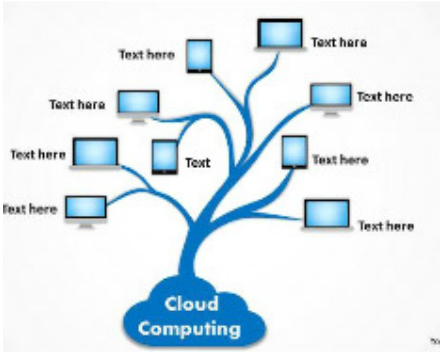
VI. CONCLUSION

Cloud computing is a newly developing paradigm of distributed computing. Virtualization in combination with utility computing model can make a difference in the IT industry and as well as in social perspective. Though cloud computing is still in its infancy but it's clearly gaining momentum. Organizations like Google, Yahoo, and Amazon are already providing cloud services. The products like Google App-Engine, Amazon EC2, and Windows Azure are capturing the market with their ease of use, availability aspects and utility computing model. Users don't have to be worried about the hinges of distributed programming as they are taken care of by the cloud providers.



They can devote more on their own domain work rather than these administrative works. Business organizations are also showing increasing interest to indulge themselves into using cloud services. In developing counties like India cloud computing can be applied in the e-governance and rural development with great success. Although as we have seen there are some crucial issues to be solved to successfully deploy cloud computing for

these social purposes. But they can be addressed by detailed study in the subject.

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MOBILE COMPUTING

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Abstract:

Mobile computing defines that a devices which permits the flow of transmissions of data from one computer to another by never been connected to the physical link layer this has becomes very interesting in the growth of the technology which allows the users to transmit the transformation details of data.

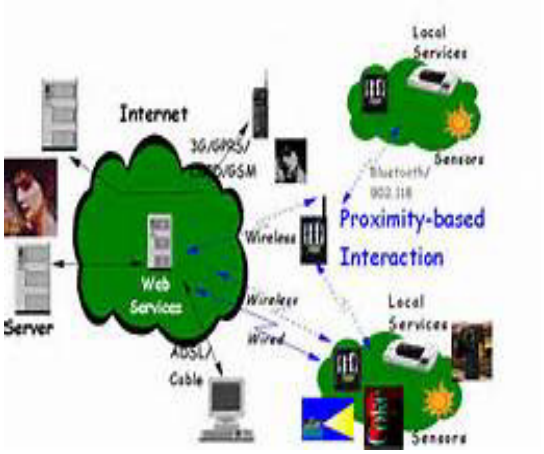
The main objective of smart-phone book application is to be easy. But it contacts list creating a contact in our phonebook seems to be easy but it becomes little confusing when we search for names in the contact lists as two or more people may have the same name but different numbers.

Key word: *NMT, PSTN, GPS, FT, WWW, ATM, SBS, BS, POS, MSC*

I. INTRODUCTION

A technology that allows transmission of data via a computer without having to be connected to a fixed physical link.

Mobile voice communication is widely established throughout the word and had a very rabid increase in the number of subscribers to the various cellular network over the last few year an extension of this technology is the ability to send and receive data across these cellular networks This is the principle of mobile computing.



Mobile data communication has become a very important and rapidly evolving technology as it allows users to transmit data from remote locations to other remote or fixed locations. This proves to be the solution to the biggest problem a cellular of business people on the move mobility.

II. EXISTING CELLULAR NETWORK ARCHITECTURE:

Mobile telephony took off with the introduction of cellular technology which allowed the efficient utilisation of frequencies enabling the connection of a large number of users. During the 1980's analogue technology was used. Among the most well known systems were the NMT900 and 450 (Nordic mobile telephone) and the AMPS (Advanced Mobile phone services).in the 1990's the digital cellular.

Technology was introduced with GSM (Global System Mobile) being the most widely accepted system around the world.

A Cellular network consists of mobile units linked together to switching equipment, which interconnect the different parts of the network and allow access to the fixed Public Switched Telephone Network (PSTN).The technology is hidden from view; it's incorporated in a number of transceivers called Base Stations (SBS). In a number of transceivers called Base Stations (BS).

Every BS is located at a strategically selected place and covers a given area or cell-hence the name cellular communication. A number of adjacent cells grouped together from an area and the corresponding BSs communicate through a so called Mobile Switching Centre (MSC).

