RESEARCHARTICLE OPENACCESS

DRINKING WATER QUALITY DETECTION USING MACHINE LEARNING TECHNIQUES

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Abstract:

One of the global hazards mentioned by the World Economic Forum is the drinking water issue, which results in the deaths of about 200 children every day. Drinking tainted water contributes to the deaths of over 3.4 million people annually. There aren't enough quality measures available to evaluate drinking water quality despite technical advancements. This paper proposes a low-cost water quality monitoring system that can replace the traditional technique of quality monitoring by utilising cutting-edge technology like Machine learning, with the aforementioned challenge serving as its main point. This guards against a variety of serious illnesses, including fluorosis and bone deformities, among others, for people living in rural areas.

Keywords: Water quality monitoring, Machine learning, MQTT, Rural Development,RandomForest.

NTRODUCTION

Nowadays, Water has become a crucial resource for humanity as a result of limited water supplies and growing population. The most crucial resource for humanity is clean, safe drinking water. There is a need for an online real-time water quality monitoring system because the majority of diseases today are transmitted through water. Currently, the procedures used to measure water quality involve collecting random water samples from different sites weekly or monthly and testing them in laboratories. This method is less effective than others since it requires a lot of time and can only simultaneously analyse a small number of water samples from different locations.

To periodically check the water quality using this method, manual labour is also required. These techniques are extremely expensive and insufficient in densely populated nations like China and India. We require a real-time system that tracks water quality using sensors such as pH, turbidity, and temperature and updates those data in a cloud service in order to get over these disadvantages.Sensors in this system determine the chemical composition of water. These sensor readings are then sent to a NodeMCU microcontroller, which includes a WiFi module, where they are used to transmit data to an Azure Event Hub. Data from Event Hub is saved as structured data in an Azure Storage hub.

Data is then transmitted to outside services via Stream hub.

The sensor values are displayed in the form of Web pages using PowerBI, a technology that is also part of the Microsoft family. The MQTT client broker architecture is also used in this study to transport data from the microcontroller to an external MQTT broker service. The quantity of invisible suspended particles in water is measured by turbidity. The risk of cholera and diarrhoea is higher the more murky the water. The turbidity must be lower for the water to be clean. Along with turbidity, pH is a crucial metric for determining how acidic a body of water is. A temperature sensor determines how hot or cold the water is. Another section of this study involves measuring the outside temperature close to the water storage and controlling a heater or cooler based on the temperature. This section of the study makes use of machine learning, where the system forecasts the weather using previously labelled datasets and regulates the heater and cooler in accordance with the outside weather. As a result, the system is entirely automated and requires no manual input. An email alert will be sent to the relevant authorities once the value of turbidity reaches a predetermined level, alerting them to the problem and requiring them to act right away.

II. LITERATUREREVIEW

The Real Time Monitoring of Water Quality in an Internet of Things Environment by Pradeepkumar M, Monisha J, Pravenisha R, Praiselin V, and Suganya Devi K. In addition to discussing sensor-based systems, this paper adds cloud computing architecture into the Internet of Things, making sensor data accessible to everyone.

The article "A Survey on Sensor-Cloud: Architecture, Applications, and Approaches" by Atif A, Wasai Shadab, Mohammad Hassan, Shamim, Alelaiwi, and Anwar Hossain addresses the architecture, methods, and many levels of transmitting generated data by integrating sensors with cloud services.Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project by Nikhil Kedia This article discusses the difficulties and economic viability of the system involving Mobile Network Operator and Government in addition to highlighting embedded sensor technologies. Based on the seriousness of the quality cothis system contacts the government immediately

The paper by R. Kartik Kumar, M. Chandra Mohan, S. Vengateshapandiyan, M. Mathan Kumar, and R. Eswaran, titled "Solar based advanced water quality monitoring system employing wireless sensor network," employs a solar node to power the wireless sensor network and presents data using a GUI made in Matlab.named "IoT based water quality monitoring system," by Jayti Bhatt and Jignesh Patoliya. This paper demonstrates the design of a system for measuring the quality of water utilising sensors

for pH, turbidity, dissolved oxygen, and temperature. The Raspberry Pi serves as the system's core controller, and Zigbee is used for distant data transmission. The "Smart Coast Projecta Smart Water Quality Monitoring System" was created by Fiona Regan, Antoin Lawlor, and Audrey McCarthy. They created intelligent water quality sensors for that system, allowing the sensors to wirelessly transmit data to the device that collects data from all the nodes.

