EFFICIENT WATER QUALITY ANALYSIS AND PREDICTION USING SUPERVISED MACHINE LEARNING

Introduction

Natural water resources like groundwater and surface water have always been the cheapest and most widely available resources of fresh water. However, these resources are also most likely to become contaminated due to various factors including human, industrial and commercial activities as well as natural processes. In addition to that, poor sanitation infrastructure and lack of awareness also contributes immensely to drinking water contamination

The basic idea of this research is to devise a comprehensive methodology that analyses and predicts water quality of particular regions with the help of certain water quality parameters.

Objective

By proposing a model based on machine learning techniques to forecast the future trends in water quality of a specific area with the aid of existing water quality data, this project seeks to address this issue.

Literature survey

Several researchers have experienced many issues in predicting the quality of water and in devising some new methodologies to analyse and forecast the future trends in water

quality. Some of the important research works in water quality evaluation and prediction are reviewed and presented below.

According to the World Health Organization (WHO) [1], 1.1 billion people worldwide are estimated to require access to clean drinking water, and 2.6 billion require basic sanitation. Water pollution is a result of population, transportation, and industry growth. A simple method for the evaluation of river water quality based on the distance of a point to the interval in Jiaozuo River L. Hu, et al. [2], has based on Grey Relational Analysis (GRA). Best result was achieved by using GRA and its simple method with best operability and the physical significance

Tirabassi [3] states that the Blackbox technique uses a mathematical model that is a known input and accurately predicts the output to describe the prediction of river water quality without chemical and physical parameters. But as per H. Liao [4], these conventional techniques are difficult and perplexing, and they have additional drawbacks such as difficulties with multivariate prediction, complex mathematical calculus, and the equal treatment of old and new data.

In order to determine the best predictors of THM levels in final potable water and distribution networks, as well as the rate at which THM creation will alter in the future, M. Valdivia, et al. [5] suggested a model. To identify the elements contributing to the progression of THMs, data from 93 full-scale Scottish water treatment plants between January 2011 and January 2013 were examined. The models for distinct THMs compounds were created using multilinear regression methods. The development of THMs in Scottish WTPs was found to be influenced by ambient temperature, DOC, and chloride according to measurements made using Pearson's correlation analysis.

Liu. P, et.al [6], developed and controlled an advanced water quality monitoring system based on the Internet of Things (IoT). The water quality measurement data from the Guazhou River, water

quality surveillance station in Yangzhou were used to evaluate water quality parameter from January 2016 to June 2018.

Conclusion

One of the most important resources for survival is water, and WQI measures the quality of water. Traditionally, one must undergo an expensive and time-consuming lab analysis to test the purity of the water. This study investigated a different machine learning approach to forecast water quality using basic, readily accessible water quality data.

Reference

[1] World Health Organization, Meeting the MDG drinking water and sanitation target: the urban and rural challenge of the decade.

[2] L. Hu, C. Zhang, C. Hu, and G. Jiang, Use of grey system for assessment of drinking water quality: a case study of Jiaozuo city, China, Advances in Grey Systems Research, Springer Berlin Heidelberg, pp. 469-478, 2010

[3] M. A. Tirabassi, A statistically based mathematical water quality model for a non estuarine river system1 JAWRA Journal of the American Water Resources Association, Vol. 7, pp. 1221-1237, December 1971.

[4] H. Liao and W. Sun. Forecasting and evaluating water quality of Chao Lake based on an improved decision tree method. Procedia Environmental Sciences 2 (2010): 970-979.

[5] M. Valdivia, D.W. Graham, and D. Werner, Climatic, Geographic and Operational Determinants of Trihalomethanes (THMs) in Drinking Water Systems Scientific reports, Vol. 6, 2016.

[6] Jayti Bhatt, Jignesh Patoliya, Iot Based Water Quality Monitoring System, IRFIC, 21feb,2016