Project ID : PNT2022TMID38737
Team Leader : Ajai B
Team Members : Karan L
Harish T
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Project Title : Efficient Water Quality Analysis and Prediction using machine Learning

Literature Survey

Paper 1:

Title	: Efficient Water Quality Prediction Using Supervised Machine Learning
Author	: Umair Ahmed, Rafia Mumtaz, Hirra Anwar, Asad A. Shah, Rabia Irfan and José García-Nieto.
Journal	: http://www.mdpi.com/journal/water
Year	: 2019
Methodology	**:** Multilayer preceptron
Scope	**:** They research and explored an alternative method of machine learning to predict water quality using minimal and easily available water quality parameters. The data used to conduct the study were acquired from PCRWR and contained 663 samples from 12 different sources of Rawal Lake, Pakistan. A set of representative supervised machine learning algorithms were employed to estimate WQI. This showed that polynomial regression with a degree of 2, and gradient boosting, with a learning rate of 0.1, outperformed other regression algorithms by predicting WQI most efficiently, while MLP with a configuration of (3, 7) outperformed other classification algorithms by classifying WQC most efficiently.

Paper 2:

Title	: Water Quality Prediction Model of a Water Diversion Project Based on the Improved Artificial Bee Colony–Backpropagation Neural Network
Author	: Siyu chen, Guohua Fang, Xianfeng Huang and Yuhong Zhang.
Journal	: http://www.mdpi.com/journal/water
Year	**:** 2018
Methodology	**:** Improved artificial bee colony (IABC) algorithm and BP nerural networks model.
Scope	**:** They used IABC-BP model which can increase the forecasting performance of the ABC-BP by searching for the best value of each connection weight and threshold has better network stability, higher learning speed, and stronger approximation ability. In a word, the IABC-BP model has been improved effectively, and it is superior to ABC-BP in all aspects and more suitable for water quality prediction.

Paper 3:

Title	: Design and implementation of a hybrid model based on two-layer decomposition method coupled with extreme learning machines to support real-time environmental monitoring of water quality parameters
Author	**:** Elham Fijani, Rahim Barzegar, Ravinesh Deo, Evangelos Tziritis, Konstantinos Skordas
Journal	: 2019 Elsevier, Science of The Total Environment
Year	**:** 2019
Methodology	**:** Complete ensemble empirical mode decomposition algorithm with adaptive noise (CEEMDAN) and the variational mode decomposition (VMD) algorithm coupled with extreme learning machines (ELM).
Scope	**:** They developed methodology demonstrates the robustness of the two-phase VMD-CEEMDAN-ELM model in identifying and analyzing critical water quality parameters with a limited set of model construction data over daily horizons, and thus, to actively support environmental monitoring tasks, especially in case of high-frequency, and relatively complex, real-time datasets.

Paper 4:

Title	: Predicting and Analyzing Water Quality using Machine Learning.
Author	: Yafra Khan and Chai Soo See
Journal	**:** 2016 IEEE Long Island Systems, Applications and Technology Conference (LISAT).
Year	**:** 2016
Methodology	**:** Comprehensive methodology, Artificial Neural Network
Scope	**:** They analyzes and forecasts the values of water quality parameters, in order to determine the concentration of Chlorophyll, Dissolved Oxygen, Turbidity and Specific Conductance and analyzes the results.

Paper 5:

Title	: An application of different artificial intelligences techniques for water quality prediction
Author	**:** A. Najah, A. El-Shafie, O. A. Karim and Amr H. El-Shafie
Journal	**:** 2012 Springer Link, *Neural Computing and Applications*
Year	**:** 2012
Methodology	**:** Multilayer perceptron neural network model MLP-NN
Scope	**:** They used three different model techniques, including LRM, multilayer perceptron neural networks (MLP-NN), and RBF-NN, were performed to identify the optimal prediction for water quality parameters along the Johor River basin on two different levels of water bodies. This manuscript focuses on critical parameters that affect water quality due to the urbanization around the rivers. The studied parameters were EC, total dissolved solids (T.D. solids), and turbidity. The MLP-NN outperformed the conventional model LRM. This result shows that it is difficult to produce a reliable model with conventional modeling approaches.

Paper 6:

Title	: The Lake Water Bloom Intelligent Prediction Method and Water Quality Remote Monitoring System.
Author	: Wang xiaoyi, Dai jun, Liu zaiwen, Zhao xiaoping, Dong suoqi, Zhao zhiyao, Zhang miao.
Journal	**:** 2010 Sixth International Conference on Natural Computation.
Year	**:** 2010
Methodology	**:** Grey-BP neural network
Scope	**:** They combined of automatic remote water quality monitoring and water bloom prediction model, it is automated and intelligent for water quality monitoring, data analysis, water bloom prediction and results publishing through Web, provides valuable and efficient references to real-time monitoring of water quality and water bloom early warning, so as to provide decision-making reference for the environmental protection department.

Paper 7:

Title	: An application of different artificial intelligences techniques for water quality prediction
Author	**:** A. Najah, A. El-Shafie, O. A. Karim and Amr H. El-Shafie
Journal	**:** 2012 Springer Link, *Neural Computing and Applications*
Year	**:** 2012
Methodology	**:** Multilayer perceptron neural network model MLP-NN
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