EXTRACT THE EXUDATES FROM DIABETIC RETINOPATHY

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Abstract: Diabetic Retinopathy (DR) is the most frequent from of diabetic eye disease. It will typically affect people who have diabetes for a significant number of years. Retinopathy becomes particularly dangerous because it will affect all diabetics and, increases the risk of blindness, when it is left untreated. To avoid total loss of sight the ophthalmologist will treat the patients by sophisticated laser treatment, if effectively at an initial period. One of main symptoms of initial stage of Diabetic Retinopathy is analysis of Exudates. In this paper, a technique is proposed depending on morphological closing operations which are in image processing is used to identify exudates from retina image. At starting phase, the retinal image must be processed, where at first the image which is in RGB color format is altered to the Gray image and Median filter is performed to reduce the noise and subsequently Adaptive histogram equalization is performed to normalize the image. In subsequent phase, the exudates are identified using morphological closing operation and thresholding value is applied, proposed technique got better sensitivity and accuracy. At early stage, using mathematical morphology the exudates are identified and removed.

Keywords: Diabetic Retinopathy, Gray level,median filter, Adaptive histogram equalization, Morphological operation and thresholding.

1. .INTRODUCTION

In a human eye Retina is the inner membrane. Diseases that take location inside the retina affect our eye–sight immediately.

Hypertension and diabetes mellitus are systemic illness in eye which cause a few pathological adjustments. Wecan give pathological facts using virtual pics of the fundus eye. Diabetic retinopathy, also referred to as diabetic eye ailment, is a scientific situation wherein harm happens to the retina due to diabetes and is a essential motive of blindness. The people who have had diabetes for 20 years or more might be easily affected. Eighty percent of humans have been stricken by diabetes. When the modifications in blood glucose tiers cause modifications in retinal blood vessels will produce Diabetic retinopathy. In some cases, these vessels will swell up and leak fluid into the rear of the eye. The early ranges of diabetic retinopathy can also occur without symptoms and without pain. A real impact at the vision will now not arise until the sickness advances.

The characteristics of Diabetic retinopathy is defined by increase of retinal microaneurysm, haemorrhages and exudates. Microaneurysms are crucial dilatations of retinal capillaries and it looks like a small spherical darkish red dots. Next we must differentiate haemorrhages and exudates. When the blood leaks from retinal vessels then it said to be haemorrhages, exudates are identified when lipid or fatsleaks from aneuryms. Based on the illness of the patient the value aneurysms, haemorrhages and exudates varied. Depending upon this values we can identify the exudates from retinal images.

To detect this disorder lot of techniques are available. RRGS technique is used to detect the darkish red dots, leakage of blood from retinal vessels and fats leaks from blood vessels. The detection of vessels can

be done by neural approach. Microaneurysms and haemorrhages are detected with the use of pixel type approach and features are classified using neighbor classifier.

2. LITERATURE SURVEY

This chapter includes some references from previous projects, journals, articles etc gathered in this survey, are a massive collection from different sources and articles. The information gathered in this paper is related to background study of this designed project.

A.Sindhura (2016) have discussed Identifying Exudates from Diabetic Retinopathy. At staring phase,the retinal image must be preprocessed, where at first the image which is in RGB colour format is altered to the image of HIS color format and on Intensity-band of HIS color format average filter is performed to reduce noise and subsequently contrast-limited adaptive histogram equalization is performed to normalize the image. Niblack thresholding technique to detect the exudates.

N.Nur, H.Tjandrasa Published (2018) has presented Exudates Segmentation in Retinal Images of Diabetic Retinopathy Using Saliency Method Based on Region.It has proposed the segmentation of exudates with Saliency method based on region obtained using intensity thresholding. There are three main stages in this research, namely optic disc removal, location detection of exudates, and exudates segmentation. Optical disc removal is done using midpoint circle algorithm. At the detection stage of the exudates location, the image will be subdivided into smaller sub-images called patches. This evaluation method is done on the diaretDBI dataset by calculating the value of accuracy, sensitivity, and specificity of the proposed method respectively 99.33%, 81.65% and 99.42%.

