

A Deep Learning Approach to Detect Complete Safety Equipment for Construction Workers Based on YOLOv7

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Abstract : In the construction sector, ensuring worker safety is of the utmost significance. In this study, a deep learning-based technique is presented for identifying safety gear worn by construction workers, such as helmets, goggles, jackets, gloves, and footwear. The suggested method precisely locates these safety items by using the YOLO v7 (You Only Look Once) object detection algorithm. The dataset utilized in this work consists of labeled images split into training, testing and validation sets. Each image has bounding box labels that indicate where the safety equipment is located within the image. The model is trained to identify and categorize the safety equipment based on the labeled dataset through an iterative training approach. We used custom dataset to train this model. Our trained model performed admirably well, with good precision, recall, and F1-score for safety equipment recognition. Also, the model's evaluation produced encouraging results, with a mAP@0.5 score of 87.7%. The model performs effectively, making it possible to quickly identify safety equipment violations on building sites. A thorough evaluation of the outcomes reveals the model's advantages and points up potential areas for development. By offering an automatic and trustworthy method for safety equipment detection, this research contributes to the fields of computer vision and workplace safety. The proposed deep learning-based approach will increase safety compliance and reduce the risk of accidents in the construction industry.

Keywords : deep learning, safety equipment detection, YOLOv7, computer vision, workplace safety

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