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Deep learning generative adversarial network model for automated detection of diabetic retinopathy
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Abstract

Diabetic retinopathy (DR) is a leading disease that cause impaired vision with a consequence of permanent blindness if it is undiagnosed and untreated at the early stages. Alas, DR often has no early warning sign and may cause no symptoms. Particularly, recent statistics recorded that about 382 million individuals globally, with the number predicted to rise to 592 million by 2030 are suffers from DR. Due to the obvious large number of DR patients and limited medical resources in particular areas, patients with DR may not be treated in time, therefore missing out the best treatment options and eventually leading to irreversible vision loss. Unfortunately, a manual diagnosis to examine DR is tedious, time consuming, and error-prone, besides the consequences of manual interpretation which is highly dependent on the medical expert experiences to identify the presence of small features and significance of DR. This manual method opens to the inconsistency of the diagnosis. Thus, Automated Diabetic Retinopathy Detection aims to reduce the burden on ophthalmologists and mitigate diagnostic inconsistencies between manual readers by classifying DR stages using previous DR images with stages labels using Deep Learning. Generative Adversarial Network (GAN) is one of the major improvement of deep learning with potential to enhance the performance of automated detection significance of DR. Two different experiments were conducted and compared resulting in the best result with GAN evaluated by Frechet Inception Distance (FID), precision and recall. © 2024 AIP Publishing LLC.

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