

Clinical Features for Detecting Diabetic Macular Edema using Artificial Intelligence

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Background:

Vision is a valuable part of life: influencing our perception of the world and of memories. Diabetes, and more specifically, Diabetic Retinopathy (DR) can affect our vision, taking away sight potentially permanently if left untreated. Currently, Diabetic Retinopathy is the leading cause for adult blindness and will continue to rise with increasing prevalence of adult diabetes. Diabetic Macular Edema (DME), a complication of DR, is diagnosed by ophthalmologists using optical coherence tomography (OCT); however, the sheer amount of DME-related imaging creates a time strain on ophthalmologists, creating a demand to further optimize the image reading process. In this study, we hypothesize that increasing the rate and ease of diagnosing DME by introducing artificial intelligence-based methods in primary medical clinics will increase the long-term preservation of ocular health in diabetic patients.

Methods:

Due to the nature of our retrospective cohort study, consent was not acquired and images were also de-identified. We categorized 676 patient files by HbA1c, non-proliferative diabetic retinopathy (NPDR) severity, and proliferative diabetic retinopathy (PDR). Retinal OCT images were annotated to identify central macular edema, a common feature of DME. Retinal fundus images were also annotated to identify microaneurysms and hemorrhages, two additional features commonly used for detecting either DR or DME.

Results:

A lesion features dataset was prepared to train our AI model. OCT and fundus imaging features were extracted and combined to train the AI model for DME detection. From annotations of the in-house Macular thickness dataset, it was seen that 167 patients had DME from the total 389 diabetic retinopathy patients.

Conclusion:

We will continue to prepare more datasets like the macular thickness dataset for our AI. We predict that after our AI receives substantial training with the datasets, the AI will potentially demonstrate some capability of diagnosing DME, supporting its use in medical diagnostics.