Abstract

Water treatment can be promoted through keen consideration of raw water quality parameters (Turbidity and pH). This paper discusses the development of a real-time water quality monitoring system using wireless sensor networks. At first, we present performance experiments on LoRa technology connectivity for wireless sensor networks in a rural set up of Dedan Kimath Uinion of Technology in Kenya. The specific sensors used for the developed system included: The DFRobot gravity Arduino turbidity sensor and the DFRobot's Gravity Analog pH Sensor. The sensed data values of these parameters were relayed to a gateway by a LoRaWAN transceiver. The gateway then uploaded the received parameter data values to The Things Network platform which was interfaced with a Google Cloud Platform, where an InfluxdB Virtual Machine database stored the received data. A web-based application (Dash Plotly app) was developed and interlinked with the database for analysis and visualization of the received data in real time. The system was deployed at the Nyeri Water and Sanitation Company treatment plant based at Nyeri town, Kenya, from 4th November, 2020 to 4th January, 2021. The dataset obtained contained a total of 2,658 records, each collected after
Using a subset of 291 records, extensive experiments were performed for the evaluation and assessment of machine learning anomaly detection algorithms of the Local Outlier Factor, the Isolation Forest, Extended Isolation Forest, and the Robust Random Cut Forest for each of the two parameters; Turbidity and pH. From analysis results, the Local Outlier Factor algorithm outperformed all the other algorithms evaluated.

References


15. Z. Rasin and M. R. Abdullah, "Water Quality Monitoring System Using Zigbee Based


Index Terms

Computer Science

Wireless

Keywords

Water quality monitoring; wireless sensor networks; anomaly detection; local outlier factor; isolation forest, extended isolation forest, robust random cut forest.