

## Comparative Analysis to Investigate Appropriate Machine Learning Approach for Landslide Susceptibility Mapping

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A Landslide is defined as a collapse of a mass of earth. Irregular development activities on mountains and inadequate attention to construction aspects have led to the increase of landslide and consequently sustaining damages to lives and properties. Of the 3275 sq.km of the area in the Ratnapura District; 2178 sq.km is considered to be highly prone to landslides. If proper investigations were performed on time, most of the landslides could be predicted relatively accurately. The main objective of this study was to map areas prone to landslide-hazards to discover the real scope of landslide processes, where this knowledge will be highly beneficial to the general public in avoiding the landslide hazards and in mitigating the losses. Machine learning approaches based on Support Vector Machine (SVM), Naïve Bayes and Ensemble Learning technique were used to develop the Landslide prediction models and multiple approaches were compared to investigate the most appropriate prediction model. This study has a strong capability to predicting landslides by considering triggering factors such as rainfall and causative factors such as slope angle, land cover, elevation, intensity, bedrock geology and soil materials. Application of Ensemble Learning techniques such as Voting, Bagging, Boosting (AdaBoostM1) and Stacking produced 98%, 74%, 94% and 76% accuracy rates respectively. Moreover, experimental results after applying SVM and Naive Bayes showed the accuracy rates to be 96% and 94% respectively. This research discovered that the ensemble approach has the best degree to fit for building a prediction model. Moreover, the study found that all the factors had relatively positive effects on the landslide.

**Keywords:** Ensemble approach, Support Vector Machine (SVM), Naive Bayes