LITERATURE REVIEW
EFFICIENT WATER QUALITY ANALYSIS USING MACHINE LEARNING

M Azrour, J Mabrouki, G Fattah (2022)

Water is an essential resource for human existence. In fact, more than 60% of the human body is made up of water. Our bodies consume water in every cell, in the different organisms and in the tissues. Hence, water allows stabilization of the body temperature and guarantees the normal functioning of the other bodily activities. Nevertheless, in recent years, water pollution has become a serious problem affecting water quality. Therefore, to design a model that predicts water quality is nowadays very important to control water pollution, as well as to alert users in case of poor quality detection. Motivated by these reasons, in this study, we take the advantages of machine learning algorithms to develop a model that is capable of predicting the water quality index and then the water quality class. The method we propose is based on four water parameters: temperature, pH, turbidity and coliforms. The use of the multiple regression algorithms has proven to be important and effective in predicting the water quality index. In addition, the adoption of the artificial neural network provides the most highly efficient way to classify the water quality.

Sani Isah Abba, Quoc Bao Pham, Gaurav Saini (2020)

In recent decades, various conventional techniques have been formulated around the world to evaluate the overall water quality (WQ) at particular locations. In the present study, back propagation neural network (BPNN) and adaptive neuro-fuzzy inference system (ANFIS), support vector regression (SVR), and one multilinear regression (MLR) are considered for the prediction of water quality index (WQI) at three stations, namely Nizamuddin, Palla, and Udi (Chambal), across the Yamuna River, India. The nonlinear ensemble technique was proposed using the neural network ensemble (NNE) approach to improve the performance accuracy of the single models. The observed WQ parameters were provided by the Central Pollution Control Board (CPCB) including dissolved oxygen (DO), pH, biological oxygen demand (BOD), ammonia (NH_3), temperature (T), and WQI. The performance of the models was evaluated by various statistical indices. The obtained results indicated the feasibility of the developed data intelligence models for predicting the WQI at the three stations with the superior modelling results of the NNE. The results also showed that the minimum values for root mean square (RMS) varied between 0.1213 and 0.4107, 0.003 and 0.0367, and 0.002 and 0.0272 for

Nizamuddin, Palla, and Udi (Chambal), respectively. ANFIS-M3, BPNN-M4, and BPNN-M3 improved the performance with regard to an absolute error by 41%, 4%, and 3%, over other models for Nizamuddin, Palla, and Udi (Chambal) stations, respectively. The predictive comparison demonstrated that NNE proved to be effective and can therefore serve as a reliable prediction approach. The inferences of this paper would be of interest to policymakers in terms of WQ for establishing sustainable management strategies of water resources.

Gaganjot Kang, Jerry Zeyu Gao, Gang Xie (2017)

Water quality becomes one of the important quality factors for the quality life in smart cities. Recently, water quality has been degraded due to diverse forms of pollution caused by disposal of human wastes, industrial wastes, automobile wastes. The increasing pollution affects water quality and the quality of people's life. Hence, water quality evaluation, monitoring, and prediction become an important and hot research subject. In the past, many environmental researchers have dedicated their research efforts on this subject using conventional approaches. Recently, many researchers begin to use the big data analytics approach to studying, evaluating, and predicting water quality due to the advances of big data applications and the availability of environmental sensing networks and sensor data. This paper reviews the published research results relating to water quality evaluation and prediction. Moreover, the paper classifies and compares the applied big data analytics approaches and big data based prediction models for water quality assessment. Furthermore, the paper also discusses the future research needs and challenges.