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Shortest Path Over Large Crowd Traffic

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Abstract:

In city area traffic the shortest path finding is very difficult in a road network. Shortest path searching is very important in some special case as medical emergency, spying, theft catching, fire brigade etc.This study deals with the problem of finding shortest paths in traversing some locations from source to destination.The online shortest path problem objective is to compute the shortest path based on live traffic circumstances and consider the dual carriage ways in the road network of source within the shortest possible time for emergence services.In this paper, we study the online computation of fastest path in time-dependent road networks and present a technique which speeds-up the path computation. To our best knowledge, there is no efficient system/solution that can offer affordable costs at both client and server sides for online shortest path computation. This method reduces the searching time of the system and gets the fastest and best path .This paper presents a route navigation system with a new revised shortest path routing algorithm for solving road traffic problems. The system can avoid selecting no left (right) turns, one-way roads and congested roads when it determines the shortest paths from source to destination.The result shows reduction in the actual distance as compared with the ordinary routing..

Index Terms— **Shortest path, Geographic Information System, Transportation, Broadcasting**

I. INTRODUCTION

Travelling is a part of daily life. The majority of people especially in large countries rely heavily on emergences services in the case of accident such as road accident, fire and any disaster event people will rely on these emergence services instead of their own vehicles. In a metropolis with a complicated road network, people often do not know how to reach their desired destinationexcept where they often visit. Such tasks require a sophisticated knowledge about public transport network. Further, we need a multi-modal route finding system, because a transport network comprises many modes of transportation, including railway, bus, mini-bus, and so on, When a user asks for a path from one place to another, the system can generate routes according to input criteria, such as time and transportation mode such as vehicle,walk,car etc. The popularity of online map applications and their wide deployment in mobile devices and car-navigation systems, an increasing number of users search for point-to-point fastest paths for departure and arrival travel-times. This problem has been extensively studied on static road networks where edge costs are constant. Many efficient speed-up techniques have been developed to compute the fastest path in a matter of milliseconds. The quickest path approaches make the assumption that the travel-time for each edge of the road network is constant. In real-world the actual travel-time on a road heavily depends on the traffic congestion and, therefore, it is time-dependent. One can observe that the time-dependent travel-times yield a change in the actual quickest path between any pair of places throughout the day. Specifically, the quickest path from one place to another varies depending on the departure-time from the source. Typical client-server architecture can be used to answer shortest path queries on live traffic data. In this case, the navigation system (such as source and destination) sends as shortest path request to the service provider and waits the result back from the provider. However, given the rapid growth of mobile devices and services, this model is facing scalability limitations in terms of network bandwidth and server loading.

Furthermore, live traffic is updated frequently these data can be collected by using crowd sourcing techniques over internet. As such, huge communication cost will be spent on sending result paths on the models.of their own vehicles. In addition, people may want to plan for the fastest or the most economical method to their destinations.

A study of this representative list reviews that

Situation a) is a shortest route model

Situation b) is a minimum-cost capacitated network model.

With the development of geographic information systems (GIS) technology, network and transportation analyses within aGIS environment have become a common practice in many application areas. A key problem in network and transportation analysis isthe computation of shortest paths between different locations on a network in a real time.

For a best of knowledge, take an example a 911 call requesting an ambulance to rush a patient to a hospital.

Today itis possible to determine the fastest route and dispatch an ambulance with the assistance of GIS. Because a link on a road network in a required areas tends to possess different levels of congestion during different time periods of a day, and it is practically impossible to determine the fastest route before a 911 call is received. Hence, thefastest route can only be determined in real time. In some cases the fastest route has to be determined in a few seconds in order to ensure the safety of a patient.A network consists of a set of points and a set of lines connecting certain pair of the points. These points are called nodes and are linked by arcs, edges or branches. Associated with each arc is the flow of some type. In a transportation network, cities represent nodes and highways represent edges or arc, with traffic representing arc flow. The standard notation for describing network G= (N, A) where N is the set of nodes and A is the set of edges or arcs and it is possible with the help of global positioning system.The key problem in network is the computation of the shortest path between different locations on a network. Sometimes this computation has to be done in real times.In some cases the fastest route has to be determined in a few second in order to ensure the safety of a patient. Moreover when large real road network are involved in an application, the determination of shortest path over a large crowd traffic can be computationally and very intensively. The use of GIS for transportation applications is widespread and requirement for most transportation GIS is a structured road network. In developing a transportation network model, thestreet system is represented by a series of nodes and links with associated weights. This representation is an attempt to quantify the street system for use in a model. The network nodes represent the intersections within the street system and the network links represent the streets. The weights represent travel time between the nodes.

