# PROJECT REPORT

# COMPARATIVE ANALYSIS OF YOLOV8 AND FASTER R-CNN FOR PROTECTIVE EQUIPMENT DETECTION WITH BACKGROUND REMOVAL PREPROCESSING

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# ABSTRACT

*Personal Protective Equipment (PPE) is crucial for maintaining workplace safety in the industrial sector, particularly in factory production areas. However, errors or negligence regarding PPE usage remain common in industrial environments, a contributing factor is manual supervision, which relies on safety officers to monitor numerous workers simultaneously. To address this issue, this study develops an automated PPE compliance detection system by comparing the performance of two object detection algorithms: YOLOv8 (a one-stage detector) and Faster R-CNN (a two-stage detector). The study also analyzes the impact of background removal preprocessing using the Segment Anything Model (SAM)on detection performance, as complex backgrounds in the dataset can interfere with the detection results of both models. Model testing scenarios were designed to evaluate these effects comprehensively: first, training YOLOv8 and Faster R-CNN models on a dataset containing backgrounds, and second, training them on a dataset with backgrounds removed, resulting in a total of four testing scenarios. The performance of each scenario is evaluated and compared using metrics such as Precision, Recall, F1-Score, mAP, and inference speed. The results of this comparison aim to provide recommendations regarding the most effective and efficient algorithms and preprocessing implementations for automated PPE monitoring systems in industrial environments.*

*Keyword: Personal Protective Equipment, Object Detection, YOLOv8, Faster R-CNN, Segment Anything Model, Background Removal, Occupational Health and Safety*