

**PERFORMANCE ANALYSIS OF BLOOD VESSEL IN RETINAL
IMAGE USING SIMPLE APPROACH DETECTION**

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ABSTRACT

Different image transformations through structuring element construction have been proposed to do an analysis of blood vessel by using retinal image. The Top-hat transformation technique had been widely used in this approach as for improving the previous method called entropy thresholding. This paper introduces modified Top-hat transformation by using Bottom-hat transformation to achieve better sensitivity and accuracy in transforming the fundus image to help detecting the blood vessel in retinal images. The step in this approach start of extracting the green channel of RGB image and it then will be enhanced by using the proposed method. The step is furthered by a mask generation and match filter followed by applying a local entropy thresholding and length filtering for vessel extraction. The performance of the result is determined by the sensitivity and accuracy calculation performed by comparing with existing hand-labelled results from the database. The difference between Top-hat and proposed techniques were then analysed. This project is done by using MATLAB R2012a with the set of retinal image obtained from STARE database. The proposed method manages to obtain Sensitivity of 0.85 and Accuracy of 0.95.

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CHAPTER 1

INTRODUCTION

Diabetic retinopathy is the commonest complication of diabetes mellitus and is the earliest manifestation of the micro-vascular complications of diabetes mellitus [1]. Sight-threatening diabetic retinopathy causes no symptoms in its early stages, when it is most amenable to treatment [2]. It is important to do a fast and accurate analysis of blood vessel in retinal image to determine the patient's eye condition to prevent further damage on their eyes thus reducing the risks of permanent blind among diabetic retinopathy patients. Ophthalmologist is a medical doctor that specializes in the structure, function and diseases of the human eye [3]. The retinal image of the patient will be taken by using optical camera which allows us to see through the pupil of the eye to the rear inner surface of the eyeball. Important parts that will be derived from the retinal image are such as optic nerve [4], fovea, surrounding vessels [5] and the retinal layer [6]. Top-hat transformation is the difference between the input and its opening by some structuring element. Bottom-hat transformation is the difference between the original image and its closing. Both image transformations will extract small elements and details from fundus images [7]. In this project, the combination of the Top-hat and Bottom-hat is introduced to detect blood vessel from retinal image and the result of sensitivity and accuracy then will be produced and compared with available Top-hat transformation technique [8]. The retinal image used in this proposed method is gained from STARE database which available on the internet [9].