



River Water Assessment and Prediction Modelling

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RIVER WATER ASSESSMENT AND PREDICTION MODELLING

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Abstract – This is a sensor based water quality monitoring system. It is a wireless sensor network which includes a raspberry pie for processing the system and various sensors like pH, turbidity, temperature, conductivity. Internet of things acts as a query to response service and remote communication technology in sending and receiving the data. Using k-means clustering a machine learning algorithm which helps in measuring large amounts of data and comparing the data with the standard values. Any fluctuations in the data with the recorded values will notify the system. The information is monitored constantly and consigned to a cloud. Therefore this system immensely helps in assessing the quality of contaminated water with prediction modelling.

Keywords – Internet of things, k-means clustering, assessing, prediction modelling.

1. INTRODUCTION

Rivers, swamps and lakes are very important bodies of water for all the living beings on the earth. But nowadays these water bodies and its resources are altered very crudely by many elements such as domestic waste, industrial waste, sewage etc. Due to which the water is polluted and adversely affected. Elimination of pollution altogether is unfathomable, but limiting its affects are merely possible in acting.

The uncontrolled urbanisation and industrialisation are polluting the meagre amount of fresh water available in rivers.

Many initiatives are been applied all over the globe to aid the marine environments. They are not specifically into river water quality monitoring but many similar concepts are involved. Traditional methodologies have much complicated methods and many disadvantages such as low precision, high cost, and long waiting time for the results. Water quality monitoring has gained this recognition in the last decade. Numerous works are ongoing in this concept with their primitive goal on eradication of water pollution and various aspects of it. This paper depicts the design of wireless sensor networks with IOT and k-means clustering algorithm to analyse and predict the pollutants in river water.

II. EXISTING SYSTEM

- The existing system uses sensors to collect data.
- Pollutant values are only stored in the cloud for the analysis and the those systems are not deliberately accurate in measuring .

- Furthermore these systems are based on conserving coral reefs, salinity and nutrients of the reefs.
- The old systems collect the water samples from different locations test them in laboratories to obtain the results.
- The older traditional methods only store the data whereas our model uses machine learning algorithms to predict and compare the results.

III. PROPOSED SYSTEM

- The main aim of the project is to create a uninterrupted monitoring of river water quality.
- This system audits the rivers and monitor the values accurately and are available in a portal and public domain.
- We can watch the live condition of the river through satellite remote sensing.
- K-means clustering algorithm can handle cluster amount of data.
- This system is out built with very low cost and high efficiency by using raspberry pie as control processor.
- This whole system can be monitored by any government body and any live disposal of waste can be intimated.
- Working of the system is level-headed frequently which makes a continuous monitoring all time.

IV. LITERATURE SURVEY

In 2019 Mohammad Salah Uddin Chowdury proposed Iot based real-time river water quality monitoring in this paper Analysis of polluted water using belief rule based system and deep learning neural networks for an automated sms alert. [1]

In 2018 Dilshad Ahmed proposed Iot based smart river monitoring system which briefs us on monitoring the water and pollutant value results are consigned to a database using tcp protocol and sends a Api push notification to the authorities. [2]

In 2018 A.N.Prasad proposed Smart water quality monitoring system which is a frequent data collecting network by using iot and remote sensing technology which is a graphical representation shows the behavioural data of the water. [3]

In 2014 K. Anderson and M. S. Hossain, "Smart Risk Assessment Systems using b-r-b, DSS and WSN Technologies", is 4th International Conference on Wireless Communications, Vehicular Technology and Information Theory, VITAE 2014 : Co-located with Global Wireless Summit. [4]

In 2018 Gayathri Surendran and Ganesh Udupa, G.J. Nair Design and modelling of cable suspended sonde for water quality monitoring Published in International Conference on Intelligent Computing, Instrumentation and Control Technologies. [5]

In 2018 S. Fang, L. Da Xu, Y. Zhu, J. Ahati, H. Pei, J. Yan, and Z. Liu "An integrated system for regional environmental monitoring and management based on internet of things.," IEEE Transactions on Industrial Informatics vol. 10, pp. 1596-1605., [6]

V. SYSTEM ARCHITECTURE

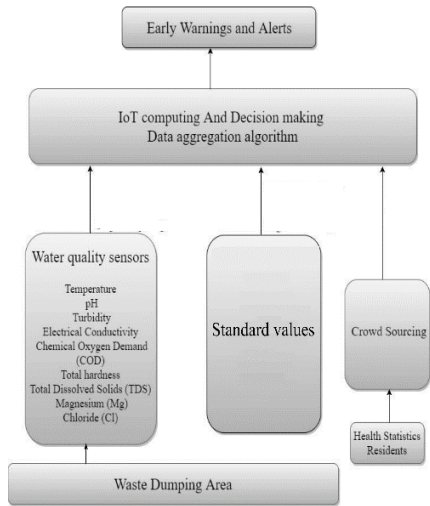


Fig.no.1 System architecture

From the fig .no. 1 the implementing system consists of a classification algorithm which used as a main processing unit for the entire system and mainly used to determination.

