

## Abstract

Coral Reefs are becoming increasingly endangered, mostly as a consequence of human activities. They urgently need to be researched and studied with the help of computer analysis and machine learning techniques. This study intends to study the coral reef ecosystem in the U.S Virgin Islands and also compare the different performance measures of various classification models including 1) K-Nearest Neighbors, 2) Decision Trees, 3) Random Forests, and 4) Logistic Regression

## Dataset Description

1. The dataset consists of 197,000 instance, and 30 features.
2. The dataset is the survey results of the National Coral Reef Monitoring Program: Assessment of coral reef communities in the U.S Virgin Islands, collected using Line Point-Intercept(LPI) survey, Belt Transect procedure, and Stationary Point Count Method.
3. The dataset contains information such as sample depth, underwater visibility, regions, habitat type, density, strata type, etc. Target Feature: Strata Type

## Experimental Results & Analysis

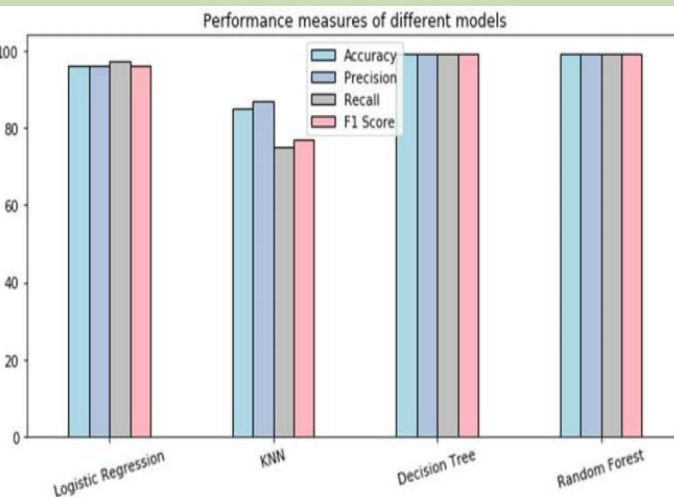


Figure 1 displays the performance measures of all the classification models.

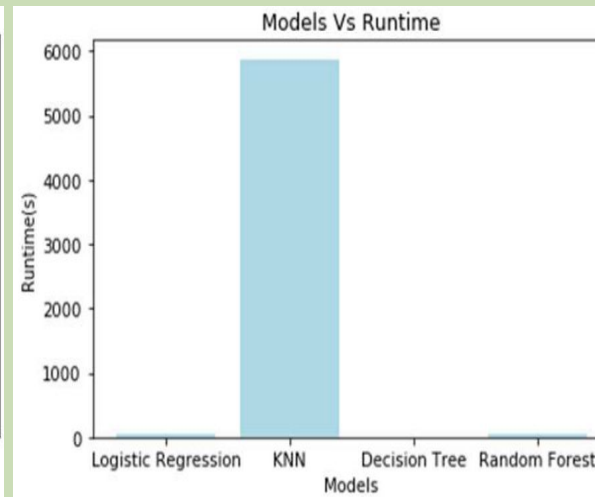


Figure 2 compares the runtime of various classification models.

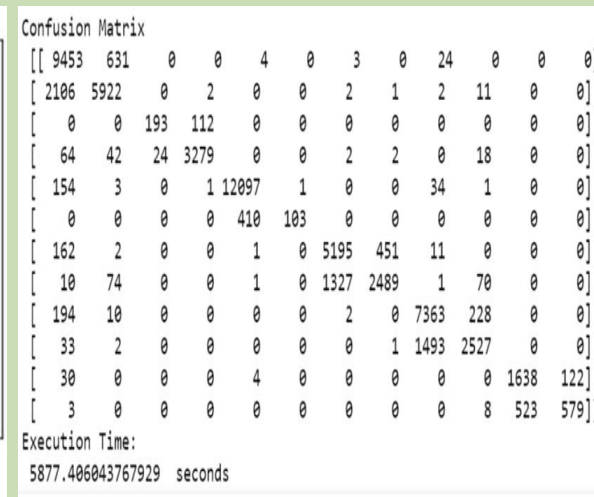


Figure 3 shows the confusion matrix of K-Nearest Neighbor(KNN)

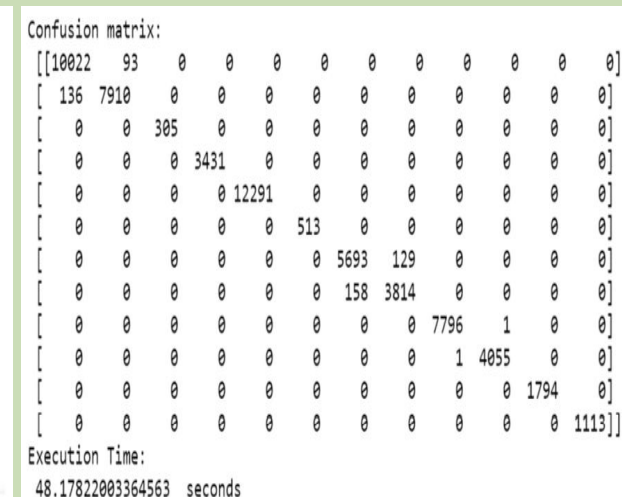


Figure 4 shows the confusion matrix of Decision Tree

## Conclusion and Future Work

1. Decision Trees and Random Forests performed the best with 99% accuracy, precision, recall, and f1 score
2. Decision Trees outperformed the rest of the classifiers in terms of runtime.
3. There were clear positives and negatives for each model, and none of them can be considered perfect.
3. The future work includes use of satellite images and Support Vector Machines and Convolutional Neural Networks for better study and interpretations.



## References

1. "National Coral Reef Monitoring Program: Assessment of coral reef fish communities in the U.S. Virgin Islands" [Available: https://data.nodc.noaa.gov/cgi-bin/iso?id=gov.noaa.nodc:NCRMP-Fish-USVI](https://data.nodc.noaa.gov/cgi-bin/iso?id=gov.noaa.nodc:NCRMP-Fish-USVI).
2. Xu, Hui, Zhen Liu, Jinshan Zhu, Xiushan Lu, and Qiang Liu. "Classification of Coral Reef Benthos around Ganquan Island Using WorldView-2 Satellite Imagery." *Journal of Coastal Research*, 2019