

Medical Diagnosis of Retinal Diseases Using Artificial Intelligence Deep Learning Models

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Abstract : Over one billion people worldwide suffer from some level of vision loss or blindness as a result of progressive retinal diseases. Many patients, particularly in developing areas, are incorrectly diagnosed or undiagnosed whatsoever due to unconventional diagnostic tools and screening methods. Artificial intelligence (AI) based on deep learning (DL) convolutional neural networks (CNN) have recently gained a high interest in ophthalmology for its computer-imaging diagnosis, disease prognosis, and risk assessment. Optical coherence tomography (OCT) is a popular imaging technique used to capture high-resolution cross-sections of retinas. In ophthalmology, DL has been applied to fundus photographs, optical coherence tomography, and visual fields, achieving robust classification performance in the detection of various retinal diseases including macular degeneration, diabetic retinopathy, and retinitis pigmentosa. However, there is no complete diagnostic model to analyze these retinal images that provide a diagnostic accuracy above 90%. Thus, the purpose of this project was to develop an AI model that utilizes machine learning techniques to automatically diagnose specific retinal diseases from OCT scans. The algorithm consists of neural network architecture that was trained from a dataset of over 20,000 real-world OCT images to train the robust model to utilize residual neural networks with cyclic pooling. This DL model can ultimately aid ophthalmologists in diagnosing patients with these retinal diseases more quickly and more accurately, therefore facilitating earlier treatment, which results in improved post-treatment outcomes.

Keywords : artificial intelligence, deep learning, imaging, medical devices, ophthalmic devices, ophthalmology, retina

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