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Rock / Mine Classification Using Supervised Machine Learning Algorithms

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Abstract



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Abstract:

Nowadays, Artificial Intelligence appears in the domain of goetechnics, underwater acoustics, tunneling, geomorphology engineering and also in several fields too. This paper focused on the prospectivefor machine learning approaches which are sub field of artificial intelligence especially in underwater acoustics domain. In this proposal, machine learning approaches such as light gradient boosting, logistic regression, and random forest classifier algorithms are used for categorizing rocks or mines from collected sonar dataset. Based on performance metrics such as precision, F-score, recall, execution time, accuracy and confusion matrix, evaluate overall performance of machine learning models. Here, the experimental results shows that among all classifier algorithms, light gradient boosting achieves greater validation accuracy as 95% also training accuracy as 100* moreover, random forest classifier achieves 100% accuracy during training phase.

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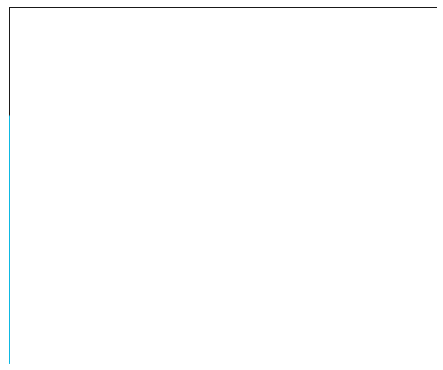
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I. Introduction

Sound Navigation and Ranging, or SONAR, is a type of unmanned vehicle which utilizes sound technology to detect submerged objects, navigate underwater, and communicate. The acoustics can range from infrasonic (low) to ultrasonic (high). Underwater acoustics, often known as hydro acoustics, is the study of underwater sound. Active sonar and passive sonar are the two types of SONAR. The non-passive transducers create some sound pulse into the water, which is used to detect underwater objects. In case some of the things available in the way of sound pulse, the echo resiles off of it and come back to the sonar device. The reading signal strength is measured by the transducer if it is ready to receive signals. Several algorithms as decision tree, k nearest neighbor, support vectors and gradient boosting by [1] which isolates the underwater sea objects specifically mines or rocks to obtain zoomed imagery. Gradient Boosting classifier produced better accuracy and how SONAR technology works in underwater sea is illustrated in figure 1. Fig. 1.

SONAR technology in underwater seafloor.

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