

## Artificial Neural Networks and Hidden Markov Model in Landslides Prediction

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**Abstract :** Landslides are the most recurrent and prominent disaster in Sri Lanka. Sri Lanka has been subjected to a number of extreme landslide disasters that resulted in a significant loss of life, material damage, and distress. It is required to explore a solution towards preparedness and mitigation to reduce recurrent losses associated with landslides. Artificial Neural Networks (ANNs) and Hidden Markov Model (HMMs) are now widely used in many computer applications spanning multiple domains. This research examines the effectiveness of using Artificial Neural Networks and Hidden Markov Model in landslides predictions and the possibility of applying the modern technology to predict landslides in a prominent geographical area in Sri Lanka. A thorough survey was conducted with the participation of resource persons from several national universities in Sri Lanka to identify and rank the influencing factors for landslides. A landslide database was created using existing topographic; soil, drainage, land cover maps and historical data. The landslide related factors which include external factors (Rainfall and Number of Previous Occurrences) and internal factors (Soil Material, Geology, Land Use, Curvature, Soil Texture, Slope, Aspect, Soil Drainage, and Soil Effective Thickness) are extracted from the landslide database. These factors are used to recognize the possibility to occur landslides by using an ANN and HMM. The model acquires the relationship between the factors of landslide and its hazard index during the training session. These models with landslide related factors as the inputs will be trained to predict three classes namely, 'landslide occurs', 'landslide does not occur' and 'landslide likely to occur'. Once trained, the models will be able to predict the most likely class for the prevailing data. Finally compared two models with regards to prediction accuracy, False Acceptance Rates and False Rejection rates and This research indicates that the Artificial Neural Network could be used as a strong decision support system to predict landslides efficiently and effectively than Hidden Markov Model.

**Keywords :** landslides, influencing factors, neural network model, hidden markov model

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