I. INTRODUCTION

Tomato is an important horticultural crop, especially as a vegetable crop. However, tomato plants are susceptible to diseases. Tomato plants are significantly affected by some diseases, which caused considerable losses in agricultural economics[1]. Some of the diseases in tomato plants are Alternaria Solani, Mosaic Leaf Virus, and others. his is due to a lack of knowledge about the disease in this plant. Therefore, plant disease control is needed to prevent damages to tomato plants if contracted by disease.

In anticipating this, farmers usually do it by seeing firsthand how the leaves lookout. In identifying problems in tomato plants, several solutions can be offered, including image processing. Some of them are Artificial Neural Network (ANN), *k*-Nearest Neighbors (*k*NN)m, and Support Machine Vector (SVM). However, one of these disadvantages is that feature extraction is still done manually, so it is crucial to choose which features to extract. Furthermore, with the increasing number of classes that have to be classified, feature extraction is becoming more complicated to do[2].

In this research, a Convolutional Neural Network (CNN) method is selected to classify tomato plant diseases. The CNN is a method suitable for image processing. Meanwhile, to evaluate the performance of the model that has been made, the *k*-Fold Cross-Validation method is used. First, the tomato plant's problems or disturbances are categorized into four classes: Alternaria Solani, Septoria leaf spot, Tomato mosaic virus, and healthy class. The dataset contains 4000 images for the four classes (1000 images each), 90% for training, and 10% for testing. Next, a new CNN model is designed and then examined using the same dataset as the previous research that implements AlexNet, GoogleNet, Mobilenet, VGG16, and InceptionV3, faster R-CNN, and masks R-CNN.