

## ABSTRACT

Cassava (*Manihot esculenta*) is one of the staple foods to the people of Indonesia. The importance of this plant is shown by the increase of its production rate over time. To match its production quantity, production quality should also be a concern, with diseases symptoms as one of the quality concerns. The disease symptoms on cassava plants that appear on its leaves can be detected with visual inspection. However, further knowledge about the diseases is needed to differentiate between one disease from another. To make the detection easier, machine learning can be utilized. Therefore, the symptoms can be detected without further knowledge of the diseases.

In this final task, convolutional neural network (CNN), one of deep learning method which is part of machine learning, is used to detect and classify cassava diseases using visual inspection on infected cassava leaves. The CNN model is based on DenseNet architecture. The metrics for measuring the model performance are accuracy, precision, recall, and F1-score. The model is trained on colored image dataset with  $224 \times 224$  pixels resolution and consists of five classes (CBSD, CMD, CBB, CGM, and healthy leaves). The dataset is divided into two parts, 80% of it (7544 images) is used as training dataset, 10% of it (943 images) as validation dataset, and 10% of it (943 images) as testing datasetf.

Testing in this final task was done to find the best combination of optimizer and learning rate for the CNN model to use. From the testing result, the model with the best combination of optimizer and learning rate has 98,73% training accuracy, 78,44% validation accuracy, and 82% testing accuracy. The model is based on DenseNet-169 and uses RMSprop optimizer and 0,0001 learning rate.

**Keywords:** *cassava diseases, convolutional neural networks, computer vision, image classification, DenseNet.*