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Performance analysis of machine learning classifiers for pothole road anomaly segmentation

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Abstract

Recently, machine learning (ML) classifiers are being widely deployed in many intelligent transportation systems towards improving the safety and comfort of passengers as well as to ease and enhance road navigation. However, the comparative performance analyses of different ML classifiers within the confines of road anomaly detection remain unexplored under some specific capture conditions such as bright light, dim light, and hazy image conditions. Consequently, this paper investigates the performance of six different state-of-the-art ML classification algorithms, viz: random forest, JRip, One-R, naive Bayesian, J48, and AdaBoost for segmenting pothole road anomalies under three different environmental conditions viz: bright, dim, and hazy light conditions. The results obtained suggest that either the J48 random forest or JRip classifiers are suitable for classifying pothole anomalies captured under broad day light (bright light) conditions with an average accuracy performance of 95%. On the other hand, the One-R classifier sufficed as more suitable for use under hazy image condition yielding an average accuracy of 73%, whereas the random forest algorithm yielded the best classification accuracy of 55% under dim light conditions. These results are helpful particularly towards determining the best ML classifiers for use towards developing robust artificial intelligencebased real-time algorithms for detecting and characterizing road anomalies effectively in autonomous vehicles.