The MSC is the heart of a cellular system. It is responsible for routing or switching calls from the originator to the destinator. It can be thought of managing the cell, being responsible for set-up, routing control and termination of the call, for management of inter-MSC hand over and supplementary services and for collecting charging

and accounting information. The MSC may be connected to other MSC'S on the same network or to the PSTN.

III. DATACOMMUNICATION

Data communication is the exchange of data using existing communication networks. The term data covers a wide range of applications including file transfer (FT) interconnection between Wide Area Network (WAN), facsimile (fax), electronic mail access to the internet and the World Wide Web (WWW).

Data communications have been achieved using a variety of networks such as PST ,leased-lines and more recently ISDN(Integrated Services Data Network) and ATM(Asynchronous Transfer Mode)/Frame Relay. These networks are partly analogue or digital using technologies such as circuit-switching packet-switching etc.

Circuit Switching implies that data from one user (sender) to another (receiver) has to follow a pre-pacified path. If a link to be used is busy the message cannot be redirected a property which causes many delays.

Packet switching is an attempt to make better utilization of the existing network by splitting the message to be sent into packets. Each packet contains information about the sender, the receiver, the position of the packet in the message as well as part of the actual message.

IV. APPLICATION S OF MOBILE COMPUTING

In many fields of which a few are described below: In many fields of work the ability to keep on the move is vital in order to utilize time efficiently. Efficient utilization of resources (ie: staff) can mean substantial savings in transportation costs able and other non quantify costs such as increased customer attention, impact of on-site maintenance and improved intercommunication with in the business.

The most importance of mobile computers has been highlighted in many fields of which a few are described below:

- **For Estate Agent**

Estate agents can work either at **t** home or out in the fields. With mobile computers they can be more productive. They can obtain current real estate information by accessing multiple listing services which they can do from home office or car when out with clients. Therefore mobile computers allow them to devote more time to clients.

- **Emergency services**

Ability to receive information on the move is vital where the emergency services are involved, information regarding the address, type and other details of an incident can be dispatched quickly, via a CAPD system using mobile computer.

- **In companies**

Managers can use mobile computer in say critical presentations to major customers. They can access the latest market share information.

- **Credit card verification**

At point of sale (POS) terminals in shops and supermarkets when customers use credit cards for transactions the inter communication required between the bank central computer and the POS Terminal in order to the effect verification of the card usage can take place quickly and securely over cellular channels using a mobile computer unit.

- **In courts**

Defence counsels can take mobile computer in court when the opposing counsel references a case which they are not familiar they can use the computer to get direct real-time access to on-line legal database services where they can gather information on the case and related precedents.

- **Electronic mail/paging**

Usage of a mobile unit to send and read e-mails is a very useful asset for any business individual as it allows him to keep in touch with any colleagues as well as any urgent development that may affect their work .Access to the internet using mobile computing technology allows the individual to have vast arrays of knowledge at his fingertips.

V. SECURE MOBILE COMPUTING

➢ Mobile Computing At a Glance

The corresponding two architectures are commonly referred to as infrastructure-less and infrastructure-based network. Ad hoc network is a collection of wireless mobile hosts forming a temporary network without the aid of any centralized administration or standard support services regularly available on the wide area network.

Due to its inherent infrastructure-less and self-organizing properties, an ad hoc network provides an extremely flexible method for establishing communications in situations where geographical or terrestrial constraints demand totally distributed network system, such as military tracking, hazardous environment exploration, reconnaissance surveillance and instant conference. While we are enjoying the various services brought by mobile computing, we have to realize that it comes with a price: security vulnerabilities.

VI. WHY IS SECURITY AN ISSUE?

Security is a prerequisite for every network, but mobile computing presents more security issues than traditional networks due to the additional constraints imposed by the characteristics of wireless transmission and the demand for mobility and portability. We address the security problems for both infrastructure-based WLANs and infrastructure-less ad hoc networks.

Because a wireless LAN signal is not limited to the physical boundary of a building, potential exists for unauthorized access to the network from personnel outside the intended coverage area.

Most security concerns arise from this aspect of a WLANs and fall into the following basic categories:

❖ Limited Physical Security:

Unlike traditional LANs, which require a wire to connect a user's computer to the network, a WLAN connects computers and other components to the network using an access point (AP) device. Access point communicates with devices equipped with wireless network adaptors and connects to a fixed network infrastructure. Since there is no physical link between the nodes of the wireless network and the access point, the users transmit information through the "air" and hence anyone within the radio range can easily intercept or eavesdrop on the communication channels.

