International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 08 | Aug 2020 www.irjet.net p-ISSN: 2395-0072
National Conference on Recent Advancements in Communication, Electronics and Signal Processing-RACES'20
Organised by: Department of ECE, Velammal Engineering College, Chennai-66

DIABETIC RETINOPATHY DETECTION BASED ON SKIN LOCUS SEGMENTATION USING DEEP LEARNING

Sharath.K[1], Kamakoni Thulasiram[1], Vinith Kumar.K[1], Paul Pillai.S [1]

[1]Student , Department of Electronics and Communication Engineering , Velammal Engineering College, Surapet, Chennai-600052, Tamil Nadu, India.

MR.GANGADURAI[2]

[2]Assistant Professor, Department of Electronics and Communication Engineering, Velammal Engineering College, Surapet, Chennai-600052, Tamil Nadu, India.

ABSTRACT: Medical image analysis is a very popular research area in these days in which digital images are analysed for the diagnosis and screening of different medical problems. Diabetic retinopathy is one of the serious eye diseases that can cause blindness and vision loss. Diabetes mellitus, a metabolic disorder, has become one of the rapidly increasing health threats both in India and worldwide. Diabetic Retinopathy (DR) is an eye disease caused by the increase of insulin in blood and may cause blindness. An automated system for the early detection of DR can save a patient vision and can also help the ophthalmologist in screening of DR which contains different types of lesion, i.e., micro aneurysms, hemorrhages, exudates. Early diagnosis by regular screening and treatment is beneficial in preventing visual impairment and blindness. This project presents a method for detection and classification of exudates in colored retinal images. It eliminates the replication exudates region by removing the optic disc region. Several image processing techniques including Image Enhancement, Segmentation, Classification, and registration has been developed for the early detection of DR on the basis of features such as blood vessels, exudes, hemorrhages and micro aneurysms. This project presents a review of latest work on the use of image processing techniques for DR feature detection. Image Processing techniques are evaluated on the basis of their results. Exudates are found using their high gray level variation, and the classification of exudates is done with exudates features and SVM classifier.

KEYWORDS: *Classification, Detection Skin locus segmentation.*

INTRODUCTION:

Diabetic Retinopathy (DR) is a general term used to express vascular problems in the retina of the diabetic patients. The retina is actually the end of the eye, the image of objects around the environment passing through the pupil, the cornea, and the space inside the eye, is sent to the brain as a comprehension message so that we can see it.

Diabetic retinopathy is one of the main causes of blindness and the complications of diabetes. Since vision is gradually reduced in most cases, early diagnosis of diabetes can increase the chance of preventing blindness and blurred vision.

Today, FUNDUS images are widely used to check the status of the retina and its related diseases. By examining these images, doctors can detect eye diseases such as cataracts, black water, and diabetes, and control their progression. Therefore, examination of retinal vascular properties by using image processing techniques can increase the speed, accuracy and reliability of the diagnosis and treatment process, and, on the other hand, reduce the cost of treatment. Several methods for diagnosis of diabetic retinopathy are presented using image processing techniques. Abbadi et al. presented an automatic method for detecting lesions and exudates in the retina image. Texture analysis technique was used to calculate the texture based on the histogram of intensity. In their pre-processing step, they used the green channel to better detect optic discs and exudates. After removing the optic disc, they extracted the exudates with a real threshold according to their shape and diameter. The results of applying the proposed method on standard database data have promising results. Zhang et al. used two-dimensional Gabor filters for segmentation. Of the two different values for σ, a large amount was used for larger vessels and a smaller value for smaller vessels. In this study, a hysteresis threshold was used to diagnose all types of vessels. The proposed method was tested on the DRIVE database and acceptable results. Youssef et al. proposed a new technique for vascular detection. In this study, an edge detection algorithm was used to

International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 08 | Aug 2020 www.irjet.net p-ISSN: 2395-0072
National Conference on Recent Advancements in Communication, Electronics and Signal Processing-RACES'20
Organised by: Department of ECE, Velammal Engineering College, Chennai-66

create an initial segmentation on the images, and then a feature-based algorithm was used to detect more precisely the blood vessels. This algorithm takes features such as brightness, width and direction for the purpose of segmentation from the characteristics of the blood vessels.

