ABSTRACT

The Ministry of Health of the Republic of Indonesia stated that in 2020 Indonesia is one of the countries with the highest cases of blindness caused by cataracts at 82%. Cataract is an abnormality in the lens of the eye with opacities that can cause vision loss and blindness. In an effort to improve eye health, early detection is important, especially to reduce cataract sufferers so that appropriate action can be taken immediately. Cataract detection is generally carried out by ophthalmologists using a slit lamp, but not all health facilities have such equipment, especially first-level health facilities, namely puskesmas.

Therefore, this study aims to design a cataract classification system using machine learning method which is implemented through the mobile application "DEKAT" with *peek retina* to obtain fundus image. So that early detection of cataracts can be done only by using a smartphone and peek retina at the puskesmas. To obtain optimalt system performance, system testing is carried out using three machine learning methods, namely K-Nearest Neighbor, Convolutional Neural Network with EfficientNet-B0 architecture and 5-*Layer* architecture.

Fundus image data that used in the classification system were taken from Cicendo Hospital Garut and *website* Kaggle. The data is divided into 4 classes based on the level of maturity, namely normal eyes, immature, mature and hypermature cataracts. The highest performance result obtained from the three algorithms is 98% with a loss of 0.1179 obtained from the CNN algorithm with EfficientNet-B0 architecture when the epoch value is 100, batch size 32, learning rate 0.001, Adamax optimizer, and 5-Fold Cross Validation.. Whereas the CNN method using 5-*Layer* architecture produces a performance of 89% with a loss of 0.391 and the KNN method is 98%. Therefore, the system used to run the application is the Convolutional Neural Network Algorithm with EfficientNet-B0 architecture which has an accuracy of 98%.

Keywords : Classification, Cataract, Fundus Image, Machine Learning, Mobile Application