Hindawi
Journal of Food Quality
Volume 2023, Article ID 3841882, 9 pages
https://doi.org/10.1155/2023/3841882

WILEY | Hindawi

Research Article

Machine Learning Integrated Multivariate Water Quality Control Framework for Prawn Harvesting from Fresh Water Ponds

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Received 22 June 2022; Revised 14 August 2022; Accepted 24 November 2022; Published 23 January 2023

Academic Editor: Rijwan Khan

Water contamination, temperature imbalance, feed, space, and cost are key issues that traditional fish farming encounters. The aquaculture business still confronts obstacles such as the development of improved monitoring systems, the early detection of outbreaks, enormous mortality, and promoting sustainability, all of which are open problems that need to be solved. The goal of this study is to provide a machine learning (ML)-based aquaculture solution that boosts prawn growth and production in ponds. The study described a proposed framework that collects data using sensors, analyses it using a machine learning framework, and provides results like a preferred list of water quality (QOW) variables that affect prawn development and yield, as well as pond categorization into low, medium, and high prawn-producing ponds. In this study, we use eight distinct machine-learning classifiers to discover the driving elements that influence the development and yield of aquatic food products in ponds in terms of QOW variables, as well as three feature selection approaches to identify the aspects that have the largest impact on the pond's total harvest performance. To validate and obtain satisfying results, the suggested system was installed and tested. The average *F* score and accuracy when yield is employed as a harvest parameter are determined to be 0.85 and 0.78, respectively. The average merit ratings of temperature, dissolved oxygen, and salinity are significantly higher than those of the other QOW components. The temperature variations are greatest during the second, fourth, and seventh weeks. Temperature, salinity, and dissolved oxygen are the three QOW variables that have the largest influence on overall pond harvest performance, according to the data. Additionally, it has been discovered that a key QOW factor in separating high-yielding ponds from low-yielding ponds is the temperature change following stocking.

1. Introduction

Water quality monitoring is considered crucial for fish farming. Several studies have found that measuring dissolved oxygen is crucial to sidestep high values of water quality, which may result in serious harm to fish such as anoxia, hyperoxia, as well as hypoxia [1]. The term "water quality monitoring" refers to the process of collecting samples of water and analysing them. In order to assess if we are succeeding in cleaning up our waterways, it is crucial that we monitor the quality of the water. It indicates the condition and make-up of streams, rivers, and lakes both in the