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A Survey Based On Blood Vessel and Optic Disc Segmentation.

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ABSTRACT

Retinal image analysis is done through different diagnosis methods in this modern Ophthalmology .Many novel methods are present to segment blood vessels and optic disc in the fundus retinal images. This methods are used for non-intrusive diagnosis since in the modern ophthalmology ,morphology of blood vessel and optic disc is an important indicator for some of the diseases like diabetic retinopathy ,glaucoma and hypertension .The starting step is the extraction of the retina vascular tree using the techniques like graph cut technique. Second is estimation of the blood vessel information in the location of the optic disc .Techniques like Markov random field (MRF) is used for the image reconstruction for performing the optic disc segmentation by removing blood vessels from the optic disc region. Testing can be done on datasets available. The comparison of the results with some alternative methods is done by the performance of the segmentation of the blood vessels and optic disc segmentation.

Keywords: Retinal images, segmentation techniques, accuracy.

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INTRODUCTION

The location where the ganglion cell axons exists the eye for forming the optic nerve is a optic disc(OD) S. Roychowdhury et al[10]. The localization of the optic disc and segmentation of the optic disc are important for the ocular image analysis. Pixel classification is done based on some methods on the basis of the edge characteristics G. Joshi et al [18].

Pixel classification methods sometimes suffer to the high number of pixels, by optimizing the level of intractable pixels based on the classification method J. Cheng et al [7]. Its performance is mostly depends on the differentiation of the edges from optic disc and especially based on the structure of the per papillary atrophy(PPA) S. Morales et al [14]. The PPA area becomes small whenever the texture is not predominant significantly.

For the poor initialization different deformable models are sensitive towards it. If it is initialized possibly, the deformation cannot exclude the PPA from the segmented optic disc because of the energy options that are differentiating PPA from the optic disc in the deformation function.

We can see some sample images that shows the PPA boundary.

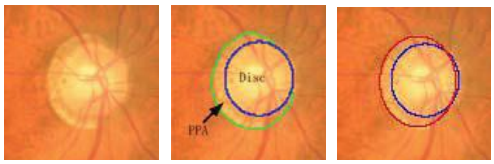

Figure 1: Sample images

(Blue colored lines: ground truth, red lines: segmented boundaries, green lines: PPA boundary)

The retinal health can be evaluated by the morphology of the eye structures. The image analysis is taken as the root of the research if noninvasive characteristics are considered D.Welfer, et al [1].

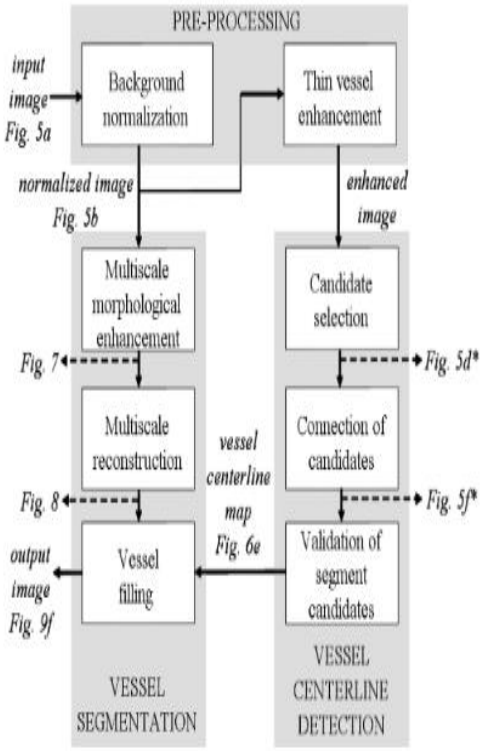

Figure 2: Blood Vessel Segmentation

The Blood vessels are thin in structure with different widths and lengths, but the optic disc is round in structure with a brighter area at the coverage of the blood vessels L.Xu et al [4].

The morphology of these structures gives the information of the presence of normality and abnormality as a starting point of a retinal systems D. Marin et al [13] and D. Marin et al [5]. There are some algorithms which are designed, which can divide into supervised and unsupervised for the optic disc segmentation.

Human guided classification is provided through a supervised segmentation K.Srilatha et al, [2]. In this process training process is required and it is a time consuming and resource consuming process.

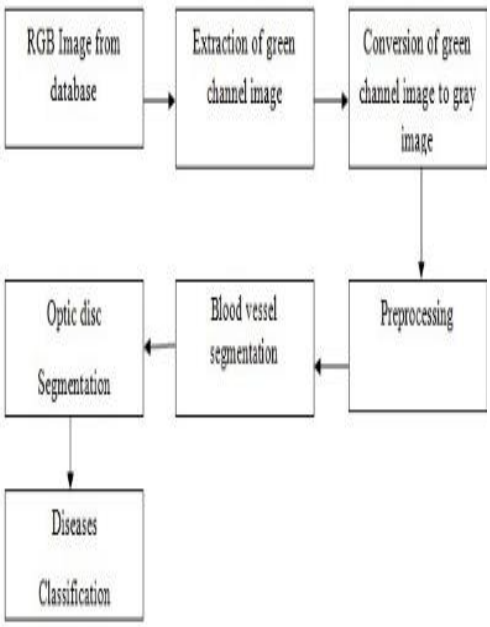

Figure 3: Optic Disc Segmentation

The unsupervised segmentation performs without using any samples with classes by the human, but it is capable to work on the different datasets. This segmentation can be done for automatic using graph cut technique.

