International Research Journal of Engineering and Management Studies (IRJEMS)
Volume: 03 Issue: 04 | April -2019 ISSN: 1847-9790 || p-ISSN: 2395-0126

"AUTOMATIC SEGMENTATION OF BLOOD VESSELS IN RETINAL IMAGE"

Miss.Kangude Nikita[1], Miss.Salunkhe Pratiksha[2], Miss.Sathe Priti[3], Mr.Kale.S.D[4]

[1,2,3,4]*SVPMs COE ETC Engineering Department, SPPU University*

[1]kangudenikita95@gmail.com
[2]salunkhepratiksha246808@gmail.com
[3]pritisathe8@gmail.com
[4]balaji.kam2000@gmail.com

Abstract—***The morphology of blood vessels in retinal fundus images is an important indicator of diseases like glaucoma, hypertension and diabetic retinopathy. The accuracy of retinal blood vessels segmentation affects the quality of retinal image analysis which is used in diagnosis methods in modern ophthalmology. Contrast enhancement is one of the crucial steps in any of retinal blood vessel segmentation approaches. The reliability of the segmentation depends on the consistency of the contrast over the image. This paper presents an assessment of the suitability of a recently invented spatially adaptive contrast enhancement technique for enhancing retinal fundus images forblood vessel segmentation.***

Keywords— **Retinal image, Morphological operation, pre-processing, post-processing, Vessel Segmentation.**

I. INTRODUCTION

Retina is the tissue lining the interior surface of the eye which contains the light-sensitive cells (photoreceptors). Photoreceptors convert light into neural signals that are carried to the brain through the optic nerves. In order to record the condition of the retina, an image of the retina (fundus image) can be obtained. A fundus camera system (retinal microscope) is usually used for capturing retinal images. Retinal image contains essential diagnostic information which assists in determining whether the retina is healthy or unhealthy.

Retinal images have been widely used for diagnosing vascular and non-vascular pathology in medical society. Retinal images provide information on the changes in retinal vascular structure, which are common in diseases such as diabetes, occlusion, glaucoma, hypertension, cardiovascular disease and stroke .These diseases usually change reflectivity, tortuosity, and patterns of blood vessels. For example, hypertension changes the branching angle or tortuosity of vessels and diabetic retinopathy can lead to neovascularization i.e., development of new blood vessels. If left untreated, these medical conditions can cause sight degradation or even blindness. The early exposure of these changes is important for taking preventive measure and hence, the major vision loss can be prevented. Automatic segmentation of retinal blood vessels from retinal images would be a powerful tool for medical diagnostics. For this purpose, the segmentation method used should be as accurate and reliable as possible. The main aim of segmentation is to differentiate an object of interest and the background from an image.

II. LITERATURE SURVEY

[1]"A retinal image enhancement technique for blood vessel segmentation algorithm", A. M. R. R. Bandara ; P.

W. G. R. M. P. B. Giragama,Published in: 2017 IEEE International Conference on Industrial and Information Systems (ICIIS),DOI: 10.1109/ICIINFS.2017.8300426, IEEE

[2]"Patch-based fully convolutional neural network with skip connections for retinal blood vessel segmentation",Zhongwei Feng ; Jie Yang ; Lixiu Yao,Published in: 2017 IEEE International Conference on Image Processing (ICIP),DOI: 10.1109/ICIP.2017.8296580 IEEE.

III. PROBLEM STATEMENT

Blood vessel segmentation is a challenging task. Although numerous algorithms have been proposed for retinal blood vessel segmentation, a "gold-standard" method is still unavailable. Some methods possess comparatively higher accuracies and vessels detection capabilities, while others have only moderate ones. The three state-of-art methods from three different categories (i.e. supervised, unsupervised, and match filtering methods) were selected for detailed study and implementation. The selection is based on their higher accuracy rates compared to other algorithms within the same categories.

