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Machine learning-based pavement crack detection, classification, and characterization: a review
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Abstract
The detection, classification, and characterization of pavement cracks are critical for maintaining safe road conditions. However, traditional manual inspection methods are slow, costly, and pose risks to inspectors. To address these issues, this article provides a comprehensive overview of state-of-the-art machine vision and machine learning-based techniques for pavement crack detection, classification, and characterization. The paper explores the process flow of these systems, including both machine learning and traditional methodologies. The paper focuses on popular artificial intelligence (AI) techniques like support vector machines (SVM) and neural networks. It underscores the significance of utilizing image processing methods for feature extraction in order to detect cracks. The paper also discusses significant advancements made through deep learning strategies. The main objectives of this research are to improve efficiency and effectiveness in pavement crack detection, reduce inspection costs, and enhance safety. Additionally, the article presents data gathering approaches, various datasets for developing road crack detection models, and compares different models to demonstrate their advantages and limitations. Finally, the paper identifies open challenges in the field and provides valuable insights for future research and development efforts. Overall, this paper highlights the potential of AI-based techniques to revolutionize pavement maintenance practices and significantly improve road safety. © 2023, Institute of Advanced Engineering and Science. All rights reserved.

Author Keywords
Deep learning; Image processing; Machine learning; Machine vision; Pavement cracks

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