GRAPH BASED APPROACH FOR DETECTING DIABETES USING RETINAL IMAGES

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Abstract-Retina is a layer format which is found at the back side of the eyeball which plays the main role for visualization. The vascular system consists of two kinds of blood vessels: artery and vein. Both these vessels from the vascular graphical tree are used to form a graph. Analysis of characteristics associated with the retinal blood vessels by distinguishing artery/Vein (A/V) can provide very helpful information to doctors for early detection of diseases like hypertension and diabetes. AVR (Arteriolar-to-venular diameter ratio) used in different approaches for the classification task, also extracting different color features and exploiting different additional information. This paper proposed an A/V classification based on a graph extracted from the retina to find the diabetes patients. This method classifies the entire vascular tree based on the type of each intersection point (graph node) and vessel segment (graph links). Here the final classification of a vessel segment as A/V done through the combination of graph-based result. This result compared with manual labeling for 3 public databases. Accuracy values of 88.3%, 87.4%, and 89.8% are obtained for the image INSPIREAVR, DRIVE and VICAVR database. These results demonstrate that our method outperforms recent approaches for A/V classification.

Key words: *Segmentation, wound analysis process, A/V classification.*

1. INTRODUCTION

The retina is the only location blood vessels can be directly visualized non-invasively in vivo. Increasing technology leading to the development of digital image systems over the past two decades has revolutionized fundal imaging. In, author has mentioned the difference between arteries and veins. They are as follows. Blood vessels of retina are divided in two types. They are Arteries and Veins.Arteries are blood vessels that carry blood away from the heart. While most arteries carry oxygenated blood, they carry blood that is oxygenated after it has been pumped from the heart. Artery transports blood rich in oxygen to the organs of the body. The veins transport blood low in oxygen level. Arteries are bright but Veins are dark. For diagnosis of various diseases it is more essential to distinguish the vessels in arteries and veins. An abnormal ratio of the size of arteries to veins is one of important symptom of another diseases like diabetic retinography, high blood pressure, pancreas etc. For example diabetic patients have abnormally wide veins, whereas pancreas patients have narrowed arteries and high blood pressure patients have thickened arteries. To detecting these diseases the retina has to be examined routinely. Blood vessel has to be segmented before classify the blood vessels into arteries and veins. Several automated techniques have been reported to quantify the changes in morphology of retinal vessels indicative of retinal or cardiovascular diseases. However recently, vessel morphology measured specific to arteries or veins was found to be associated with disease. Arterial narrowing and resulting decrease in artery-to-vein width ratio (AVR) may predict the future occurrence of a stroke events or a myocardial infarct. Retinal vessels are affected by several systematic diseases namely diabetes, hypertension, and Vascular disorder. In diabetic retinopathy, the blood vessels often show abnormalities at early stage, as well as vessels diameter alterations. Changes in retinal blood vessels, such as significant dilatation and elongation of main artery, vein, and their branches, are also frequently associated with hypertension and other cardiovascular pathologies.

2. RELATED WORK

[1]There are visual and geometric features that enatic discrimination between veins and arteries; several methods have explored these property for A/V classification. Arteries are bright red while veins are darker, and in general artery calibers are smaller than vein calibers.

[2] Vessel caliber scan be affected by diseases; therefore this is not a reliable feature for A/V classification. Arteries also have thick walls, which reflect the light as a shiny central reflex strip. In this paper a cross-sectional study comprising5979 persons aged 45 to 84 years residing in six U.S. communities.

[3] Retinal vascular caliber was measured summarized from digital retinal photographs. Standard cardiovascular risk factors, including biomarkers of inflammation were assessed. In this paper Retinal arteriolar and venular (vascular) was quantitatively measured from fungus images using a computer-assisted program. Retinal vascular was defined as the integral of the curvature square along the path of the vessels, normalized by the total path length. Data on blood pressure and major cardiovascular disease (CVD) risk factors were collected from all patients.

[4]Retinal photographs from the Singapore Malay Eye Study, a population-based cross-section study of 3280persons aged 40-80 years, were analyzed. Quantitative changes in the retinal vasculature were measured useful for a semi-automated computer-based program. Qualitative signs, including focal arteriolar narrowing (FAN), artry vein nicking (AVN), opacification of the arteriolar wall (OAW), and retinopathy (e.g., micro aneurysms, retinal hemorrhages), were assessed from photograph by trained technicians. After excluding persons with diabetes and ungrade photographs, 1913 persons provided data for this analysis.