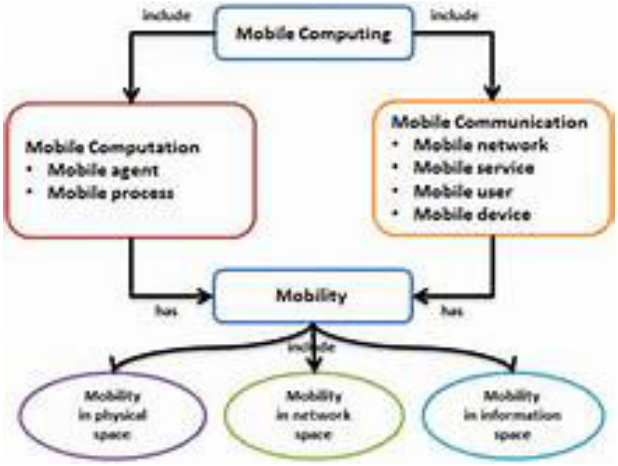
Further, an attacker can deploy unauthorized devices or create new wireless networks by plugging in unauthorized clients or setting up renegade access points.

Constrained Network Bandwidth:

The use of wireless communication typically implies a lower bandwidth than that of traditional wired networks.

SCHEMES FOR AD HOC NETWORKS

In the recent research of security in wireless ad hoc networks, several good security approaches have been proposed, and they generally fall into three categories, secure routing, trust and key management, and service availability protection.



Secure Routing:-

Establishing correct route between communicating nodes in ad hoc network is a pre-requisite for guaranteeing the messages to be delivered in a timely manner. If routing is misdirected, the entire network can be paralyzed.

The function of route discovery is performed by routing protocols, and hence securing routing protocols has been paid more attention.

Trust and Key Management

Most of the protocols discussed above make an assumption that efficient key distribution and management has been implemented by some kind of key distribution center, or by a certificate authority, which has super power to keep connecting to the network and cannot be compromised, but how to maintain the server safely and keep it available when needed presents another major issue and cannot be easily solved.

VII. CONCLUSION:

Today's mobile computing has rapidly grown from being confined to a single location with mobile computing people can work from the comfort of any location they wish to as the connection and the security concerns are properly factored.

Mobile computing technology provides anytime and anywhere service to mobile users by combining wireless networking and mobility, which would engender various new applications and services. However, the inherent characteristics of wireless communication and the demand for mobility and portability make mobile computing more vulnerable to various threats than traditional networks. Securing mobile computing is critical to develop viable applications.

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NANOTECHNOLOGY

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**Lecturer, Dept.of Computer Science, Viriyur.

ABSTRACT

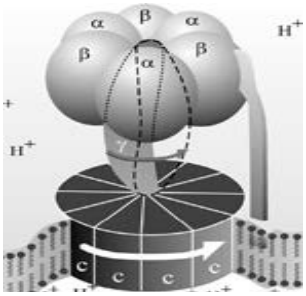
The future of technology at times becomes easier to predict when computer will compute faster, materials will become stronger and medicine will cure more diseases. This technology that works at the nanometer scale of molecules. Atom will be enable part of this future, enabling in the great improvements in future, it must be used in all the fields, in which the human present.

KEYWORDS: *Nano, Medicine and Nanoscale.*

I. INTRODUCTION

Nanotechnology will touch our live right-out to the water we drink and the air we breathe once we have ability to capture position and change the configuration of the molecule, we would be able to create filtration systems that will scrub the toxins from the or remove hazardous organisms from the water we drink. Space will always open up to us in new ways.

With the current cost of transporting pay loads into space being as, high as $20,000 per kg, little is being done to take the advantage of space. Nanotechnology might even allow us to adapt our body for survive in space. We will able to expand control of systems from the macro level to the micro level and beyond, while simultaneously reducing the cost associated with manufacturing of products.



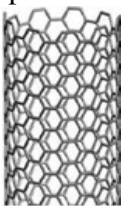
Nanotechnology is the art an science of manipulating matter at the **nanoscale**. Nanotechnology is the study of making small microscopic things. Nanotechnology thinking is very small but working is fast.

