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Assessment of physical and chemical water quality parameters using naive bayes control algorithm

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ABSTRACT

In recent decades, one of the challenging issues faced by global nations is the degradation of water resources. Traditionally, water samples are manually collected from different locations to monitor its standards. Such conventional practices incur heavy cost, demand highly-skilled professionals, consume time and produce low precision results. Due to these drawbacks, these techniques are no longer considered to be efficient ones to check the water quality parameters continuously on real-time basis. In this background, the current study designed and developed a low-cost water quality monitoring configuration that can check the quality of water on real-time basis with the help of IoT. The methodology includes the analysis of physical and chemical water quality parameters. Various sensors are used to determine the water quality parameters in the projectedmethod namely, turbidity, conductivity and temperature. The data collection from the system is communicated via microcontroller system following Arduino model. Naïve Bayes theorem is used to analyse the data collected from the sensor to controller. Using this classifier, either one or multiple water quality parameters are checked in a specific location, leaving beside other parameters. The analysis produced highly accurate results and incurred less cost during implemented in comparison with other techniques.

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1. Introduction

In conventional water quality analysis processes, the water samples are physically collected from various sites and are processed in laboratories. In spite of the process being time-consuming, costly and demands extensive professional skills, the results do not reflect real-time information about the quality of water. This real-time information about chemical and physical properties of the water is critical in decision making processes, associated with public health safety. Since the conventional techniques lack to monitor water quality parameters on real-time basis, there exists a necessitate to extend novel approaches that can leverage internet-based tools to monitor water quality. Summary of various water quality monitoring techniques are described in Table 1.

In the study conducted by [1] a real-time water quality measurement system was designed and implemented with the help of GSM. The system exhibited a few advantages namely, accuracy and low cost while it failed to achieve the expected efficiency since it used microcontroller in its setup.

The prototype developed by [2–4] is WSN water quality monitoring system. This system showcased excellent applicability and had the potential to be incorporated in real-time situation for finest control of aquaculture situation. The users were empowered to envisage the data from WSN by the software module in this prototype without any need for specific software. Furthermore, the model is appropriate long-term outdoor environments while the gateway module also incurs less cost comparatively. However, the prototype experienced heavy data loss.

A solar panel-powered WSN-based water quality configuration was proposed by the researchers in [5], in which the wireless system is used to monitor water quality. This reduces the cost incurred upon overall monitoring system and labor cost while it

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