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Review on: Identification of all True Vessels from Retinal Images

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Abstract

Retinal images has numerous qualitative procedures can be used in more applications, such as ocular fundus operations with human recognition. Likewise, it plays important roles in detection of a few diseases in premature stages, such as diabetes, which can be performed by evaluation of the states of retinal blood vessels. Image processing, analysis and computer vision techniques are increasing in prominence in all fields of medical science, and are especially pertinent to modern ophthalmology, as it is heavily dependent on visually oriented signs. The diagnostic systems offer the potential to be used in large-scale screening programs, with the potential for significant resource savings, as well as being free from observer bias and fatigue. In addition, quantitative measurements of retinal vascular topography using digital image analysis from retinal photography have been used as research tools to better understand the relationship between the retinal microvasculature and cardiovascular disease. The wrong identification of vessels may result in a large variation of these measurements, leading to a wrong clinical diagnosis. This paper is about identifying true vessels as a post processing step to vascular structure segmentation.

Keywords: Ophthalmology, Retinal image analysis, Vessel identification.

Introduction

Digital retinal imaging is a relatively new technology that can be used to assess patients for diabetic retinopathy. Automated image processing has the potential to assist in the early detection of diabetes, by detecting changes in blood vessel diameter and patterns in the retina. An accurate identification of blood vessels for the purpose of studying changes in the vessel network that can be utilized for detecting blood vessel diameter changes associated with the patho physiology of diabetes. A retinal image provides a snapshot of what is happening inside the human body. In particular, the state of the retinal vessels has been shown to reflect the cardiovascular condition of the body. Measurements to quantify retinal vascular structure and properties have shown to provide good diagnostic capabilities for the risk of cardiovascular diseases. Retinal image processing is an important tool in diagnosing and curing the diseases that influence the retina. Diagnosis and treatment of several disorders affecting the retina require capturing a sequence of fundus images using the fundus camera. These images are to be processed for better diagnosis and planning of treatment. Retinal image segmentation is greatly required to extract certain features that may help in diagnosis and treatment. Also registration of retinal images is very useful in extracting the motion parameters that help in composing a complete map for the retina as well as in retinal tracking. Blood vessels in ophthalmoscope images play an important role in diagnosis of some serious pathology on retinal images. Hence, accurate extraction of vessels is becoming a main topic of this research area.

In this paper, it describes the method to identify the vessel in the retinal images that utilizes the global information of the segmented vascular structure to correctly identify true vessels in a retinal image. The accurate identification of vessels is key to obtaining reliable vascular morphology measurements for clinical studies.

Proposed Methodology

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Here we proposed a system that can perform identification of all true vessels from retinal images.

The framework for the proposed methodology is given in Figure 1.

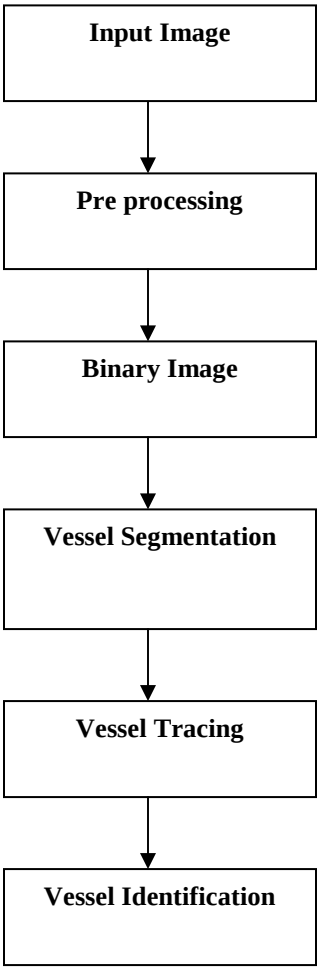

Fig 1: Block diagram of proposed system

The input image sequences are retinal fundus input images. After acquiring these images, pre processing operations are performed. In order to segment the retinal image correctly, this preprocessing is used to detect whether the input image is corrupted with noise or not. Depending on the image quality some segmentation methods may require image preprocessing prior to the segmentation algorithm. In order to reduce the noise effects associated with the processing, the input image was preprocessed by a mean filter of size 5x5 pixels. After pre processing, the retinal image is converted into binary image, so as to perform the processing of vessel segmentation

The input retinal images undergo segmentation to detect blood vessels. Automated blood vessel segmentation is an important issue for assessing retinal abnormalities and diagnoses of many diseases.

The technique for vessel segmentation include ‘‘vessel-tracking’’ ,where by vessel centre locations are automatically sought over each cross-section of a vessel along the vessels longitudinal axis, having been given a starting and end point . Vessel tracking algorithms segment a vessel between two points using local information and work at the level of a single vessel rather than the entire vasculature. The centre of the longitudinal cross-section of a vessel is determined with various properties of the vessel including average width gray level intensity and tortuosity measured during tracking. Tracking consists of following vessel center lines guided by local information, usually trying to find the path which best matches a vessel profile model. The main advantage of vessel tracking methods is that they provide highly accurate vessel widths, and can provide information about individual vessels that is usually unavailable using other methods. Vessel tracking can thus give information on vessel structure such as branching and connectivity. Generally, the vessel tracking algorithms are used in conjunction with matched filters of morphological operators. The morphology of the retinal blood vessels can be an important indicator for diseases like diabetes, hyperten-sion and retinopathy of prematurely (ROP). Thus, the measurement of changes in morphology of arterioles and venules can be of diagnostic value.

The proposed method is a post processing step to vessel segmentation. After segmentation it removes the unwanted region by the use of morphological operation. some morphological operations are required such as edge detection, border thinning, erosion, dilasion, opening, closing, etc. And finally trace the vessel by the use of algorithm. After this we will get the vessel identification from retinal images.

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Conclusion

Here we have proposed an efficient system that can perform identification of all true vessels from retinal images and is very useful for the early detection of diabetes associated retinal pathology. The accurate extraction of the retinal vascular tree forms the backbone of many automated computer aided systems for screening and diagnosis of cardiovascular and ophthalmologic diseases.

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