II. HISTORY OF NANOTECHNOLOGY

The first ever concept was presented in 1959 by the famous professor of physics Dr.Richard p.Feynman.Invention of the scanning tunneling microscope in 1981 and the discovery of fullerence (c60) in 1985 lead to the emergence of nanotechnology. The term "Nano-technology" had been coined by norio taniguchi in 1974.

III. FUNDAMENTAL CONCEPTS

Nanotechonology is the engineering of functional systems at the molecular scale. This covers both current work and concepts that are more advanced. In its original sense, nanotechonology refers to the projected ability to construction items from the bottom up, using techniques and tools being developed today to make complete, high performance products.

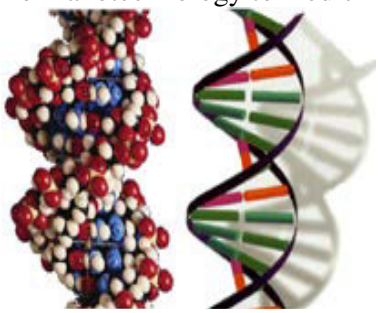


The put that scale in another context, the comparative size of a nanometer to a meter is the same as that of a marble to the size of the earth. Or another way of putting it a nanometer is the amount an average man's beard grows in the time it takes him to raise the razor the razor to his face.

Two main approaches are used in nanotechnology. In the "bottom up" approach , materials and devices are built from molecular components which assemble themselves chemically by principles of molecular recognition. In the "top-down" approach, nano-object are constructed from larger entities without atomic-level control.

NANOMEDICINE

An exciting revolution in health care and medical technology looms large on the horizon. Yet the agents of change will be microscopically small, future products of a new discipline known as nanotechnology. Nanotechnology is the engineering of molecularly precise structures e typically 0.1 mm or smaller e and, ultimately, molecular machines. Nanomedicine1e4 is the application of nanotechnology to medicine.



It is the preservation and improvement of human health, using molecular tools and molecular knowledge of the human body. Present-day nanomedicine exploits carefully structured nanoparticles such as dendrimers,5 carbon fullerenes (buckyballs)6 and nanoshells7 to target specific tissues and organs. These nanoparticles may serve as diagnostic and therapeutic antiviral, antitumor or anticancer agents. But as this technology matures in the years ahead, complex nanodevices and even nanorobots will be fabricated, first of biological materials but later using more durable materials such as diamond to achieve the most powerful results.

IV. APPLICATIONS OF NANOTECHNOLOGY

DRUGS & MEDICIEN:

- It provide new option for drug delivery and drug therapies.
- Enable drugs to be delivered to the right location in the body and release drugs doses on a predetermined schedule for optimal treatment.
- Attach the drug to a nanosized carrier.
- They become localized at the disease site,i.e cancer tumour.
- Then they release medicine that kills the tumour .
- Current treatment is through radiotherapy or chemotherapy.
- Nanobots can clear the blockage in arteries.

MOBILE:

- Morph, a nanotechnology concept device developed by nokia research center(NRC) and university of Cambridge(UK).
- The morph will be super hydrophobic making extremely dirt repellent.
- It will be able to charge itself from available light sources using photovoltaic nanowire grass covering it's surface.

ACHIEVEMENTS OF NANOTECHNOLOGY:

Electronic paper:

If it is possible we don't want to carry copy to go any hard copy to go any where. We can keep like electronic paper in our devices.

Nokia morph:

Some time it is difficult to keep of mobile phone in our hand always that's time nokia morph is easy to carry.

Contact lenses:

It's good example for nano tech using spexe now a days.

We are using contact lence it is mostly accepeted by youngsters.

V. FUNDAMENTAL CONCEPTS

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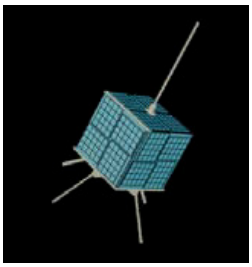
components which assemble themselves chemically by principles of molecular recognition. In the "top-down" approach, nano-object are constructed from larger entities without atomic-level control.