METHOD:

A computer-aided screening and grading system relies on the automatic detection of lesions. Fundus images with DR exhibit red lesions, such as micro aneurysms (MA) and hemorrhages (HE), and bright lesions, such as exudates and cotton wool spots. .The Existing method takes as input a color fundus image together with the binary mask of its region of interest (ROI). The ROI is the circular area surrounded by a black background. It outputs a probability color map for red lesion detection. The method comprises six steps .First, spatial calibration is applied to support different image resolutions. Second, the input image is preprocessed via smoothing and normalization. Third, the optic disc (OD) is automatically detected, to discard this area from the lesion detection. The prediction of Retinopathy is quite difficult. Segmentation method may produce unwanted noise. PSNR value is high. Image Assessment analysis provides poor performance. Segmentation covers unwanted region

In proposed system Diabetic Retinopathy cause changes in eye damage the blood vessel .Image will undergo a standard method of applying image processing which include image acquisition, pre-processing like filtering (Median/Wiener/Gaussian), contrast enhancement (Histogram Equalization / Adaptive Histogram), feature extraction like GLCM, Region Properties Image Assessment techniques followed by exact identification of disease.We will use Skin locus model and color histogram for classification of the retinal images into category of Normal. The Overall classification rate of the proposed system will give the better efficiency and accuracy of identifying the disease with respect to existing systems. After getting results, patient can receive their report via e-mail. After getting result, records will be sent through E-mail and SMS through GSM module.

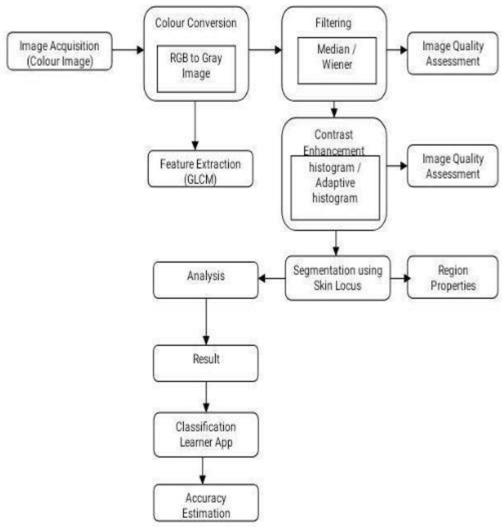

Figure 1.Block diagram of software unit in the proposed system

THE OBJECTIVES OF THE PROPOSED SYSTEMS:

Diabetic Retinopathy cause changes in eye damage the blood vessel. Image will undergo a standard method of applying image processing which include

- image acquisition,
- pre-processing like filtering (Median/Wiener/Gaussian),
- contrast enhancement (Histogram Equalization/Adaptive Histogram),
- feature extraction like GLCM,
- Region Properties
- Image Assessment techniques followed by exact identification of disease.

We will use Skin locus model and color histogram for classification of the retinal images into category of Normal.

The Overall classification rate of the proposed system will give the better efficiency and accuracy of identifying the disease with respect to existing systems. After getting results, patient can receive their report via e-mail. After getting result, records will be sent through E-mail and SMS through GSM module.

IMPLEMENTATION:

IMAGE ACQUISITION:

The first stage of any vision system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks required today. However, if the image has not been acquired satisfactorily then the intended tasks may not be achievable, even with the aid of some form of image enhancement. Digital imaging or digital image acquisition is the creation of a digitally encoded representation of the visual characteristics of an object, such as a physical scene or the interior structure of an object. The term is often assumed to imply or include the processing, compression, storage, printing, and display of such images. A key advantage of a digital image, versus an analog image such as a film photograph, is the ability make copies and copies of copies digitally indefinitely without any loss of image quality.

