

# Automated Damage Assessment: Detecting Vegetation Growth in Aging Masonry Structures using YOLOv8

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## ABSTRACT

Aging and lack of proper maintenance have contributed to the deterioration of numerous structures across the globe. Ensuring the structural integrity of these aging buildings is vital to safeguard their safety and prolong their lifespan. This study presents an innovative approach to damage assessment, utilizing the You Only Look Once version 8 (YOLOv8), a cutting-edge deep learning (DL) architecture, to detect and localize surface damage; specifically, vegetation growth, which is often an indicator of deeper structural issues. A brick masonry building in Kharagpur, West Bengal, has been chosen as a case study, where extensive vegetation growth along its boundary walls, resulting from years of neglect, posed a potential risk to the structure. To address this problem, a custom-trained YOLOv8 model has been applied to a dataset of images documenting the vegetation growth. The model's performance was evaluated using essential metrics, including mean average precision (mAP), precision, recall, F1-score, and a confusion matrix. The results demonstrated exceptional accuracy in detecting and localizing vegetation growth, underscoring the model's effectiveness not only as a tool for vegetation detection but also for comprehensive surface damage assessment. This approach offers a valuable solution for the proactive maintenance and preservation of aging structures worldwide, aiding in the timely identification of structural vulnerabilities.

**Keywords** Damage assessment; Deep learning; You only look once (YOLO); Brick masonry; Convolutional neural network (CNN)

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