IV.PROPOSED SYSTEM

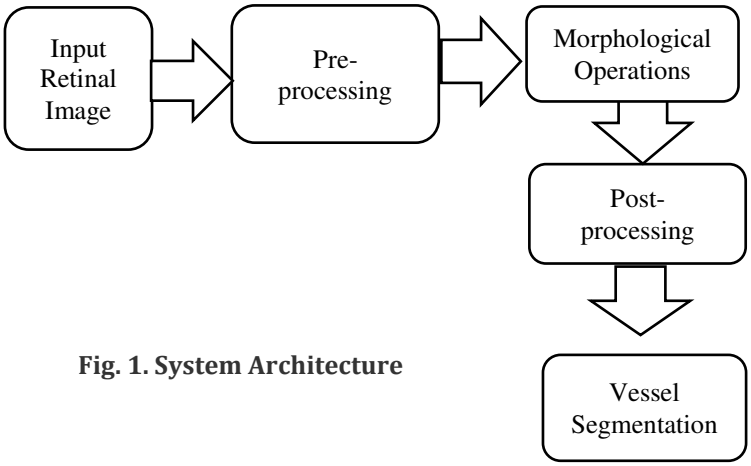
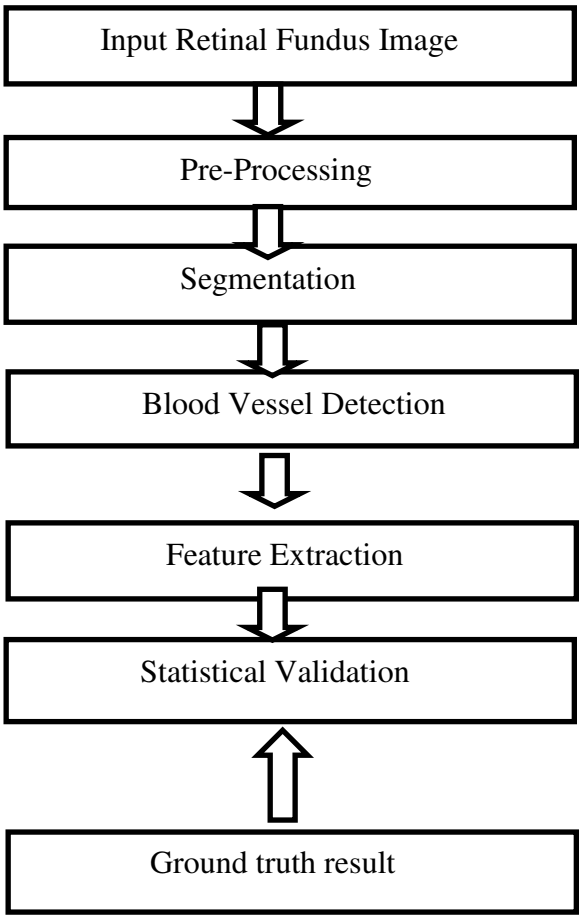


Fig. 1. System Architecture

In this architecture, as shown in Fig. 1 initially we are reading the input image from the databases. Databases are publically available for retinal images analysis some of the mare are DRIVE, STARE, and CHASE_DB1. By using these databases we are reading image from one of the dataset. After acquiring an image we are resizing it for our convenient. After resizing an input image we are extracting green channel from the RGB image. RGB image containing three primary components such as Blue channel (B), Red channel (R) and Green channel (G). The green channel gives high sensitivity to the blood vessels. Hence this channel is considered for the segmentation and detection of retinal blood vessels in the retinal image. To detach the images from the background we are extracting the mask to make image to be on its particular place or to put it in another background. We are removing the background noise and highlighting only the foreground objects those are blood vessels and exudates. Further, we are using contrast-limited adaptive histogram equalization (CLAHE) to increase the contrast between the vessels. It is also an option of using histogram equalization. Histogram equalization performs action over the entire image but adaptive histogram equalization works on small areas present in the image. The small parts or areas are called as tiles. We are improving each tiles present in an image. After completion of equalization, to connect the tiles which are neighbor we are using adaptive histogram equalization which leads to bilinear interpolation eliminates false boundaries.

V.FLOWCHART



VI.ADVANTAGES

Eye Blood vessel segmentation has many advantages like

i. Manual segmentation of the retinal blood vessels is rduous and time consuming

ii. Retinal images have been widely used for diagnosing vascular and non-vascular pathology in medical society. Retinal images provide information on the changes in retinal vascular structure, which are common in diseases such as diabetes, occlusion, glaucoma, hypertension, cardiovascular disease and stroke .These diseases usually change reflectivity, tortuosity, and patterns of blood vessels.

iii. Early detection in the change of the vessel is obtained so that the prevention can be taken from being total blindness

iv. detection of some diseases in early stages, such as diabetes, which can be performed by comparison of the states of retinal blood vessels

v. Vision loss related to diabetic retinopathy can be prevented if the disease is discovered in an early stage.

VII.APPLICATIONS

i. In Hospitals.

VIII.CONCLUSION

The blood vessel detection and segmentation is an important for diabetic retinopathy diagnosis at earlier stage. The morphological and SVM classifier is proposed in this paper to detect and segment the blood vessels from the retinal image. The local binary pattern and GLCM features are extracted from the morphologically processed image and used as blood vessels features. The proposed method detected blood vessels with an average sensitivity of 78%, average specificity of 97.99% and an average accuracy of 99.6% in the retinal fundus images.

ACKNOWLEDGMENT

We would like to thank our guide Prof.S.D. Kale of E&TC department, for the valuable guidance and constructive suggestions. This helps us in making our project.

REFRENCES

[1] Soares J.V., Leandro J.J., Cesar R.M., Jelinek H.F., Cree M.J., (2006): Retinal vessel segmentation using the 2-D Gabor wavelet and supervised classification. *IEEE Transaction of Medical Imaging*, vol.25, pp.1214–1222.

[2] Fathi A., Naghsh-Nilchi A.R. (2012): Automatic wavelet-based retinal blood vessels segmentation and vessel diameter estimation. *Biomedical Signal Pro-cessing and Control*, vol.8(1), pp.71-80.

[3] Fang B., Hsu W., Lee M.U., (2003): On the Detection of Retinal Vessels in Fundus Images. http://hdl.handle.net/1721.1/3675 (04.05.2016)

[4] You X., Peng Q., Yuan Y., Cheung Y., Lei J. (2011): Segmentation of retinal blood vessels using the radial projection and semi-supervised approach. *Pattern Recognition*, vol.44, pp.2314-2324.

[5] Wasan B., Cerutti A., Ford S., Marsh R., (1995): Vascular network changes in the retina with age and hypertension. *Journal of Hypertension*, vol.13(12), pp.1724-1728.