Digital imaging can be classified by the type of electromagnetic radiation or other waves whose variable attenuation, as they pass through or reflect off objects, conveys the information that constitutes the image. In all classes of digital imaging, the information is converted by image sensors into digital signals that are processed by a computer and made output as a visible-light image. For example, the medium of visible light allows digital photography (including digital videography) with various kinds of digital cameras (including digital video cameras). X-rays allow digital X-ray imaging (digital radiography, fluoroscopy, and CT), and gamma rays allow digital gamma ray imaging (digital scintigraphy, SPECT, and PET). Sound allows ultrasonography (such as medical ultrasonography) and sonar, and radio waves allow radar. Digital imaging lends itself well to image analysis by software, as well as to image editing (including image manipulation).

WIENER FILTER:

In signal processing, the Wiener filter is a filter used to produce an estimate of a desired or target random process by linear time-invariant (LTI) filtering of an observed noisy process, assuming known stationary signal and noise spectra, and additive noise. The Wiener filter minimizes the mean square error between the estimated random process and the desired process.

ADAPTIVE HISTOGRAM EQUALIZATION:

Adaptive histogram equalization (AHE) is a computer image processing technique used to improve contrast in images. It differs from ordinary histogram equalization in the respect that the adaptive method computes several histograms, each corresponding to a distinct section of the image, and uses them to redistribute the lightness values of the image. It is therefore suitable for improving the local contrast and enhancing the definitions of edges in each region of an image. However, AHE has a tendency to over amplify noise in relatively homogeneous regions of an image. A variant of adaptive histogram equalization called contrast limited adaptive histogram equalization (CLAHE) prevents this by limiting the amplification.

SKIN LOCUS OPERATION:

In computer vision, image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super-pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze

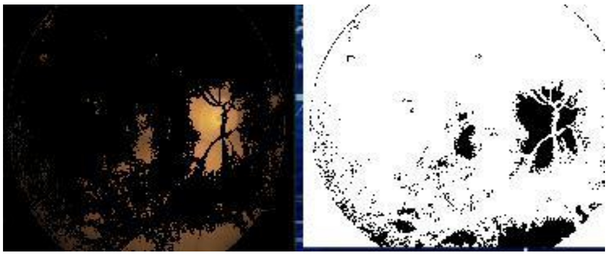

Fig 2 Segmentation

WORKING:

Figure 3 working

In the above figure, an image has been captured by a camera and has been sent to a digital system to remove all the other details, and just focus on the water drop by zooming it in such a way that the quality of the image remains the same.

SIGNAL PROCESSING:

Signal processing is a discipline in electrical engineering and in mathematics that deals with analysis and processing of analog and digital signals, and deals with storing, filtering, and other operations on signals. These signals include transmission signals, sound or voice signals, image signals, and other signals e.t.c. Out of all these signals, the field that deals with the type of signals for which the input is an image and the output is also an image is done in image processing. As it name suggests, it deals with the processing on images. It can be further divided into analog image processing and digital image processing.

ANALOG IMAGE PROCESSING:

Analog image processing is done on analog signals. It includes processing on two dimensional analog signals. In this type of processing, the images are manipulated by electrical means by varying the electrical signal. The common example include is the television image. Digital image processing has dominated over analog image processing with the passage of time due its wider range of applications.

DIGITAL IMAGE PROCESSING:

The digital image processing deals with developing a digital system that performs operations on an digital image. After preprocessing and contrast enhancement, we detected and classified exudates in colored retinal images. The result is displayed on the LCD.

