

ABSTRACT

Water conditions in aquaculture are highly influenced by various parameters such as temperature, pH, and dissolved oxygen (DO). The main problem is that these parameters are very dynamic and can change rapidly due to environmental influences, making it difficult for fish farmers to predict the risks to fish survival. To address this issue, this research develops a water quality monitoring system using a Fuzzy logic algorithm capable of classifying water conditions in real-time based on pH and DO parameters. This system is implemented on floating net cages located in waters with water flow. The method used is Fuzzy Sugeno, where data from the pH and DO sensors is processed directly by the ESP32 microcontroller without prior data collection. During testing in BTP fish ponds over two days, from a total of 165 data points obtained, the system demonstrated the ability to classify water quality risks according to changes in pH and DO values. For example, the system classified 70 data points as 'Low' (ideal conditions), 46 data points as 'Medium', and 49 data points as 'High', indicating significant changes in water parameters. Validation results with MATLAB showed a label accuracy of 94.55%, although there were numerical differences with MATLAB, a Mean Absolute Error (MAE) of 3.46 indicates a relatively small average numerical error. This system provides the ability for quick decision-making and maintains the sustainability of fish farming.

Keywords: Fuzzy logic, Classification System, Water Quality, pH, DO, Floating Net Cages.