Concrete crack detection using the integration of convolutional neural network and support vector machine

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Abstrak

ABSTRACT
Crack detection in concrete structures is an important task in the inspection of buildings to ensure their safety and serviceability. Previous studies relating to crack detection via image-processing and machine learning techniques generally involve the complex modelling of cracks and the extraction of hand crafted crack features. This approach often fails to apply to images from a real environment. This paper proposes a new image-based crack detection system using a combined model of classifiers, namely a Convolutional Neural Network (CNN) and a Support Vector Machine (SVM), which was proven to perform better than the methods involving the handcrafted features. In the proposed technique, a CNN is used in extracting deep convolutional features from the RGB images of cracks and an SVM classifier is used as an alternative to a softmax layer to enhance classification ability. The combined model automatically extracts features and determines whether or not an image patch belongs to a crack class. A dataset of 550 images are collected by a digital camera from various locations, and from the results, it is concluded that the proposed method is able to identify cracks on concrete surface with an accuracy of 90.76 %