# ABSTRACT

Rice is a food crop that produces rice, which plays an important role in the life of the Indonesian economy. The quality of rice production is highly dependent on the nutrients absorbed by the plant. However, rice plants are often malnourished, resulting in poor quality of rice production. In general, nutritional deficiencies can be seen in the color and shape of unhealthy leaves, so early detection can reduce symptoms of malnutrition in rice.

This study uses image processing based on Convolutional Neural Network (CNN) to classify symptoms of malnutrition in rice plants. There are 1156 images containing the www.kaggle.com dataset, which are classified into three nutrient deficiency classes namely Nitrogen (N), Phosphorus (P) and Potassium (K).

The parameters used in this study are accuracy, precision, recall, and F1-Score. There are 5 test scenarios for hyperparameters namely optimizer, learning rate, batch size, input size, and testing the comparison between the number of original images (unbalance) and the number of augmented images (balance). From the tests that have been carried out, the best results are obtained with the augmented image (balance dataset) using the Adam optimizer, the learning rate is 0.001, the batch size is 16, and the input size is $512 \times 512$ pixels. With this configuration, the test accuracy is obtained at 97.73% with a test loss of 0.1135.

**Keywords:** Nutrient Deficiency, Rice, Inception V3, Machine Learning, Convolutional Neural Network