3. PROBLEM STATEMENT

A Wound boundary determination based on the foot outlines detection result is existing system maintained. If the foot detection result is concern as a binary images within the foot area marked as "white" and rest part marked as "black," it is easy to locating the wound boundary within the foot region boundary by detecting the large connected black" components within the "white" part. If the wound is located at the foot region boundary, then the foot boundary is not closed, and the problem becomes more complicated, i.e., we might need to first form a closed boundary. When the wound boundary has been successful it determined and the wound area calculated, we next evaluate the healing state of the wound by performs *Color segmentation*, with the goal of categorizing each pixel in the wound boundary into certain things classes labeled as granulation, slough and necrosis. The classical self-organized clustering method called K-mean with high computation efficiency is used. After the color segmentation, a feature vector including the wound area size and dimensions for differentiation of wound tissues is formed to describe the wound quantitatively. This feature vector, along with both the originality and analyzed images, is saved in the result database. The *Wound healing trend analysis* is perform on a time sequence of images belonging to a given patient to monitor the wound healing status. The current trend is obtained by compare the wound feature vectors between the current wound record and the one that is just one standard time interval earlierise (typically one or two weeks). Alternatively, a longer term healing trend is obtained by comparing the features vector between the current wound and the base record which is the earliest record for this patient.

The mean-shift algorithm belongs to the density assessment based nonparametric clustering methods, in which the feature space can be considered as the factual probability density function of the represented parameter. This type of algorithms sufficient analyzes the image feature space (color space, spatial space or the combination of the two spaces) to cluster and can provide a reliable solution for many vision tasks

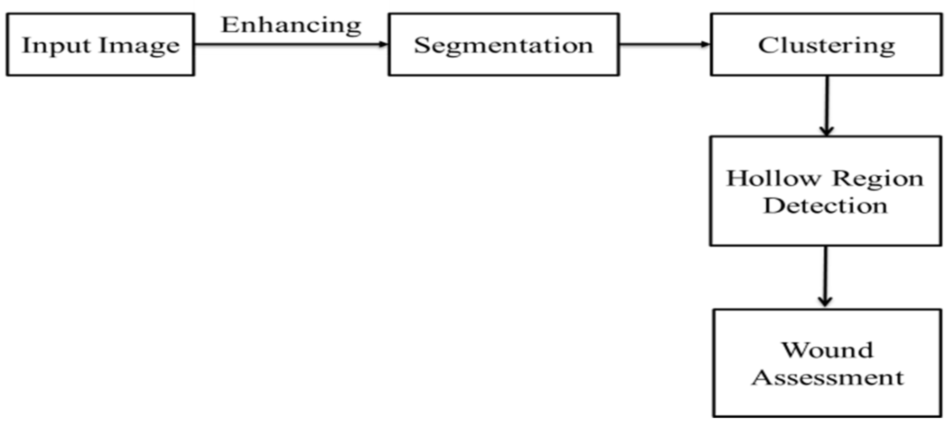


Figure 1: Existing System

An object recognition method is needed to convert the segmentation result into a meaningful wound boundary determination that can be easily understand by the users of the wound analysis system. As noted, a standard recognition method relies on known model information to development a hypothesis, based on which a decision is made whether a region should be consider as a entrant object, i.e., a wound. A verification step is also needed for further confirmation. Because our wound determination algorithm is plan for real time implementation on the smart phones with limited computational resources, we simplify the object identification process while ensuring that recognition accuracy is acceptable.

Neurons of general feed forward networks needn’t be tuned and these secret nodes neurons of generalized feed forward networks need not be tuned and these hidden nodes. Neurons can be randomly generated. All the hidden node parameters are independent from the quarry functions or the training datasets. ELM theories conjecture that this randomness may be true to biological studying in animal brains. Although in theory all the parameters of ELMs can be analytically determined alternative of being tuned, for the sake of efficiency, in real and vessel's continuity properties. Tracking applications the output weights of ELMs may be determined in different ways.

Disadvantage:

1. SVM cannot deal with simple parametric function because its dimension is high.
2. It is neither a linear combination of single financial ratios nor has it another simple functional form. The weights of the financial ratios are not constant.
3. To ELM concept different algorithm is used for certain process.
4. Some parameters should be tuned manually.
5. Over fitting.

