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Convolutional Neural Network based Pothole and Driver Drowsiness Detection for Monitoring Road Condition

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Abstract: *Monitoring city road and traffic conditions is a well-studied issue. Several approaches to addressing this issue have been proposed. Potholes and Drowsiness Detection is a common annoyance that most people have encountered. These bowl-shaped holes in the road cause a significant number of automobile accidents, either directly or indirectly. Starting the process of getting a pothole covered/fixed takes time because it involves notifying the appropriate authorities and having them take action. What is envisioned is the implementation of a system that involves citizens in the process of detecting potholes. Many image processing techniques (IPTs) have been proposed to inspect pavement defects in order to improve the precision and efficiency of human on-site inspections. However, the various pavement conditions resulted in IPTs with unacceptable stability. As a result, in this study, a convolutional neural network (CNN) application for pothole detection using digital images is presented. The CNNs, known as conventional CNN and pre-pooling CNN, were created, trained, and tested using 96,000 images of pavement. Based on the testing results, a stability study and a comparative study were also conducted. The results showed that the optimized pre-pooling CNN had a recognition precision of 98.95% in the testing. The stability study revealed that the optimized CNN model was robust in a variety of real-world scenarios. When compared to traditional IPT methods, CNN had a higher precision for autonomously extracting pothole features. In today's fast-paced world, a safe commute is not only everyone's priority; it is also the government's responsibility to provide a hassle-free shuttle between locations. In this paper, we propose a system for detecting road potholes. Because we all know that prevention is better than cure, we design and implement a system that not only detects potholes but also stores this data on a cloud platform that can serve as a database for future reference and allows us to analyze the data. The proposed system has two important functions: the first is to detect the pothole using an input video subsystem, and the second is to detect the driver's drowsiness and store this information on a cloud base that other users can access to help them detect potholes on their route. Once the location of the potholes is known, government officials can be notified.*

Keywords: Potholes Detection, Congested Traffic, Drowsiness Detection, Convolutional Neural Network (CNN), etc.

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