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# Localization of Optic Disc and Fovea in Retinal Images using Intensity Based Line Scanning Analysis <sup>☆</sup>

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## Abstract

Accurate detection of diabetic retinopathy (DR) mainly depends on identification of retinal landmarks such as optic disc and fovea. Present methods suffer from challenges like less accuracy and high computational complexity. To address this issue, this paper presents a novel approach for fast and accurate localization of optic disc (OD) and fovea using one-dimensional scanned intensity profile analysis. The proposed method utilizes both time and frequency domain information effectively for localization of OD. The final OD center is located using signal peak-valley detection in time domain and discontinuity detection in frequency domain analysis. However, with the help of detected OD location, the fovea center is located using signal valley analysis. Experiments were conducted on MESSIDOR dataset, where OD was successfully located in 1197 out of 1200 images (99.75 %) and fovea in 1196 out of 1200 images (99.66 %) with an average computation time of 0.52 sec. The large scale evaluation has been carried out extensively on nine publicly available databases. The proposed method is highly efficient in terms of quickly and accurately localizing OD and fovea structure together compared with the other state-of-the-art methods.

*Keywords:* Diabetic retinopathy (DR), optic disc (OD), macular edema (ME), fovea, peak-valley detection, wavelet transform.

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## 1. Introduction

### 1.1. Motivation

Diabetic retinopathy (DR) using computer-aided diagnosis primarily requires accurate detection of optic disc (OD) and fovea region. DR is a chronic disease caused by any deterioration developed in the retinal blood vessels [1]. Closely related with DR is diabetic macular edema (DME), which is caused by the accumulation

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