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BLOOD VESSEL DETECTION ON RETINAL IMAGES USING MORPHOLOGICAL APPROACHES

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1. INTRODUCTION

The retinal blood vessel is recognized as a crucial part in both cardiovascular disease diagnosis and Ophthalmological such as diabetic retinopathy and glaucoma [1]-[3]. Diabetic retinopathy is a diabetes complication that affects the eyes. The statistic of this disease increases in community health and it's also the reason for the loss of sight. Hence, precise recognition of retinal blood vessel is vital. Manual diagnosis is usually performed by analysing the images from a patient, as not all images show signs of diabetic retinopathy [4],[5]. It raises the time and tips to an incorrect diagnostic decision for ophthalmologists. Hence, an automatic segmentation of the vasculature might preserve the work of the ophthalmologists and will support in portraying spotted injuries. The characteristics of retinal vasculature together with tortuosity, width, length, angles and branching pattern can play a part in the diagnostic result. Nevertheless, even though promising, manual segmentation of retinal blood vessels is a repetitive work and time consuming, and it involves specialized expertise for even though the finest vessel could contribute to the differential diagnosis list [6]. The demand for faster and automatic study of the retinal vessel images must appraise for supporting ophthalmologists with this unpredictable and monotonous work.

1.1 Structure of the Human Eye

The human eye is a light-sensitive body part that allows an individual to see the surrounding environment. The human eye can also be related to a camera because in a sense that the image is designed on the retina of the

eye while in a traditional camera the image is formed on a film. The cornea and the crystalline lens of the human eye are equivalent to the lens of a camera and the iris of the eye works like the diaphragm of a camera, which controls the amount of light reaching the retina by adjusting the size of the pupil [7],[8]. The light passing through the cornea, pupil and the lens reaches the retina at the back of the eye, which contains the light-sensitive photoreceptors.

The image formed on the retina is transformed into electrical impulses and carried to the brain through the optic nerves, where the signals are processed and the sensation of vision is generated. The structure of the human eye is shown in Figure 6.1.

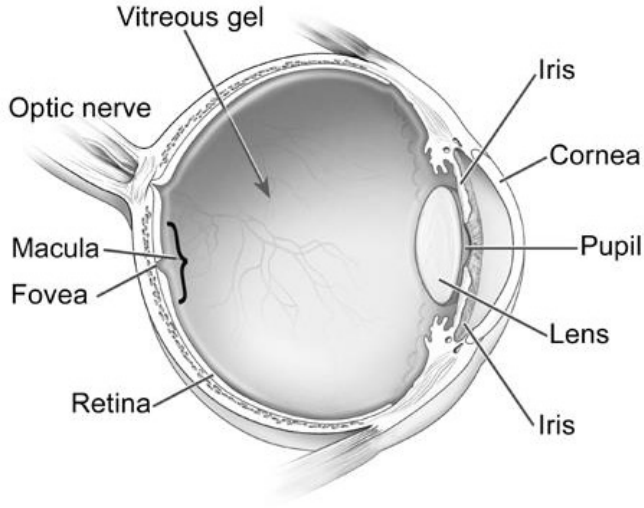

Figure 6.1. Structure of Human Eye [9].