Maria Garcia,Roberto Hornero, Maria Lopez Galvez (2016) has presented Diabetic retinopathy (DR) is a disease with an increasing prevalence and the main cause of blindness among working-age population. The risk of severe vision loss can be significantly reduced by timely diagnosis and treatment. Systematic screening for DR has been identified as a cost-effective way to save health services resources. Automatic retinal image analysis is emerging as an important screening tool for early DR detection, which can reduce the workload associated to manual grading as well as save diagnosis costs and time. Many research efforts in the last years have been devoted to developing automatic tools to help in the detection and evaluation of DR lesions. However, there is a large variability in the databases and evaluation criteria used in the literature, which hampers a direct comparison of the different studies. This work is aimed at summarizing the results of the available algorithms for the detection and classification of DR pathology. A detailed literature search was conducted using PubMed. Selected relevant studies in the last 10 years were scrutinized and included in the review. Furthermore, we will try to give an overview of the available commercial software for automatic retinal image analysis.

3. PROPOSED METHODOLOGY

The set of rules planned here is the use of the standard of Morphological operation and thresholding to detect the exudates. As show bellow in Fig proposed technique
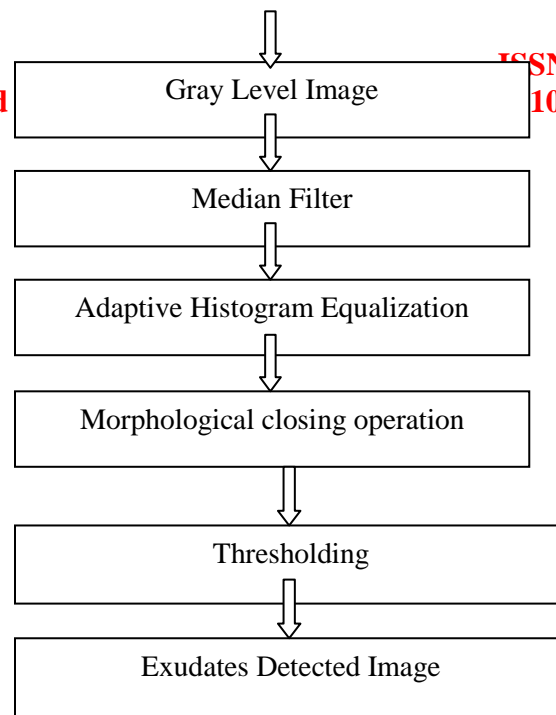
Fundus Image

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                    ┌──────────────────────────────────┐
                    │         Gray Level Image          │
                    └──────────────────────────────────┘
                                    ⇓
                    ┌──────────────────────────────────┐
                    │          Median Filter            │
                    └──────────────────────────────────┘
                                    ⇓
                    ┌──────────────────────────────────┐
                    │   Adaptive Histogram Equalization │
                    └──────────────────────────────────┘
                                    ⇓
                    ┌──────────────────────────────────┐
                    │   Morphological closing operation │
                    └──────────────────────────────────┘
                                    ⇓
                    ┌──────────────────────────────────┐
                    │           Thresholding            │
                    └──────────────────────────────────┘
                                    ⇓
                    ┌──────────────────────────────────┐
                    │      Exudates Detected Image      │
                    └──────────────────────────────────┘
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Figure1. Proposed Technique

Gray Level Image

A gray scale is one in which the value of each pixel is a single sample representing only an amount of light, that is, it carries only intensity information. The input image (RGB) is converted into Gray level image. Here we using Weighed method of Gray level .The formula is

$$Gray\ level= ((0.3*R)+(0.59*G)+(0.11*B))$$

According to this equation, Red has contribute 30%, Green has contributed 59% which is greater in all three colors and Blue has contributed 11%.

Median Filter

Median filtering is a nonlinear method used to remove noise from images. It is widely used as it is very effective at removing noise while preserving edges. It is particularly effective at removing 'salt and pepper' type noise. The median filter works by moving through the image pixel by pixel, replacing each value with the median value of neighbouring pixels. Median filter is applied to Gray level image.

Adaptive Histogram Equalization

Histogram Equalization is a process which uses histogram of an image for contrast correction. This technique raises overall contrast of an image, mainly the data which is important in an image is show in low contrast values. The intensity values of the pixels can be better scattered on the histogram through this histogram equalization. This method is useful when both background and foreground of an image are bright or dark.

In this process, Adaptive histogram equalization is used and then the technique i.e. histogram equalization is performed on each region.

