

## ABSTRACT

Along with advances in technology and automation, there is a significant increase in Smart Surveillance System (SSS) development, especially for Autonomous Vehicle (AV). Some advanced technologies are applied, including object detection which has an important role in AV technology. Convolutional Neural Network (CNN) is the main algorithm used for recognized and classify different objects on the road, and to make appropriate decisions. In practice, bad weather conditions can cause the detection network perform poorly, especially during foggy weather. Therefore, image dehazing has been used to enhance the visibility of hazy image.

This Final Project analyze the configuration of collaborative learning based on dehazing and object detection algorithm to improve AV object detection system performance during foggy weather. The algorithm used for dehazing is Two-Branch Neural Network, meanwhile the algorithm used for object detection is YOLOv5. Optimizing YOLOv5 is done by hyperparameter tuning process to get the best metrics value.

The configuration scheme of collaborative learning used in the testing process is serial Two-Branch Neural Network and YOLOv5. Experimental results shows that the mAP achieved when using collaborative learning model is 71,5%, which is higher than those obtained when using YOLOv5 original model. On the other hand, the best hyperparameter configuration obtained with learning rate at 0,00334; batch size at 32; and other values from the hyperparameter VOC. It boosts the mAP from 71,5% to 74,8%.

**Key Word :** AV, YOLOv5, Two-Branch Neural Network, object detection, image dehazing, hyperparameter