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Prediction of Water Quality on Aquaculture Using Machine Learning

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Abstract: One of the primary factors of culturing aquatic farming is by knowing the quality of water. In the rapid development of marine aquaculture, the water quality of the aquatic environment is regarded as a main limiting factor. Water quality determines the success or failure of a fish cultural operation to a great extent. Therefore, it is necessary to assess the water quality and environmental conditions in marine aquaculture areas. To predict the quality of water, some common parameters include aluminium, barium, chromium, lead, etc. So, we are using ML algorithms like Random Forest, and KNN to predict the quality of water.

Keywords: **Machine Learning, Random Forest, Parameters, Water Quality.**

Introduction

Fish farming is an occupation for many people in India. Water Quality is the main factor for cultivating and stabilizing fish production. Fish farming means a growing variety of marine species such as fishing fish, Grass carp, and prawns which are raised in various places such as rivers, seas, and lakes. There are various restrictions on marine life. Each parameter in water is dependent on others and affects the aquatic organisms. In fish farming, water should be kept between 6 and 8. If the pH is below 4.5 that will lead the fish to die. Aqua farmers depend on the self-assessment by understanding the bounds of water, time-ingesting, and erroneous as barriers can extrude over time. To conquer this problem, modern technology must combine with agriculture. Therefore, it will increase productivity and decreases losses through continuously tracking water quality parameters. The water parameters that need to be checked are Aluminium, Arsenic, Barium, cadmium, Chloramine, Chromium, Copper, Bacteria, Viruses, Lead, Nitrates, and Mercury.

Literature Survey

There are many procedures for identifying and predicting the quality of water, and one of them is by evaluating the chemicals of water. It is the easiest and most accurate technique for keeping our water sustainable for fish growth. Without

managing the water quality, we cannot grow our fish in an unstudied environment. So, we take out different chemical values as parameters to educate a classifier.

Proposed System

The drastic change in climate leads to various changes in animals. Fish farming also suffered an adverse loss. To improve fish farming many techniques have been proposed in which predicting water quality is an approach. We designed our system using Random Forest Algorithm. With this system, a model is built to provide more accuracy by using parameters like Aluminium, Arsenic, Barium, Cadmium, Chloramine, Chromium, Copper, Bacteria, Viruses, Lead, Nitrates, Nitrites, and Mercury. By using this algorithm, the system takes less training time as compared to others, and predicts output with accuracy even for a large dataset it runs efficiently. And mainly it maintains accuracy when a large proportion of data is missing.

Algorithm

Random Forest

Random Forest is a famous machine learning algorithm belonging to supervised learning which is used for both Classification and Regression categories. Random Forest is a classifier algorithm which contains many decision trees

created by the given dataset and presents the average to improve the accuracy of the dataset. Without relying on one decision tree, the random forest picks the prediction from each tree and evaluates the majority votes of predictions and presents the final output. Random Forest is best suited for large datasets for the best accuracy.

Proposed System Architecture

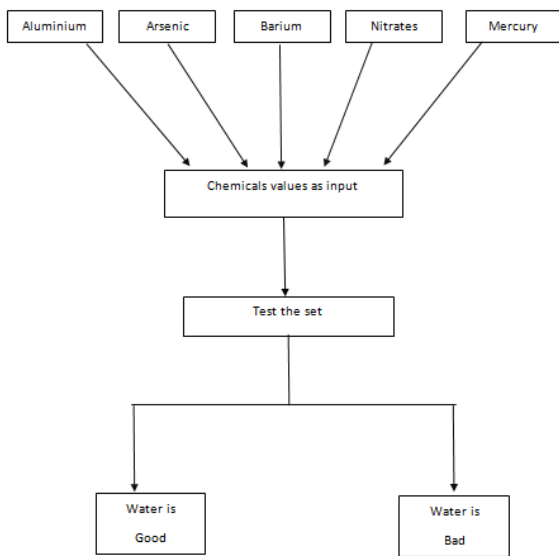


Fig.1. Classification of Water Quality

Water Quality is varied in two ways, one is whether it is suitable for agriculture and the other is not suitable for agriculture. We evaluate the water on basis of the chemical values entered on our website.

DATASET

Fig 2: This is the dataset we have used for our project

Experimental Results

Initially, we collect the chemical values of water from the user. The outcome of the situation is calculated by evaluating various decision trees which are formed from the training dataset.

