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Deep Learning for tunnel defects classification

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ABSTRACT

Nowadays, drawing up plans to control and manage infrastructure assets has become one of the most important challenges in most developed countries. The latter must cope with issues relating to the aging of their infrastructures, which are getting towards the end of their useful life. This study proposes an automatic approach for tunnel defects classification. Starting with non-destructive investigations using Ground Penetrating Radar (GPR), the application of 2D Fourier Transform and deep convolutional neural networks (CNN) has allowed the classification of several structural defects (e.g., crack, voids, anomaly, etc.) with high accuracy. The proposed methodology eliminates the need for human interpretation of Ground Penetrating Radar profiles and the use of integrative investigations (e.g., video-endoscopy, core drilling, jacking, and pull-out testing) for defects classification. As a result, it has significant speed and reliability that make it both time and cost efficient.