

9、 Corrosion Monitoring

High-efficient automatic corrosion detection for large steel structures of power stations in coastal area based on an improved YOLOv8 model

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Abstract

Electric power is the significant support of national economy. However, large steel structures of the power stations in coastal areas are facing harsh atmospheric corrosion conditions in long term. It may decrease the reliability of devices and brings high safety risks. As one commonly used maintenance method, manual inspection is time-consuming, labor-intensive, and poses severe personal safety risks. The advancement of computer vision techniques offers a rapid and accurate non-contact alternative for detecting corrosion in such structures. In this paper, we addressed the limitations of existing deep learning methods for accurate detection of corrosion from the interference such as aged coating yellowing by proposing an improved YOLOv8n model, YOLOv8-RM. The method enhanced the extraction of corrosion features in complex backgrounds by incorporating the RepNCSPPELAN4 module and the MC attention mechanism module, leading to improved detection accuracy. Comparative experiments demonstrate that the proposed YOLOv8-RM algorithm outperforms other methods, achieving a detection accuracy of 91.8%, while also meeting the speed requirements for deployment on edge devices.

Keywords Steel structure, Corrosion detection, YOLOv8, Automatic detection

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