II. RELATED WORK

There are various types of routing queries that may be submitted to the centralized GIS server.The first query deals with finding the optimal route from the current location to a known destination.

1 TYPES OF ROUTING QUERIES

A. Routing Query for Known Destination

In this query, the driver has a definite destination in mind and desires to acquire the optimal route according to the destination.Since the traffic condition changes continually over time, the optimal route will change during travel whenever up-to-date traffic conditions are provided. we can plan the entire optimal route prior to departure according to the current condition of the transportation network. So, we have to modify our route midway and plan a new path from the current location to the destination based on live traffic circumstances.

B. Routing Query for Unknown Destination

For this query, drivers may inquire about the location of the closest facility, such as the nearest hotel, hospital or gas station, without knowing the destination in advance. In this case, the closest facility is defined in terms of travel distance (time) within the road network as opposed to travel distance. Similarly, the optimal route also has to be recalculated whenever up-to-date traffic conditions are provided dynamically based on the current location and traffic conditions. In this scenario, the query is route query.

C. Introduction to the Shortest Path Algorithms

The shortest path (SP) algorithms are among fundamental network analysis problems.The shortest path algorithms are currently widely used.They determine the smallest cost of travel of a production cycle, the shortest path in an electric circuit or the most reliable path.Internet is a large field where the shortest path algorithms can be applied. The Internet problems involve data packages transmission with the minimal time or by the most reliable path.

2. TYPES OF NETWORK

A. Sparse Networks

Public transportation networks are sparse network. Sparse networks are those which have the number of links only a few times bigger than the number of nodes. A network of one hundred (100) nodes and four hundred (400) links would be considered sparse but a network with one hundred (100) nodes and five thousand (5000) links would be classified as dense. From node approximately four links leave.

B. Road Networks

In the representation of a road network a link represents a road and a node represents a crossroad. The ratio of the number of links to the number of nodes. The link costs are always non-negative. The road networks are usually planar and sparse. The number of nodes is big,usually expressed in thousands. The characteristic feature of the road networks is their nonnegative link lengths property.

III. PROPOSED METHODOLOGY

We analyze the shortest best path and study how to optimize it. we present a stochastic based index construction that minimizes not only the size overhead but also reduces the search space of shortest path queries. To the best of our knowledge, enable fast shortest path computation on a portion of entire index which significantly reduces the tune-in cost of transmission model.

It may comprise of following task:

a. Live traffic index is expected to provide relatively short tune-in cost at client side.
b. Fast query response time at client side.
c. Small broadcast size at server side.
d. Light maintenance time at server side.

Tune-in Cost (Client Side)

We prioritize the tune-in cost as the main optimized factor since it affects the duration of client receivers into active mode and power consumption is essentially determined by the tuning cost (i.e, number ofpackets received. These services may include providing live weather information, delivering latest promotions insurrounding area, and monitoring avail-ability of parking slots at destination.

Broadcast Size and Maintenance Time (Server Side)

The index maintenance time and broadcast size relate to the freshness of the live traffic information.The maintenance time is the time required to update the index according to live traffic information.

Query Response Time (Client Side)

The last factor is the response time at client side. the response time of shortest path computation can be very fast (i.e., few milliseconds on large road maps) which is negligible compared toaccess for current wireless network speed. The computational so consumes power but their effect is Outweighed by communication.

IV. EXPERIMENTAL RESULTS

In this section, we evaluate the performance of some representative algorithms using the broadcasting architecture ,we ignore the client-server architecture due to massive live traffic in below section. We omit some methods (such as , SHARC,) due to their prohibitive maintenance time and broadcast size. In the following, we first describe the road map data used in experiments and describe the simulation of clients' movements and live traffic circumstances on a road map. Then, we study the performance of the above methods with respect to various factors.The algorithm breaks the network into nodes (where lines join, start or end) and the paths between such nodes are represented by lines. In addition, each line has an associated cost representing the cost (length) of each line in order to reach a node. There are many possible paths between the origin and destination, but the path calculated depends on which nodes are visited and in which order. The idea is that, each time the node, to be visited next, is selected after a sequence of comparative iterations, during which, each candidate-node is compared with others in terms of cost.

Network users to enable dynamically model realistic network conditions, including turn(left or right) restrictions, speed limits, height restrictions, and traffic conditions at different times of the day. The users with Network Analyst extension are able to:

i. Find efficient travel routes
ii. Determine which facility or vehicle is closest,
iii. Generate travel directions, and
iv. Find a service area around a site.

In the current work, it is used for find an optimal route for the routine find in particular area is generated in the area under study. based on two criteria

(i).**Distance criteria:** The route is generated taking only into consideration the location of the waste large items. The volume of traffic in the roads is not considered in this case.

