Abstract

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Measuring the skid resistance of pavement surface with the conventional methods is generally a tedious and time taking job. With the advancements in computer vision and machine learning techniques, it is worthy to explore image-based non-contact techniques to predict the skid resistance of the pavement surface. The present study proposes a new approach that captures the pavement surface characteristics in the form of shadows and highlights under controlled illumination. It is envisaged that the shadows would be different for different surfaces and would therefore carry information about the spectral as well as spatial characteristics of the pavement surface. In the present study, an experimental setup is designed and fabricated to implement the proposed approach. A total of 300 sets of images from nine sites have been captured using the experimental setup, and the corresponding skid resistance values at those locations are measured using a British pendulum tester. Next, two models based on supervised machine learning and deep learning techniques are developed to evaluate the ability of these models to predict skid resistance. The results show that the model could correlate between the images and the surface texture well and achieve a highest accuracy of 88%. Further, synthetic data is generated using multiple light sources from various directions – it is found that the accuracy does not drop significantly, indicating the robustness of the models proposed.