To represent the output, we present each parameter value on our website then from the testing set we equate the output. We present the water in two ways whether it is suitable for fish farming or not.

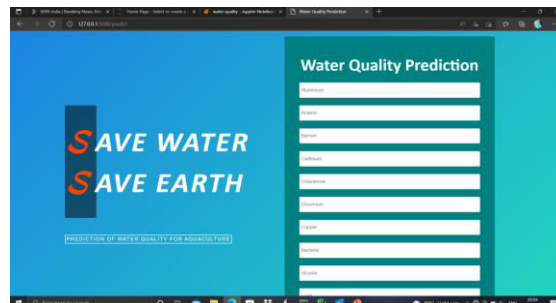


Fig 3: In here we have to upload the chemical values of water, then we can evaluate the quality of the water

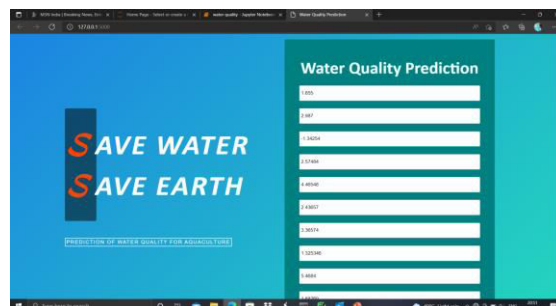


Fig 4: Here we have uploaded the values of chemicals

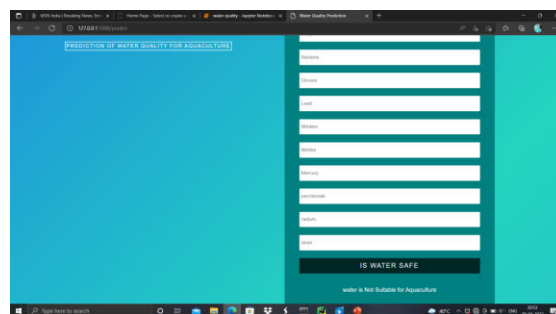


Fig 5: We have uploaded the values of the parameters which are not suitable for aquaculture.

Comparative Study

| S. No | Machine Learning Model | Accuracy (%) |
|-------|------------------------|--------------|
| 1 | Random Forest | 94% |
| 2 | Decision tree | 92% |
| 3 | KNN | 90% |
| 4 | Adaboost | 86% |

Conclusion

We used aluminium, barium and chromium as parameters of the dataset where we marked aluminium, barium and copper as feature variables and Nitrites as the target variable. We find out accuracy as the performance metric. We evaluated a total of four supervised machine models. They are Random Forest(RF), Decision Tree, K-nearest neighbour(KNN) and Adaboost. Among these models, our proposed model, random forest has the best accuracy. Random Forest provides an accuracy of 94.16%, KNN 90% and Decision Tree 92%.

References

- [1]
<https://www.kaggle.com/authentic/water-quality-prediction>
- [2]Fish survival prediction in an aquatic environment using random forest model
IEEE base paper 2021
- [3]FAO, The State of World Fisheries and Aquaculture 2020-sustainability in action,2020, FAO, Italy,2020, pp.0-244,
<http://www.fao.org/3/ca9231en/CA9231EN.pdf>.
- [4]M.K.Alsmedi, K.B.Omar, S.A.Noah, and A.I.Almarashdeh, "Fish Recognition Based on Robust Features Extraction from Size and Shape Measurements Using Neural Network," *Journal of Computer Science*, vol.6,no.10, pp.10881094,2010,
doi:10.3844/jcssp.2010.1088.1094.
- [5]T.H.Hoang, K.Lock, A.Mounton, and P.L.M.Goethals, "Application of classification trees and support vector machines to model the presence of macroinvertebrates in rivers in Vietnam," *Ecological Informatics*, vol.5, no.2,2010, pp.140-146, 2010,
doi:10.1016/j.ecoinf.2009.12.001.
- [6]B.Benson, J.Cho, D.Goshorn, and R.kastner, "Field programmable gate array(FPGA) based fish detection using haar classifiers," *American Academy of Underwater Sciences*, Georgia, USA, 2009, pp.1-8.
- [7]S.Bermejo, "Fish age classification based on length, weight, sex and otolith morphological features," *Fisheries Research*, vol.84, no.2, pp.270-274,2007,
doi:10.1016/j.fishres.2006.12.007.