Larger to smaller: a materials perspective

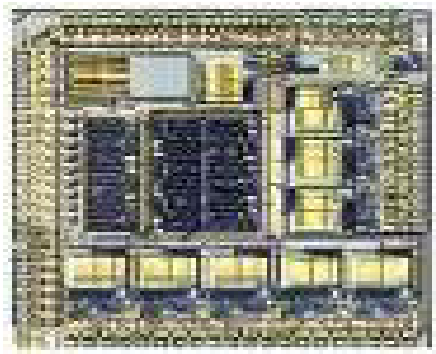
A number of physical phenomena become pronounced as the size of the system decrease. These include statistical mechanical effects, as well as Quantum mechanical effects.

Materials reduced to the nanoscale can show different properties compared to what they exhibit on a macroscale, enabling unique applications. For instance, opaque substances can become transparent (copper);stable materials

ADVANTAGES

- Materials



✓ With nanotechnology, we can create unique material and products which are:

-Stronger
-Lighter
-Durable
-Precise

- Industrials

-Computer can become a billion times faster and a million times smaller.
-Automatic pollution cleanup.
-Manufacturing at all most low cost .

- Medicals

-End of illnesses(i.e,cancer,heart disease)
-Universal immunity(i.e, aids,flu)
-Body sculpting(i.e, change your appearance)

- War

Disadvantage

Electricity

- Health
- Mass production

-The mass production is impossible.

CONCLUSION

- Nanotechnology with all its challenges and opportunities will become a part of our future.
- The researchers are optimistic for the products based upon this technology.
- Nanotechnology is slowly but steadily ushering in the new industrial revolution.

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IMAGE PROCESSING

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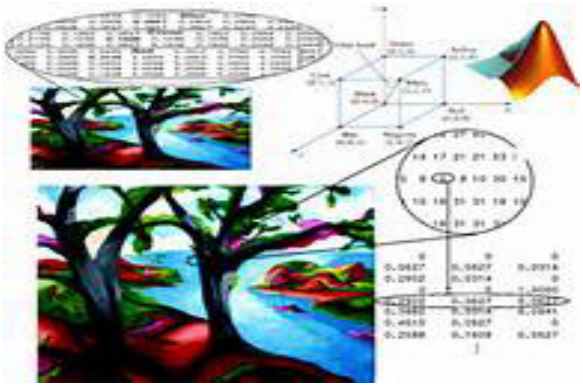
Abstract:

This paper describes the basic technological aspects of Digital Image Processing with special reference to satellite image processing. Basically, all satellite image-processing operations can be grouped into three categories: Image Rectification and Restoration, Enhancement and Information Extraction. The former deals with initial processing of raw image data to correct for geometric distortion, to calibrate the data radio metrically and to eliminate noise present in the data. The enhancement procedures are applied to image data in order to effectively display the data for subsequent visual interpretation. It involves techniques for increasing the visual distinction between features in a scene. The objective of the information extraction operations is to replace visual analysis of the image data with quantitative techniques for automating the identification of features in a scene. This involves the analysis of multispectral image data and the application of statistically based decision rules for determining the land cover identity of each pixel in an image.

The intent of classification process is to categorize all pixels in a digital image into one of several land cover classes or themes. This classified data may be used to produce thematic maps of the land cover present in an image.

INTRODUCTION

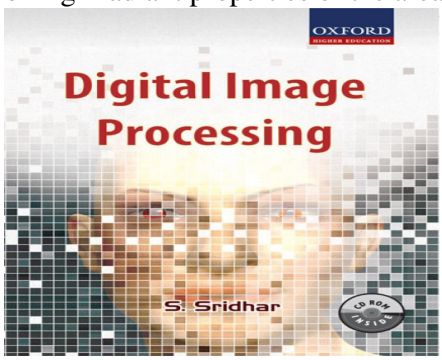
Pictures are the most common and convenient means of conveying or transmitting information. A picture is worth a thousand words. Pictures concisely convey information about positions, sizes and inter-relationships between objects. They portray spatial information that we can recognize as
objects. Human beings are good at deriving information from such images, because of our innate visual and mental abilities. About 75% of the information received by human is in pictorial form. In the present context, the analysis of pictures that employ an overhead perspective, including the radiation not visible to human eye are considered.



Thus our discussion will be focussing on analysis of remotely sensed images. These images are represented in digital form. When represented as numbers, brightness can be added, subtracted, multiplied, divided and, in general, subjected to statistical manipulations that are not possible if an image is presented only as a photograph.