Although this system is extremely scalable, quick, and user-friendly, the sort of sensors employed makes it expensive. Water Quality Monitoring System Based on IOT by Vaishnavi V. Daigavane and Dr. M.A. Gaikwad. This study uses a flow sensor to evaluate turbidity, pH, and water flow. This study demonstrates the most practical and cost-effective way to send sensor information for a water monitoring system using the current GSM network.

"Water Quality Monitoring System Using Zigbee Based Wireless Sensor Network," ZulhaniRasin and Mohd Rizal Abdullah. The water quality monitoring system developed in this paper is based on a ZigBee wireless sensor network. This study also demonstrates the use of C++ to develop a GUI that makes the data available to the general public.

III. EXISTING SYSTEM

This section presents the IoT architecture based on whichthe system is built. Fig. 1 explains the layer wise architecture

of our model according to reference model of IoT world Forum from layer 1 at bottom to layer 7 at top.

• Layer 1: The first layer is made up of all the sensors, such as the temperature and turbidity sensors, as well as the actuators, such as the heater or cooler LEDs.

• Layer 2: To guarantee dependable connection between devices and the cloud, we select WiFi as the connecting technology to assure dependable message transmission throughout the network.

.Layer 3:Azure Event Hub only accepts data in structured format at Layer 3. Therefore, the data is formatted into a JSON packet before being transferred to the cloud, and it is then sent to Azure EventHub.

• Layer 4: Azure is being used for data accumulating storage hub for the data to be kept on cloud servers that promises affordability and dependability. In several cases, The data is also created to provide backup capability in instance of physical server damage.

• Layer 5: Data from the Storage Hub is sent to Azure Stream Analytics, which makes the data available to additional devices not connected to Azure.

• Layer 6: We use PowerBI, a Microsoft product for data analysis and data visualisation, for analysis and reporting.

IV. PROPOSED MODEL

The temperature adjustment and email sending methods employed in our system are described in this section.

A. Temperature Algorithm Adjustment. The system's temperature control module. The getExternal() function, which is described in depth in the machine learning section, is used to calculate the external temperature. Using a waterproof temperature sensor (DS18B20), we can also determine the temperature of water. If the water temperature is hot (>15 C) and the ambient temperature is hot (>25 C), the cooler will switch on and the heater will turn off. Similarly, the second if statement regulates the temperature in frigid climates.

B. Email sending Algorithm: The system's email module is described in 2. When the turbidity is more than 4.0, the system sends an email to everytime the turbidity is determined using the getTurbidity() function.

```
 Result: Water temperature adjusted according to
Environment
 External temperature = getExternal();
Temperature = getTemperature();
 if Externaltemperature > 25 then
      if temperature > 15 then
           heater = OFF;
           cooler = ON;
      end
end
if Externaltemperature < 10 then
      if temperature < 15 then
          heater = ON;
cooler = OFF;
      end
end
```

Algorithm 1: Algorithm for adjusting temperature

```
Result: Sending email to authorities
turbidity = getTurbidity();
count = Threshold limit;
 if turbidity > 4.0 then
       if count > 0 then
            sendEmail();
            count = count - 1;
       end
       polluted = true;
 end
```

Algorithm 2: Algorithm for sending Email to authorities

V. ADVANTAGES

- Measuring the amount of dissolved oxygen in water
- Monitoring water quality will allow to discover trends over time.
- This testing will also allows to adhere to strict permit regulations.
- Identifying the health of your water will help you to discover where it may need some help.

