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Enhanced Segmentation Techniques for Images of Concrete sections from Construction Sites: A Comparative Study of Mask R-CNN and Semantic segmentation

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ABSTRACT

This study presents an improving approach to enhancing the segmentation of concrete structures in images from construction sites using instance segmentation (Mask R-CNN). 2000+ construction images were collected and labelled with classes: 'concrete', 'person', 'equipment', and ‘person'. Both semantic segmentation and instance segmentation models were rigorously trained and assessed side-by-side to find the prospects and limitations. The study delved into critical factors such as data quality, choice of architecture, hyperparameter adjustments: learning rate, match size, and Epoch, and optimization techniques to evaluate and compare the efficacy of these models. The results revealed that adjustments to the learning rate, along with a well-balanced batch size and epoch configuration, significantly enhanced model performance. In addition, the mask R-CNN performed better in both segmentation accuracy and the precise localization of different classes.

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