DIGITAL IMAGE

A digital remotely sensed image is typically composed of picture elements (pixels) located at the intersection of each row i and column j in each K bands of imagery. Associated with each pixel is a number known as Digital Number (DN) or Brightness Value (BV), that depicts the average radiance of a relatively small area within a scene. A smaller number indicates low average radiance from the area and the high number is an indicator of high radiant properties of the area.



The size of this area effects the reproduction of details within the scene. As pixel size is reduced more scene detail is presented in digital representation.

COLOR COMPOSITES

While displaying the different bands of a multispectral data set, images obtained in different bands are displayed in image planes (other than their own) the color composite is regarded as False Color Composite (FCC). High spectral resolution is important when producing color components. For a true color composite an image data used in red, green and blue spectral region must be assigned bits of red, green and blue image processor frame buffer memory. A color infrared composite 'standard false color composite' is displayed by placing the infrared, red, green in the red, green and blue frame buffer memory.

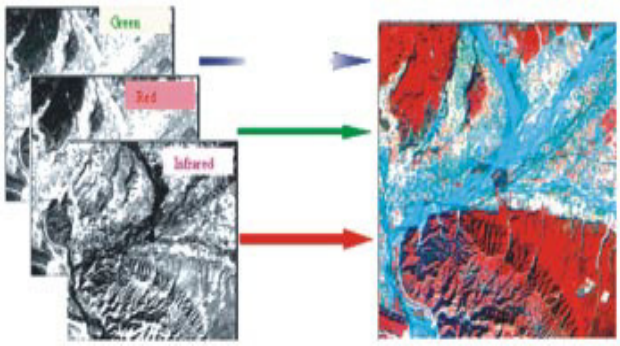


IMAGE RECTIFICATION AND REGISTRATION

Geometric distortions manifest themselves as errors in the position of a pixel relative to other pixels in the scene and with respect to their absolute position within some defined map projection. If left uncorrected, these geometric distortions render any data extracted from the image useless. This is particularly so if the information is to be compared to other data sets, be it from another image or a GIS data set. Distortions occur for many reasons.

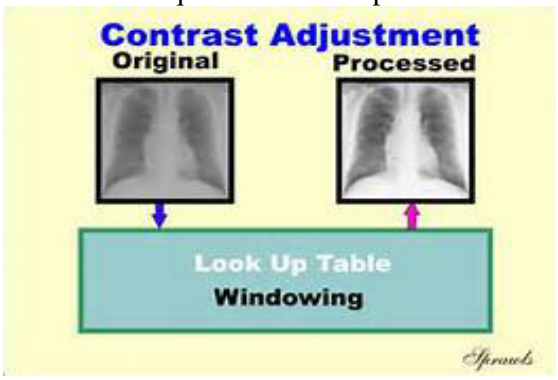
IMAGE ENHANCEMENT TECHNIQUES

Image enhancement techniques improve the quality of an image as perceived by a human. These techniques are most useful because many satellite images when examined on a colour display give inadequate information for image interpretation. There is no conscious effort to improve the fidelity of the image with regard to some ideal form of the image.

There exists a wide variety of techniques for improving image quality. The contrast stretch, density slicing, edge enhancement, and spatial filtering are the more commonly used techniques. Image enhancement is attempted after the image is corrected for geometric and radiometric distortions. Image enhancement methods are applied separately to each band of a multispectral image. Digital techniques have been found to be most satisfactory than the photographic technique for image enhancement, because of the precision and wide variety of digital processes.

Contrast

Contrast generally refers to the difference in luminance or grey level values in an image and is an important characteristic. It can be defined as the ratio of the maximum intensity to the minimum intensity over an image. Contrast ratio has a strong bearing on the resolving power and detectability of an image. Larger this ratio, more easy it is to interpret the image. Satellite images lack adequate contrast and require contrast improvement.



Contrast Enhancement

Contrast enhancement techniques expand the range of brightness values in an image so that the image can be efficiently displayed in a manner desired by the analyst. The density values in a scene are literally pulled farther apart, that is, expanded over a greater range. The effect is to increase the visual contrast between two areas of different uniform densities. This enables the analyst to discriminate easily between areas initially having a small difference in density.

