

## Majority voting of ensemble classifiers to improve shoreline extraction of medium resolution satellite images

### ABSTRACT

Coastal zones are constantly exposed to changes caused by natural processes, anthropogenic activities or both, which can precariously alter the coastal landscapes of many countries. Thus, monitoring of coastal zones is needed to provide important information about current conditions of a country's coastal areas by examining changes that are taking place. In this respect, such monitoring can be carried out by traditional ground survey, airborne aerial photo, or remote sensing. However, the former is more effective and efficient as it can extract vital boundary information from satellite images using appropriate image analysis. Nonetheless, shoreline extraction has a number of challenges, and many methods have been proposed to improve such extraction, such as the use of machine learning methods. Thus, this study was carried out to determine the most effective ensemble voting classifier based on two different types of classifiers, comprising 11 single classifiers and 4 ensemble classifiers. Performance criteria of the classifiers were based on the overall accuracy, training time, and testing time. The analysis of the experimental data revealed several interesting results. First, for the combination of single and ensemble classifiers, ensemble classifiers with majority voting of Random Forest and Support Vector Machine RBF kernel were the most effective classifiers, attaining high overall accuracy. Second, for the combination of two single classifiers, Multilayer Perceptron and k-Nearest Neighbor attained high overall accuracy, rendering them as the most effective classifiers in this category of classifiers. Third, there were trade-offs between performance measures, as increased overall accuracy was accompanied by longer training and testing time in the performance of such classifiers as both of voting-based ensemble classifiers increased significantly.

**Keyword:** Shoreline extraction; Image classification; Satellite images; Majority voting; Ensemble classifier