

Enhancing Dam Safety with Deep Learning for Earthquake Prone Damage Detection

Phromphat Thansirichaisree^{1,*}, Switz Thammavichit¹, Apichat Buatik¹, Nakhorn Poovarodom¹

¹Research Unit in Infrastructure Inspection, Monitoring, Repair and Strengthening (IIMRaS), Thammasat School of Engineering, Faculty of Engineering, Pathum Thani

ABSTRACT

In seismic-prone regions, ensuring dam safety is crucial. The fast identification of structural issues, notably concrete cracks and deformation, is critical to averting disasters, especially when compounded by earthquakes. This research represents a significant advance in dam safety through the utilization of advanced deep learning techniques, specifically the VGG19 and ResNet152V2 convolutional neural network (CNN) models. These models serve as the core components of an efficient system designed to detect earthquake-induced damage within dam structures. In our study, the deep learning method for crack detection is applied a dam. The comparative analysis, the VGG19 CNN excelled, achieving an impressive 99.37% accuracy, surpassing the STRUM Classifier (95.36%). This underscores the VGG19 model's potential as a crucial tool for enhancing dam safety assessments. This research is a significant contribution to the advancement of dam safety and earthquake resilience. It highlights the transformative potential of advanced deep learning models, such as the VGG19 CNN, in the field of dam inspection and structural integrity assessment, ultimately promoting safer and more resilient infrastructure in regions vulnerable to seismic activity.

Keywords: Deep learning, crack detection, dam, CNN, Resnet