

ABSTRACT

Wood is one of the natural resources that are widely used in Indonesia. However, the growth of this wood itself cannot be separated from various attacks - insects as well as fungi, so it can cause such defects as decay of the wood. This certainly affects the quality at the same time the selling price of the wood itself. However, the detection of defects in wood is still carried out manually, that is, it is carried out by timber experts by comparing one wood with other wood. So a system is needed to detect defects in the wood automatically and give a more accurate result.

In this study, the system was designed using one of the Deep Learning models, namely the Convolutional Neural Network (CNN) with the YOLOv5 model. This YOLOv5 model uses relu and sigmoid leaky activation, Adaptive Moment (Adam) and Stochastic Gradient Decent (SGD) optimization functions. In YOLO v5, Cross Stage Partial Networks (CSP Net) is used as the backbone to extract informative features from input images. The design of this defect detection system on wooden surfaces uses several models from YOLOv5 and uses two image enhancements, namely edge filters and ESR GAN.

In this study, it produced the best mAP value in the pine wood dataset using the YOLOv5s model without the addition of image enhancement, which reached 94.3%. While the best mAP results on the rubber wood dataset use the YOLOv5s-Transformer model with the addition of esr GAN image enhancement, which reaches 94.7%. However, the FPS value in these two datasets has increased quite high when the image is given an image enhancement edge filter, which reaches 125 FPS on the pine wood image dataset and 139 FPS on the rubber wood image dataset..

Keyword: *Detection, CNN, Wood, YOLOv5*