VI. METHODOLOGY

1. Raspberry pie
2. WSN
3. Software
4. K-means clustering

1. Raspberry Pie

The Raspberry Pie is a low cost single board computer with USB ports, Ethernet port, GPIO port, Micro SD card slot, audio port, HDMI port and power provision. This is the most crucial component in the system. It takes sensor data as input and gives output to the valve and LCD.

The water quality is determined and consumption is monitored and calculations are carried out by raspberry pie.

2. Wireless Sensor Network (WSN)

Utilizing a system of sensors which is remote to transmit the information and the parameters they have considered for testing the water quality are pH, turbidity, dissolved oxygen and temperature, phosphate, conductivity and water level which are actualizing the water structure and pollutants. Normally a remote sensor system contains the countless sensor hubs. The sensors can impart among themselves utilizing radio signs. A remote sensor hub is outfitted with detecting and the registering gadgets, radio handsets and parts. The individual hubs in a remote sensor organize are intrinsically asset compelled and they have constrained handled speed, stockpiling limit, and correspondence transfer speed.

3. Software

Thing Speak is an Internet of Things (IoT) platform that lets you collect and store sensor data in the cloud and develop IoT applications. The Thing Speak™ IoT platform provides apps that let you analyze and visualize your data in the system, and then act on the data. raspbian is a Debian-based PC working framework for Raspberry Pi. There are a few variants of Raspbian including Raspbian Buster and Raspbian Stretch. Since 2015 it has been authoritatively given by the Raspberry Pi Establishment as the essential working framework for the group of Raspberry Pi single-board PCs

4. K-means Clustering

This is a clustering algorithm which helps in analysing the enormous amount of data. It operates better on the clusters distributed rather than which are accentral.

It selects its cluster heads based on the two factors:-

1. Euclidian Distances
2. Residual energies of nodes

This algorithm works on distributed nodes as if the central node is failed the whole system is failed whereas the distributed nodes work if one is failed.

Table.no.1 Comparison of Values

Characteristics	River Water	Well
Turbidity (NTU)	5.4	3.2
pH	8.03	7.05
Electrical Conductivity	1358	289.0
Temperature	29	29
Acidity	9	30.0
Alkalinity	70	82
Total Dissolved Solids (TDS)	674	149
Total hardness (CaCO3)	184	112
Calcium (Ca)	64.1	43.29
Magnesium (Mg)	5.83	0.97
Chloride (Cl)	347.41	36.87
Fluoride (F)	Nil	Nil
Iron (Fe)	0.7	0.3
Nitrate (NO3)	10	30.0
Chemical Oxygen Demand(COD)	Nil	Nil
Phosphate (PO4)	Nil	Nil
Ammonia	1.0	Nil

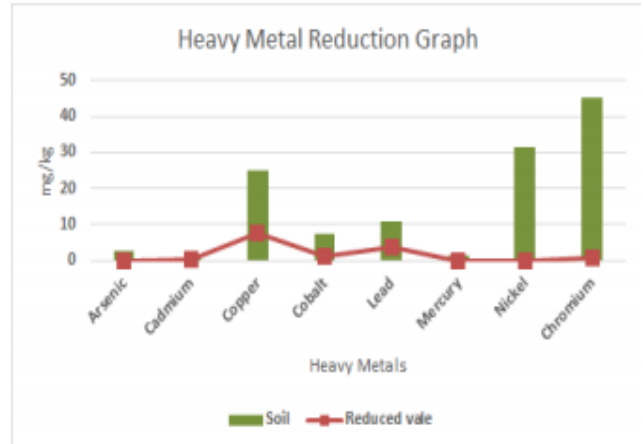


Fig.no.2 Graphical Result

The above figure and graph represents the simulation result of the pollutants and characteristics present in the river water. In this remediation process we can find the hazardous heavy metallic ions and their threshold values. The acquired values are equal or less to the standard values which is referred as good unless it is referred as bad. The graphical representation is the perfect understanding for the process. Here the K-means clustering algorithm compares all the data in the cluster to give a real time understanding of the river water. The quality parameters are given in the clusters as inputs where it runs a combination of data to produce a perfect result.

VII. CONCLUSION & DISCUSSION

In this Project we've given a machine learning pipeline for assessing the quality of the river water. The system immensely focuses on the monitoring of river water quality. This system is appeared to be a better solution on reliability, persistence and speed. Using the WSN and clustering algorithm concepts which brings the life into this project. And all the data collected through sensors are legit and rectified. These values are compared to the fresh water in the wells and canals to bring subtle values of the pollutants and characteristics present in the water.

In this work we evaluated the results we gained to those standard values for a definitive results and the frame work this system produced is always represented graphically for a better understanding.

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