ABSTRACT

Glaucoma is an eye disease that occurs when fluid builds up in the front of the eye. This fluid increases the pressure in the eye which can damage the optic nerve and can lead to blindness. Glaucoma is one of the leading causes of incurable blindness in the world. Glaucoma cannot be prevented and can affect anyone, but early detection and proper treatment will help prevent permanent blindness. One way to do early detection is to visit an ophthalmologist for an eye examination. However, the results issued from eye examinations take a long time due to lack of ophthalmologists, so people must be patient in waiting for the decision given by the doctor.

Based on this problem, the author designed a system to be able to classify glaucoma disease using deep learning methods implemented on an android-based smartphone so that it can be operated without an internet connection. The dataset used in making this system is the ACRIMA public dataset in the form of 705 fundus images and augmented into 1805 fundus images which are divided into glaucoma and normal classes. Convolutional Neural Network (CNN) is used as an algorithm for classifying fundus images, the algorithm is applied to an android application developed using the Kotlin programming language. Then the author conducted tests to find the best results from the AlexNet, Custom Layer, MobileNetV2, EfficientNetV1, InceptionV3 and VGG19 architectures. The best results of the architecture are deployed to the android application to classify fundus images directly using the developed application.

After testing, it can be concluded that the selected model is EfficientNetV1 with batch size 128 parameters, learning rate 0.01, Adam optimizers and with 97% accuracy. The model was chosen based on testing the model with testing data which is combined ACRIMA and RIM-ONE DL data and the model can predict images well compared to the other five models. Based on the test, the system can be run without an internet connection because it applies the embedded deep learning method.

Keywords: Android, CNN, Deep Learning, Early Detection, Glaucoma