RESULT:

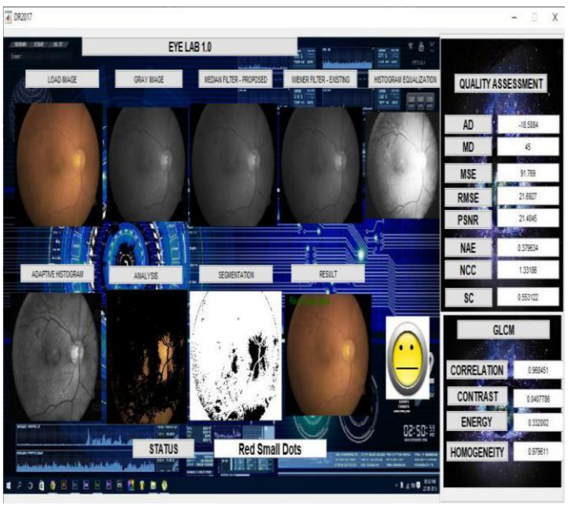

Figure 4 Result

CONCLUSION:

In this paper, we propose a deep MIL method for DR detection by taking the complementary advantages from MIL and deep learning: only the image-level annotation is needed to achieve both detection of DR images and DR lesions, meanwhile, features and classifiers are jointly learned from data. The pre-trained AlexNet is adapted and deeply fine-tuned in our framework to achieve the patch-level DR estimation. An end-to-end multi-scale framework is applied to help better handle the irregular DR lesions. Compared to existing MIL methods for DR detection, our method significantly improves the detection performance. In the future work, we are going to incorporate techniques such as semi-supervised learning and active learning into our deep MIL method to further achieve the accurate segmentation of DR lesions.

REFERENCES:

[1] Saiprasad Ravishankar, Arpit Jain, Anurag Mittal "Automated feature extraction for early detection of diabetic retinopathy in funds images", IEEE 2009.

[2] D. Welfer and D. R Marinho "A course to fine strategy for automatically detecting exudates in color eye funds images", computerized medical imaging and graphics, vol 34, 2010.

[3] Banumathi A, Karthika, R., Kumar.A (2003),"Performance analysis of matched filter techniques for automated detection of blood vessels in retinal images", Conference on Convergent Technologies for Asia Pacific Region, 2, pp 543–546.

[4] BevilacquaV.,Combo,S.Cariello, L.Mastronardi, G., (2005), "A combined method to detect Retinal Fundus Features",Conference on EACDA, Italy.

[5] Chaudhury S, Chatterjee S, Katz N., Nelson M,Goldbaum, M, (1989), "Detection of blood vessels in retinal images using two dimensional matched filters", IEEE Transactions on medical imaging, 8, pp 3.

[6] Herbert F. Jelinek, Michael J. Cree, Jorge J. G. Leandro, João V. B. Soares and Roberto M.Cesar, Jr. A. Luckie, May (2007), "Automated segmentation of retinal blood vessels and identification of proliferative diabetic retinopathy", Optical society of America, 24, pp14481456.

[7] Mohammed AlRawi, Munib Qutaishat, Mohammed Arrar, (2006), "An improved matched filter for blood

vessel detection of digital retinal images", Computers in Biology and Medicine, pp 262 – 267.

[8] Vallabha, D., Dorairaj, R., Namuduri, K.,Thompson, H., (2004), "Automated Detection and Classification of Vascular Abnormalities inDiabetic Retinopathy" in: Proceedings of 13th IEEE Signals, Systems and Computers, 2, pp 1625–1629.

[9] Wong Li Yun , U. Rajendra Acharya, Y.V.Venkatesh, Caroline Cheec, Lim Choo Min,(2008), "Identification of different stages of diabetic retinopathy using retinal optical images", E.Y.K. Ng / Information Sciences 178 pp 106– 121.

[10] http://www.isi.uu.nl/Research/Databases/

[11] J.J. Staal, M.D. Abramoff, M. Niemeijer, M.A.Viergever, B. van Ginneken, "Ridge based vessel segmentation in color images of the retina", IEEE Transactions on Medical Imaging, 2004, vol. 23, pp. 501-509.