VI. RESULTS

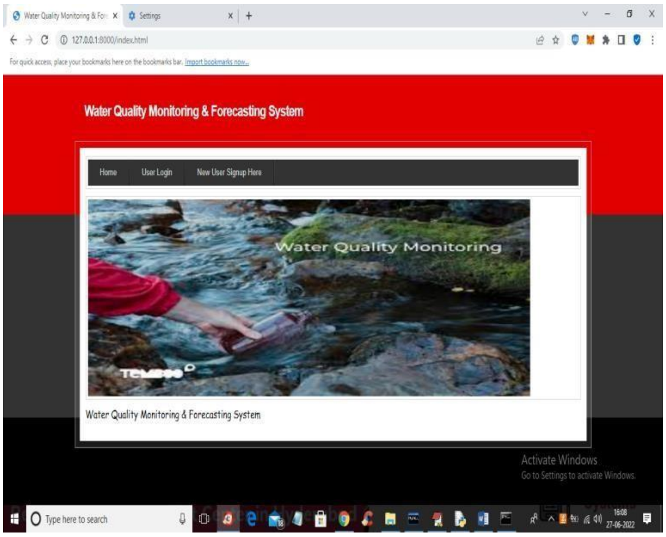

Fig.1.New User Login Portal

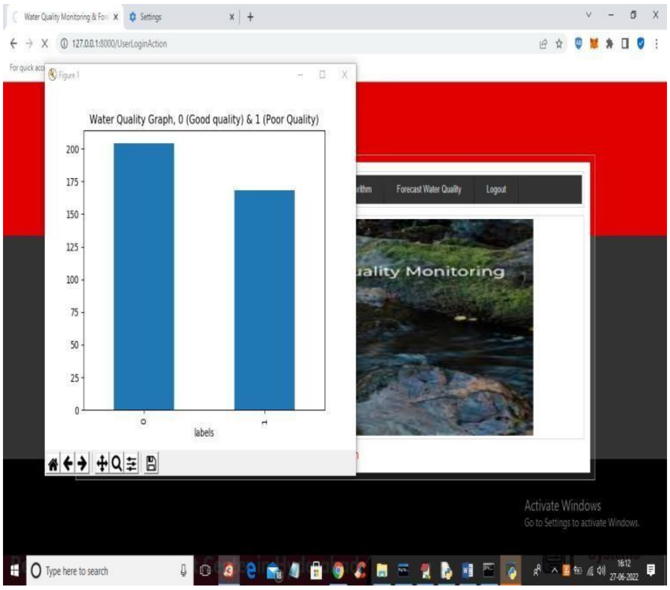

Fig 2. Water Quality Graph

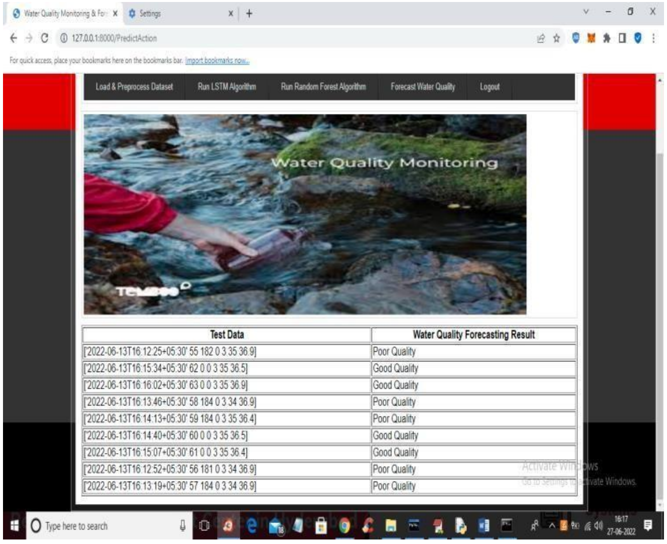

Fig.3 .Tabular Output forecasting results

VII. CONCLUSION

This paper offered a useful and affordable method for Automatically monitoring water quality, particularly in remote places. To address this issue, The paper discussed numerous modern technology, including cloud computing, machine learning, and IoT. about combining Using these tools, we can resolve one of the most fundamental growing issue with human survival to some degree.

VIII. REFERENCES

[1] Pradeepkumar M, Monisha J. "The Real Time Monitoring of Water Quality in IoT Environment" 2016 International Journal of Innovative Research in Science, Engineering and Technology, 2015 ISSN(Online) : 2319-8753

[2] Atif Alamri, Wasai Shadab Ansari, Mohammad Mehedi Hassan, M. Shamim Hossain, Abdulhameed Alelaiwi, and M.Anwar Hossain, "A Survey on Sensor-Cloud: Architecture, Applications, and Approaches", International Journal of Distributed Sensor Networks, Volume 2013

[3] Kedia, Nikhil. "Water Quality Monitoring for Rura l Areas- a Sensor Cloud Based Economical Project" 2015 1st International Conference on Next Generation Computing Technologies (NGCT), 2015, doi:10.1109/ngct.2015.7375081.

[4] Vijayakumar, N, and R Ramya. "The Real Time Monitoring of Water Quality in IoT Environment" 2015 International Conference on Circuits, Power and Computing Technologies [ICCPCT-2015], 2015, doi:10.1109/iccpct.2015.7159459.

[5] R.Karthik Kumar,M.Chandra Mohan, S.Vengateshapandiyan, M.Mathan Kumar, R.Eswaran. "Solar based advanced water quality monitoring system using wireless sensor network" 2014, International Journal of Science, Engineering and Technology Research, 2014 .