Linear Contrast Stretch

This is the simplest contrast stretch algorithm. The grey values in the original image and the modified image follow a linear relation in this algorithm. A density number in the low range of the original histogram is assigned to extremely black and a value at the high end is assigned to extremely white. The remaining pixel values are distributed linearly between these extremes.

The features or details that were obscure on the original image will be clear in the contrast stretched image. To provide optimal contrast and colour variation in colour composites the small range of grey values in each band is stretched to the full brightness range of the output or display unit.

SPATIAL FILTERING

A characteristic of remotely sensed images is a parameter called spatial frequency defined as number of changes in Brightness Value per unit distance for any particular part of an image. If there are very few changes in Brightness Value once a given area in an image, this is referred to as low frequency area. Conversely, if the Brightness Value changes dramatically over short distances, this is an area of high frequency.

Spatial filtering is the process of dividing the image into its constituent spatial frequencies, and selectively altering certain spatial frequencies to emphasize some image features. This technique increases the analyst's ability to discriminate detail.

The three types of spatial filters used in remote sensor data processing are:

- Low pass filters
- Band pass filters
- High pass filters.

High-Frequency Filtering in the Spatial Domain

High-pass filtering is applied to imagery to remove the slowly varying components and enhance the high-frequency local variations. Brightness values tend to be highly correlated in a nine-element window. Thus, the high frequency filtered image will have a relatively narrow intensity histogram. This suggests that the output from most high-frequency filtered images must be contrast stretched prior to visual analysis.

Edge Enhancement in the Spatial Domain

For many remote sensing earth science applications, the most valuable information that may be derived from an image is contained in the edges
surrounding various objects of interest.

Edge enhancement delineates these edges and makes the shapes and details comprising the image more conspicuous and perhaps easier to analyze. Generally, what the eyes see as pictorial edges are simply sharp changes in brightness value between two adjacent pixels. The edges may be enhanced using either linear or nonlinear edge enhancement techniques.

Linear Edge Enhancement

A straightforward method of extracting edges in remotely sensed imagery is the application of a directional first-difference algorithm and approximates the first derivative between two adjacent pixels. The algorithm produces the first

difference of the image input in the horizontal, vertical, and diagonal directions.

The Laplacian operator generally highlights point, lines, and edges in the image and suppresses uniform and smoothly varying regions. Human vision physiological research suggests that we see objects in much the same way. Hence, the use of this operation has a more natural look than many of the other edge-enhanced images.

IMAGE CLASSIFICATION

The overall objective of image classification is to automatically categorize all pixels in an image into land cover classes or themes. Normally, multispectral data are used to perform the classification, and the spectral pattern present within the data for each pixel is used as numerical basis for categorization. That is, different feature types manifest different combination of DNs based on their inherent spectral reflectance and emittance properties.

CONCLUSIONS

Digital image processings of satellite data can be primarily grouped into three categories :

- Image Rectification
- Restoration, Enhancement
- Information extraction

Image rectification is the pre-processing of satellite data for geometric and radiometric connections.

Enhancement is applied to image data in order to effectively display data for subsequent visual interpretation.

MOBILE COMPUTING

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Abstract:

Mobile Computing has fast become an important new paradigm in today's world of networked computing systems. Ranging from wireless laptops to cellular phones and WiFi/Bluetooth-enabled PDAs to wireless sensor networks, mobile computing has become ubiquitous in its impact on our daily lives. The debut if iPhones and the proliferation of other handheld devices has spurred excitement and interest in this evolving field. In this seminar, we will study the state-of-the-art in both the research and commercial communities with respect to mobile computing. We will investigate standard protocols and platforms, the capabilities of today's commercial devices, and proposed next-generation solutions.

INTRODUCTION

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link. The main concept involves:

- Mobile communication
- Mobile hardware
- Mobile software

MOBILE COMMUNICATION

The mobile communication in this case, refers to the infrastructure put in place to ensure that seamless and reliable communication goes on. These would include devices such as protocols, services, bandwidth, and portals necessary to facilitate and support the stated services. The data format is also defined at this stage. This ensures that there is no collision with other existing systems which offer the same service

MOBILE HARDWARE

Mobile hardware includes mobile devices or device components that receive or access the service of mobility. They would range from portable laptops, smartphones, tablet PCs, Personal Digital Assistants.

These devices will have a receptor medium that is capable of sensing and receiving signals. These devices are configured to operate in full-duplex, whereby they are capable of sending and receiving signals at the same time. They don't have to wait until one device has finished communicating for the other device to initiate communications.