(ii).**Time criteria:** The total travel time in each road segment .Total travel time in the route = runtime of the vehicle + distance time. The runtime of the vehicle is calculated by considering the length of the road and the speed of the vehicle in each road which solves a network problem by finding the least cost impedance path on the network from one stop to one or more stops.

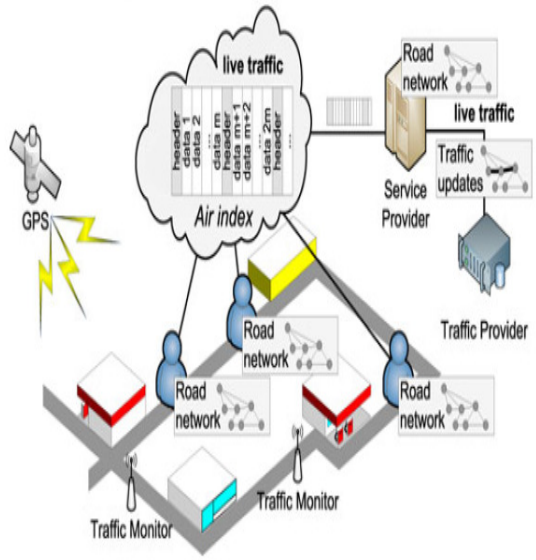

Fig : Architecture of shortest path over large crowd traffic

In the above figure,

Simulation of Clients and Traffic Updates: We run the network based generator to generate the weight of edges. It initializes 100,000 cars (i.e., clients) and generates 1,000 new cars in each iteration default values. The weight of an edge is set to the average driving time on it. The initial weights of edges are assigned by the above network-based algorithm. In each iteration, we randomly select a set of edges to the update ratio and specific weight updates. In our work, each weight update can be either a light traffic change, a heavy traffic change, or a roadmaintainace

.**Implementation and evaluation platforms**. All tested methods are implemented in java. Experimentson the service provider were conducted on running Windows 10.1 and experiments on the client were performed on an Intel Core2Duo 2.66 GHz CPU machine with 4 GBytes memory, running Windows 7. For each method, we measure its performance in terms of tune-in size, query response time, broadcast size, and index maintenance time for all tested methods, and report its average performance over 2,000 shortest path queries. The response time is the query computation time at client and the maintenance time is the index maintenance time at service provider. In order to measure the exact transmission behavior, we use the number of packets received (broadcasted) by client (service provider) to represent the tune-in (broadcast) performance. Each packet size is of 128 bytes and the packet format. Each edge weight occupies 4 bytes. We randomly generate 1,000 queries at each side and we only partition the graph into 2 to 16 subgraphs at every partitioning for boosting up the construction time.

V. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

In conclusion the shortest distance from any area to another can be calculated, let us have a look at the case of an emergence call, requesting an ambulance to rush a patient from hospital. The shortest distance can easily be known using this project, because a link on a real road network in the city tends to posse different levels of congestion during different time period of a day. This study addresses the problem of determining dynamic shortest path in traffic networks, where arc travel times vary over time. This study proposes a dynamic routing system which is based on the integration of GIS and real-time traffic conditions. It uses GIS for improving the visualization of the urban network map and analysis of car routing. GIS is used as a powerful functionality for planning optimal routes based on particular map travel time information. This efficiency will be most important when unwanted incidents take place in roads and serious traffic congestion occur to determine if the direction may be a changed. This study addresses the problem of determining shortest path in traffic networks traversal of shortest route between two selected junctions. The updated route is send via a dynamic routing system for all vehicles in urban road communication system to vehicle driver to change his network has some special considerations which are the route.

5.2. Suggestion.

Sometimes the given algorithms may produce output that is of no use even though it has been correctly generated. There can be a path that will require an ambulance and one bus only to reach the destination after 30 minutes. However, the algorithm may advice you to take a car and three times to take a bus which will take 25 minutes, 5 minutes less than the previous path. From the point of view of the defined conditions the second path is better, but a more reasonable path is the first one, though 5 minutes shorter. The first path is actually better because it is less cumbersome (it is easier to take one bus instead of three), more reliable (three buses cause more risk than only one since each bus can break down, changing buses is risky as opposed to sitting in the bus) and is cheaper. First, well known algorithms can be adapted into the public transport needs. For example, the algorithm for finding second shortest path, third etc. paths for buses can be developed. The other direction is more interesting: development of new algorithms for traffic issues and not just adaptation of existing algorithms. There would not be anything interesting in this except that the buses and metro would be considered in parallel. More than that, user can specify exactly how many changes he wants between different types of transportation. For example the usercan say that only one change between car and bus is allowed but that changing between buses and an underground vehicle can be done as many times as necessary.

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