The graph is provided with neighboring pixels.

All algorithms involves using blood vessels can be used as supervised and unsupervised depends on the type of category.

It mainly involves the major vessels, iterative vessel segmentation and the accuracy of the normal and abnormal conditions of the blood vessels. Sometimes it may be complex for using different techniques or may complexity increase.

DIFFERENT METHODS

Three step automated OD and VO segmentation algorithm:

The supervised OD boundary and the optic disc segmentation are used to analyze on the fundus images from the available datasets A.Aquino et al [3], A. Aquino et al [9].

The optical disc region is not equal in the elements of brightness. In this method the 1st step is the process to detect the major blood vessels by the threshold value of the plane image which is morphologically reconstructed. The 2nd step is the classification process based on the regions detected B. Zhang et al [6].

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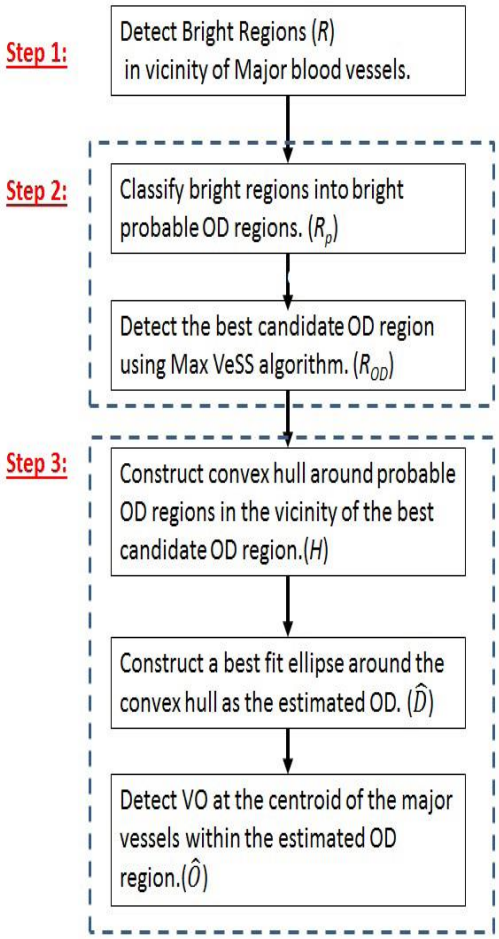
Next the best region is selected or identified among them S. Lu et al [16].3rd step involves the neighborhood of the best optic disc region in the selected list.

Convex hull will be created near every optic disc region for the optic disc segmentation purpose.

The VO pixel is normally segmented into pre-processing sub-categorized forms. It may be as base 24, base 31, base 32, base 33, and base 34 A. Giachetti et al [11], D. Zhang et al [12].



CNN ALGORITHM

This algorithm includes many of the detections of linear structures through the different operators to perform different operations. By using this technique the retinal blood vessel segmentation and optic disc segmentation R. J. Qureshi et al [8], it makes the changes in the template size to be 15*15. A.M. Mendonca et al [15].

CNN is used to adopt a multistep operation with the virtual template expansion and this makes to reduce in the segmentation of the blood vessels S. Lu et al [17].

It can be simulated on a computer and the performance will be evaluated.

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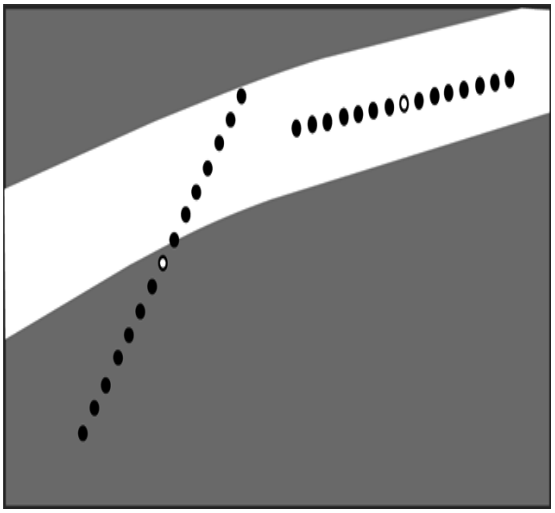

Figure 2: Line detector of CNN

CONCLUSION

In the blood vessel and the optic disc segmentations some of the major optimization techniques are required. The classification accuracy should be more by using proper algorithms of the data sets available .To improve the efficiency of the blood vessel segmentation better and suitable algorithms made to use.

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