Pengembangan Metode Deteksi Glaukoma dengan Transfer Learning Arsitektur Inception-V3 dan Resnet50 berbasis Citra Fundus = Development of Glaucoma Detection Method with Transfer Learning Architecture Inception-v3 and ResNet50 Based on Fundus Image

Merlin Wijaya, author

Abstrak

Penyakit glaukoma ditandai dengan hilangnya serabut saraf optik dan astrosit. Kehilangan ini dapat diperiksa dengan mengukur ketebalan neuro-retinal rim dan ukuran optic cup sehubungan dengan optic disc. Namun, penentuan glaukoma masih membutuhkan pemeriksaan mata lengkap oleh dokter mata. Beberapa metodologi otomatis berdasarkan transfer learning deep convolutional neural network untuk klasifikasi glaukoma telah dikembangkan. Untuk meningkatkan akurasi dari penelitian sebelumnya, digunakan metode transfer learning dari metode klasifikasi skin cancer. Arsitektur Inception-v3 dan ResNet50 serta pengklasifikasi serial dari kedua arsitektur tersebut dikembangkan untuk klasifikasi glaukoma otomatis menggunakan citra fundus. Selain arsitektur, variasi splitting dataset dengan metode train-test-split validation serta k-fold cross validation dibandingkan untuk mendapatkan nilai akurasi tertinggi. Berdasarkan hasil penelitian, model terbaik yang didapatkan berupa Inception-v3 dengan metode validasi train-valid-test rasio 80:20 dengan akurasi 95%, presisi 96%, sensitivitas 95%, dan skor-f1 95%. Pembagian 80:20 dipilih karena cocok dengan ukuran dataset yang digunakan. Performa model ini lebih baik dari metode yang telah ada sebelumnya, yaitu Xception dengan peningkatan akurasi sebanyak 2%.

.....Glaucoma is characterized by loss of optic nerve fibers and astrocytes. This loss can be checked by measuring the thickness of the neuro-retinal rim and the size of the optic cup in relation to the optic disc. However, the determination of glaucoma still requires a complete eye examination by an ophthalmologist. Several automated methodologies based on transfer learning deep convolutional neural networks for glaucoma classification have been developed. To increase the accuracy of previous research, transfer learning method is used from the skin cancer classification method. The Inception-v3 and ResNet50 architectures also the serial classifiers of the two architectures were developed for automatic glaucoma classification using fundus images. In addition to the architecture, variations of splitting datasets using the train-test-split validation method and k-fold cross validation were compared to get the highest accuracy value. Based on the results of the study, the best model obtained was Inception-v3 with a train-valid-test ratio validation method of 80:20 with 95% accuracy, 96% precision, 95% sensitivity, and 95% f1-score. The 80:20 division was chosen because it matches the size of the dataset used. The performance of this model is better than the previous method, namely Xception with an increase in accuracy of 2%.