Morphological closing operation

Closing operation appears to smoothes units of contours, whereas, opening operation shrinks narrow breaks, lengthy thin gulfs, eradicates small holes, and gaps in the contour are filled.

Morphological closing operation in image processing is one among the all nonlinear operations linked to the shape of an image. Morphological procedures identify an image with a shape called the structuring element. Morphological closing operation on an image is applied by a structuring element where dilation operation is applied and then erosion operation is performed as:

$$f \bullet s = (f \oplus s_{\text{rot}}) \ominus s_{\text{rot}}$$

Where f is an image and S is a structuring element.

Thresholding

Finally threshold values are applied to Morphological closing operation to detect the exudates. Thresholding is used to split an image into smaller segments, or junks, using at least one color or gray scale value to define their boundary. The advantage of obtaining first a binary image is that it reduces the complexity of the data and simplifies the process of recognition and classification.

4. RESULTS AND DISCUSSION

(a)   **(b)**   **(c)**
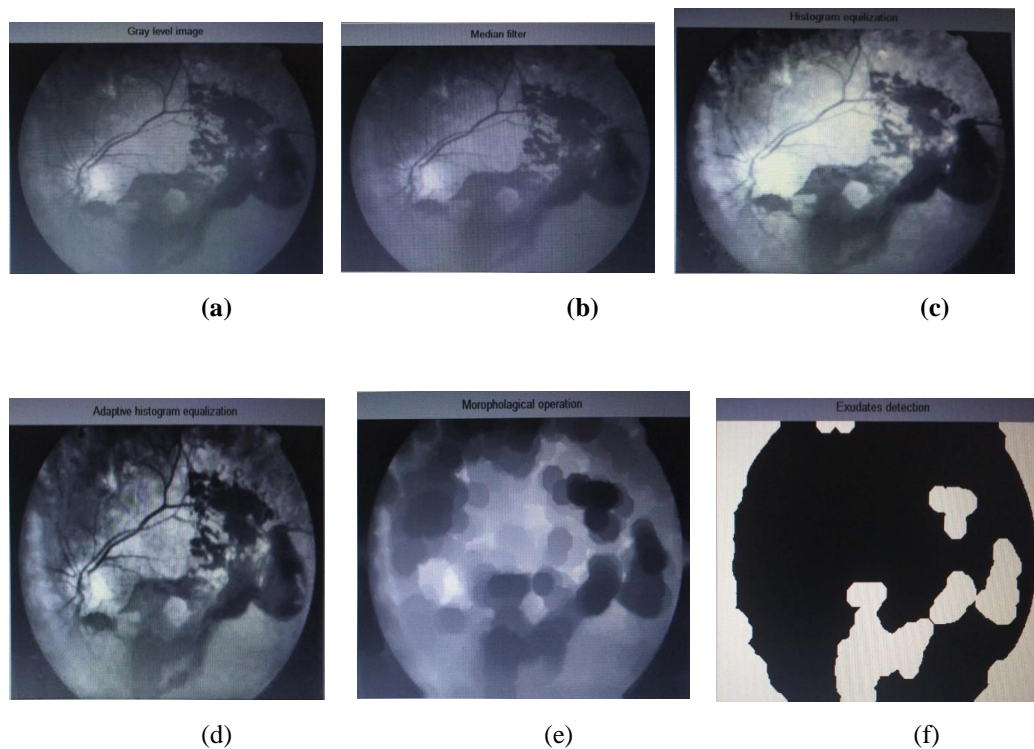
(d)   (e)   (f)

Figure 2. Recognizing Exudates from Retinal Image.

In the above Fig2 (a) Gray Level image, 1(b) median Filter, 1(c) Histogram Equalization, 1(d) Adaptive histogram equalization, 1(e) Morphological closing operation, 1(f) Exudate detected image.

5. CONCLUSION

In this research a novel approach is proposed discover exudates morphological method and threshold. Most of them are based on the retinal image and image processing plays a important role in detection of DR.

Diabets occur when the level of glucose in the blood is get high above the normal and can cause damage to the blood vessels, so they can use their fundus images as input to the threshold and they are suffering from diabetic retinopathy or not. In this procedure to detect exudates by means of Morphological closing operation and along with the more noise and with the use of Median filter.

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