

OC 21. A UNet-based Ensemble Method for Corrosion Segmentation

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Abstract

Corrosion is a natural phenomenon that causes huge material and economic losses. Steel structures are subject to corrosion and need timely inspections. Visual inspection is a common method to evaluate the status of steel structures in a safe and non-destructive manner. Deep learning (DL) models have gained attention, and several studies have leveraged DL to detect metal corrosion [1-5]. Although existing studies report promising results, they mainly rely on single deep learning models, thereby overlooking the potential performance gains that ensemble learning can offer. Therefore, in this study, several corrosion segmentation models based on UNet architecture were developed and trained using different loss functions, and an ensemble method was proposed based on the trained models. Eventually, a comparison based on performance metrics—including Accuracy, Precision, Recall, F1-score, and Jaccard Index—was conducted to evaluate the models' capability in segmenting corrosion. The results demonstrated that the developed ensemble method outperformed each individual model.

Acknowledgments

This work was funded by National Funds through FCT - Fundação para a Ciência e a Tecnologia, under the project 2024.04183.BD. This work was also financially supported within the scope of Agenda "R2UTechnologies - modular systems", contract C644876810-00000019, investment project 48, funded by the Recovery and Resilience Plan (PRR) and by the European Union - NextGeneration EU, and UID/04708 of the CONSTRUCT - Instituto de I&D em Estruturas e Construções - funded by Fundação para a Ciência e a Tecnologia, I.P./ MCTES through the national funds.

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