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Transfer Learning Approach to Detect Landslides in Disaster Recovery Situation

Project Specification and Prototype Design

by

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ABSTRACT

Many tropical nations experience frequent heavy rains that lead to disasters such as floods and landslides. Landslides are a frequent geological catastrophe that results in significant casualties and financial losses each year. Having prompt access to information about disasters is critical in ensuring effective disaster response and mitigation measures. To minimize harm to people and property, disaster management authorities work to recover and rescue those affected. Currently, satellite images are used to identify larger areas affected by landslides in the aftermath of the disaster. The traditional satellite image processing methods face difficulties due to orbital cycles and poor weather conditions, leading to challenges in obtaining timely information about affected areas.

The solution being proposed seeks to reduce both human fatalities and financial damages during disaster recovery efforts. This is to be achieved through an investigation of landslide detection techniques that rely on remote sensing images captured by unmanned aerial vehicles (UAVs). With accuracy challenges and limited training data for landslide detection, new technologies and techniques need to be utilized to find landslide disasters effectively. The proposed system will utilize transfer learning and aerial images to provide a reliable system for pre-identifying landslides.

The proposed system offers improved detection performance compared to the deep learning based model, providing more accurate data support for disaster rescue decision-making. The experimental outcomes show that the Landslide Detection System can enhance both accuracy and processing time without hindering the standard model's performance. Specifically, the system was found to increase accuracy and precision by 5 to 25% compared to the models currently being evaluated. By using a low amount of data and reducing training time, this new approach yields novel results that can help save lives and speed up recovery.

Keywords – Transfer Learning, Aerial Image Processing, Machine Learning, Convolutional Neural Network, Disaster Prevention, Machine Learning, Landslide Detection

Subject Descriptors:
- Data Science methodologies >> Machine learning >> Machine learning approaches >> Transfer Learning
- Geological hazards >> Natural disasters >> Disaster management >>Landslide Recovery
- Computing methodologies >> Artificial intelligence >> Computer vision >> Remote Sensing >> Aerial Imagery