Research on the Detection Method of Helmet Wearing in Construction Site Based on Deep Learning

Authors : Afaq Ahmad, Yifei Wang, Muhammad Kashif

Abstract : This paper addresses the rising safety accidents in China's construction industry by focusing on detecting safety helmet usage among workers using deep learning techniques. It enhances existing datasets through the collection of construction site images and merges them with public datasets to create a diverse sample library. An improved Cascade R-CNN algorithm is developed, incorporating a Swin Transformer for better feature extraction, ROI Align for detecting small and occluded targets, and Gaussian weighted Soft-NMS to reduce redundant detections. The model, trained on the "My-SHWD" dataset, achieved a mean Average Precision of 92.66%, showcasing strong performance. Additionally, a helmet detection system was designed for testing images, videos, and live feeds, demonstrating reliability and stability in practical applications.
Keywords : deep learning, safety helmet-wearing detection, cascade R-CNN, swin transformer
Conference Title : ICECEBE 2025 : International Conference on Electrical, Computer, Electronics and Biomedical Engineering
Conference Location : Tokyo, Japan
Conference Dates : January 09-10, 2025