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Title:	Building Vulnerability and Landslide Susceptibility Assessment Using Frequency Ratio and Random Forest Method of Champawat District, Uttarakhand
Authors:	Sharma, Devesh
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Abstract:	Landslides in the Uttarakhand's' steep slopes have increased significantly in recent years, causing massive devastation and loss of life. To reduce the threat presented by landslide hazards to communities, one important method is to create accurate landslide susceptibility maps for susceptible areas. In this context, the study used integrated methodologies that combine machine learning and satellite remote sensing to create landslide susceptibility maps. The study area is located in the Uttarakhand's Champawat region, which is a very sensitive zone that has not previously been properly evaluated. Landslide inventory prepared by using ten landslide conditioning factors linked in the region, including topographic, hydrologic, and climatic aspects, were identified as predictors and the dependent variable. This study looks into the evaluate the performance of frequency ratio model and the random forest model for identify the different zones of landslide susceptibility. Our suggested model was trained and validated using distinct datasets, with 70% for training and 30% for testing. The accuracy of both models was assessed using Receiver Operating Characteristic (ROC) curve. Comparative assessment findings revealed that the Random Forest (RF) model outperformed the others. The ROC area under the curve follows following values: Random Forest model: 90% and Frequency ratio model: 70% creates significant disparities in the accuracy of the two models. The LSM map created by the RF model shows a high susceptibility zone surrounding the Champawat area. The final objective of this research is to identify number of buildings which are more vulnerable for landslide hazard in the region. Evaluation carried out more than 1300 buildings are located in very high susceptible zone and consist around 0.2 Sq. km area. These findings have significant promise for improving landslip risk management and informing land-use choices in the Chamapwat region. Keywords: Landslide Susceptible Mapping, Random Forest, Frequency Ratio, Building Vulnerability, Landslide Inventory, Champawat
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