Evenness Detection in Pavement of Roads & Highway with Transfer Learning

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Abstract

This study presents a system using an image processing technique that evaluates the pavement condition from an image. Pavement condition evaluation is an integral part of roads and highway maintenance works, which mostly depends on human inspection. Although recently some researches have been conducted on road condition detection with image processing, these researches used huge databases and deep CNNs that require expansive computer and longer training time, which limits the use of deep CNN in practical problems where huge database collection is not possible always. To solve this problem, in this study, transfer learning in deep CNN is applied and with only 195 images in each category, pre-trained VGG-16 and Inception-ResNet v2 models are used for pavement condition evaluation. VGG-16 achieved more than 90% prediction accuracy, while Inception-ResNet v2 achieved more than 85% prediction accuracy. Moreover, to validate the performance, both models have been tested with random images collected from Google. Evaluating pavement conditions this way would reduce the need for human inspection. Finally, the outcome of the study shows that the transfer learning approach could be useful in research areas, especially in civil engineering, where image data is insufficient.

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