Above mentioned devices use an existing and established network to operate on. In most cases, it would be a wireless network.

MOBILE SOFTWARE:

Mobile software is the actual program that runs on the mobile hardware. It deals with the characteristics and requirements of mobile applications. This is the engine of the mobile device. In other terms, it is the operating system of the appliance. It is the essential component that operates the mobile device.

Since portability is the main factor, this type of computing ensures that users are not tied or pinned to a single physical location, but are able to operate from anywhere. It incorporates all aspects of wireless communications**.**

MOBILE COMPUTING EVALUVATION

In today's computing world, different technologies have emerged. These have grown to support the existing computer networks all over the world. With mobile computing, we find that the need to be confined within one physical location has been eradicated. We hear of terms such as telecommuting, which is being able to work from home or the field but at the same time accessing resources as if one is in the office.

CLASSIFICATION

PERSONAL DIGITAL ASSISTANT

PDA is an extension of the PC, not a replacement. These systems are capable of sharing information with a computer system through a process or service known as synchronization. Both devices will access each other to check for changes or updates in the individual devices. The use of infrared and Bluetooth

connections enables these devices to always be synchronized.

SMARTPHONES

This kind of phone combines the features of a PDA with that of a mobile phone or camera phone. It has a superior edge over other kinds of mobile phones.

Smartphones have the capability to run multiple programs concurrently. These phones include high-resolution touch screens, web browsers that can access and properly display standard web pages rather than just mobile-optimized sites, and high-speed data access via Wi-Fi and high speed cellular broadband.

TABLET PC OF IPADS

This mobile device is larger than a mobile phone or a PDA and integrates into a touch screen and is operated using touch sensitive motions on the screen. They are often controlled by a pen or by the touch of a finger. They are usually in slate form and are light in weight. Examples would include iPads, Galaxy Tabs, Blackberry Playbooks etc.

ADVANTAGES

Mobile computing has changed the complete landscape of our day-to-day life. Following are the major advantages of Mobile Computing –

Location Flexibility

This has enabled users to work from anywhere as long as there is a connection established. A user can work without being in a fixed position. Their mobility ensures that they are able to carry out numerous tasks at the same time and perform their stated jobs.

Saves Time

The time consumed or wasted while travelling from different locations or to the office and back, has been slashed. One can now access all the important documents and

files over a secure channel or portal and work as if they were on their computer. It has enhanced telecommuting in many companies. It has also reduced unnecessary incurred expenses.

Enhanced Productivity

Users can work efficiently and effectively from whichever location they find comfortable. This in turn enhances their productivity level.

Ease of Research

Research has been made easier, since users earlier were required to go to the field and search for facts and feed them back into the system. It has also made it easier for field officers and researchers to collect and feed data from wherever they are without making unnecessary trips to and from the office to the field.

Entertainment

Video and audio recordings can now be streamed on-the-go using mobile computing. It's easy to access a wide variety of movies, educational and informative material. With the improvement and availability of high speed data connections at considerable cost, one is able to get all the entertainment they want as they browse the internet for streamed data. One is able to watch news, movies, and documentaries among other entertainment offers over the internet. This was not possible before mobile computing dawned on the computing world.

SECURITY ISSUES

Mobile computing has its fair share of security concerns as any other technology. Due to its nomadic nature, it's not easy to monitor the proper usage. Users might have different intentions on how to utilize this privilege. Improper and unethical practices such as hacking, industrial espionage, pirating, online fraud and malicious destruction are some but few of the problems experienced by mobile computing.

- Some of those measures include –
- Hiring qualified personnel
- Installing security hardware and software
- Educating the users on proper mobile computing ethics
- Auditing and developing sound, effective policies to govern mobile computing
- Enforcing proper access rights and permissions

CURRENT TRENDS

- 4G
- Global positioning system
- Long term evalution
- Wimax
- Near field communication

CONCLUSION

Today's computing has rapidly grown from being confined to a single location. With mobile computing, people can work from the comfort of any location they wish to as long as the connection and the security concerns are properly factored. In the same light, the presence of high speed connections has also promoted the use of mobile computing.

Being an ever growing and emerging technology, mobile computing will continue to be a core service in computing, and Information and Communications Technology.

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