World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:18, No:09, 2024

Deep Learning-Based Automated Structure Deterioration Detection for Building Structures: A Technological Advancement for Ensuring Structural Integrity

Authors : Kavita Bodke

Abstract : Structural health monitoring (SHM) is experiencing growth, necessitating the development of distinct methodologies to address its expanding scope effectively. In this study, we developed automatic structure damage identification, which incorporates three unique types of a building's structural integrity. The first pertains to the presence of fractures within the structure, the second relates to the issue of dampness within the structure, and the third involves corrosion inside the structure. This study employs image classification techniques to discern between intact and impaired structures within structural data. The aim of this research is to find automatic damage detection with the probability of each damage class being present in one image. Based on this probability, we know which class has a higher probability or is more affected than the other classes. Utilizing photographs captured by a mobile camera serves as the input for an image classification system. Image classification was employed in our study to perform multi-class and multi-label classification. The objective was to categorize structural data based on the presence of cracks, moisture, and corrosion. In the context of multi-class image classification, our study employed three distinct methodologies: Random Forest, Multilayer Perceptron, and CNN. For the task of multi-label image classification, the models employed were Rasnet, Xceptionet, and Inception.

Keywords : SHM, CNN, deep learning, multi-class classification, multi-label classification
Conference Title : ICDAAIE 2024 : International Conference on Data and Artifical Intelligence Engineering
Conference Location : Amsterdam, Netherlands
Conference Dates : September 12-13, 2024