ABSTRACT

The eyes are one of the most important vital organs that humans have. Therefore, the eye needs to be well cared for. Eye health has a significant impact on the quality of human life such as physical activity, mental and social well-being. Eye disorders are a frequent cause of blindness. Therefore, researchers want to detect eye disorders before blindness occurs.

In this final project research, an eye disease classification system is designed on the fundus image. The classification of eye diseases is divided into 3 classes, namely normal, cataract, and glaucoma. The fundus image dataset used is obtained online through Kaggle which consists of 601 images consisting of "normal" (300 images), "cataract" (100 images), "glaucoma" (101 images), and "retina disease" (100 images). Not only the original data is used but, the original data that has been augmented is also involved in this study. Augmentation data amounted to 3600 fundus images consisting of "normal" (1200 images), "cataract" (1200 images), and "glaucoma" (1200 images). This data is processed into 4 different datasets, namely the original dataset, augmentation dataset, augmentation dataset that has been preprocessed grayscale, and augmentation dataset that has been preprocessed thresholding. Each image is divided into 50% image data as train, 25% as validation data, and 25% as test data.

The system for eye disease classification in this study uses CNN with EfficientNet-B0 architecture. Parameters that affect system performance are based on the influence of pre-processing, optimizer, learning rate, and batch size. System tests that have been carried out, obtained the best results using the Adam optimizer, learning rate 0.00001, and batch size 32, and iterations of 20 epochs. The best dataset is the augmentation dataset that has been preprocessed grayscale with an accuracy of 79.22%, precision value of 80.3%, recall value of 79.22%, F1-Score of 78.87%.

Key Word: *Convolutional Neural Network* (CNN), *EfficientNet,* Eye Disease.