ABSTRACT

Glaucoma is one of the leading causes of permanent blindness worldwide, with a steadily increasing prevalence, including in Indonesia. Early diagnosis of glaucoma is crucial to prevent irreversible damage to the optic nerve. Conventional diagnostic methods, such as visual field tests and optic disc evaluations, are time-consuming, require expert clinicians, and are prone to subjectivity. Artificial intelligence approaches based on fundus retinal images offer a faster and more objective solution for classifying this disease. This study employs the Visual Geometry Group 19 (VGG19) architecture with transfer learning techniques and optimizes key hyperparameters such as dropout, learning rate, and batch size. VGG19 was chosen due to its proven ability to extract detailed visual features and its consistently high accuracy in various medical image classification studies, including glaucoma detection. The dataset used in this research is a combination of two sources: ACRIMA and RIM-ONE DL, consisting of a total of 1,190 color fundus images with varying resolutions, including 568 glaucoma cases and 622 normal, all focused on the optic disc region. The model was trained and evaluated through three scenarios based on different dropout values, with the data split into training, validation, and testing sets. Performance evaluation was conducted using accuracy and loss metrics. The best result was achieved with a model using a combination of dropout 0.2, learning rate 10^{-6}, and batch size 16, reaching a testing accuracy of 95.53%. It is expected that the results of this study can serve as a foundation for the development of an efficient automatic glaucoma diagnosis system that can be widely implemented, particularly in areas with limited medical personnel and healthcare facilities.

Keywords : *glaucoma*, VGG19, *fundus retina*, *transfer learning*, *hyperparameter*