4. PROPOSED METHOD

There are visual and geometrical feature that enable discrimination between veins and arteries. In this paper a proposed graph- based approach is focused mostly of the characteristics of the retinal vessel tree that, at least in the region near the optic disc, veins infrequent cross veins and arteries hardly cross arteries. The goal of blood vessel tracking is to find and stores all vessels, and each vessel will be labeled with a number. Identification and measurement of blood vessels in retinal images could enable quantitative evaluation of clinical features, which may allow early diagnosis and effectual monitoring of therapies in retinopathy.

A new system is proposed for the automatic extraction of the vascular structure in retinal images, based on a Graph based approach algorithm. After processing pixels on a grid of rows and columns to discover set of starting points, the tracking procedure starts.

It moves along the vessel by analyze following vessel cross sections, and extracting the vessel center, caliber and direction. Vessel structures such as retinal vasculature are main features for computer-aided diagnosis. In this paper, a probabilistic tracking method is suggest to detect blood vessels in retinal images.

During the tracking process, vessel edge points are detected iteratively using local grey level practice begins with the located starting, together with initial estimates for the Gaussian model coefficients. In practice the cross-sections are two-dimensional to improve the accuracy of the estimate. The algorithm then steps to the next candidate point construct on the estimated orientation and width of the blood vessel.

This process is carried out iteratively until some ending point is met. It grows and analyzes crossovers around the critical points, allowing the survey of the vessel structure beyond the critical areas. Finally bifurcations and crossings are identified analyzing vessel end points with respect to the vessel structure. Numerical evaluation of the performances of the system compared to human expert is reported.

4.1 Diagram:

The proposed architecture is explained in the below Fig 1: The retina image is first given as input. The image is then converted to a gray scale image. For graphical transformation now the gray scale image is ready for preprocessing. After preprocessing the next step contains two fragmentations. First step is removing noise in this step if any noise placed in the original image means it should be removed for further classifications.

The next step is Filtering process here the noise that identified in the image is further filter for better classification. After this the image is allowed for segmentation process. In this process the filtered image is segmented for graphical calculation. Then the segmented image is ready for vessel extraction. Here the vessel denotes the link that is used to connect the node

The next step is to implement the graphical approach. After designing the graphical representation A/V classification is used. After A/V classification the image is further evaluated to identify the disease. During this process the evaluation of finding the disease is comparatively reduced. By using graph based approach is an easy and efficient technique.

The best method is used to find the simple classification using the proposed model.In that particular image concept the foot image is registered But the scope of the project is to analyse the wound image based on the boundary region .That's why the wound boundary is detected based on the proposed image enhancement model. After the image enhancement the wound boundary is successfully calculated

4.2Proposed Architecture:

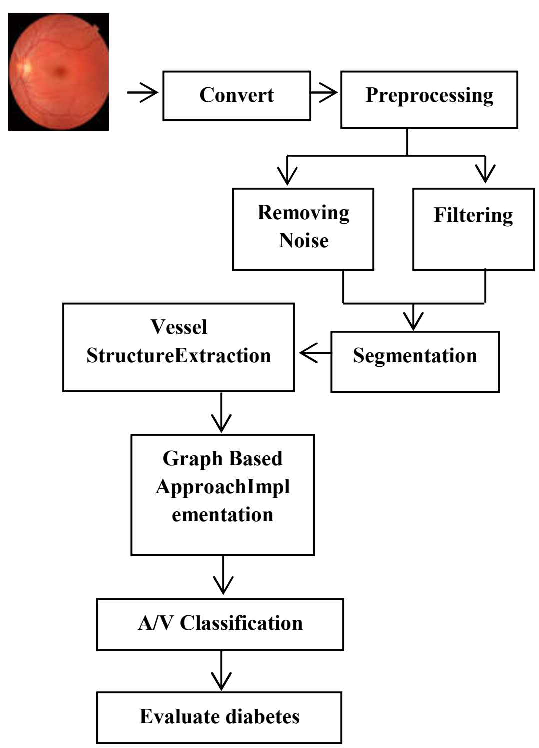


Figure 2: Proposed Architecture.

4.3Advantage:

1. Efficient process to identify the disease by using Artery Vein classification.
2. Advanced graphical approach for vessel segment.
3. Measurements are used to identify the disease such as hypertension, stroke, and coronary heart disease etc.,

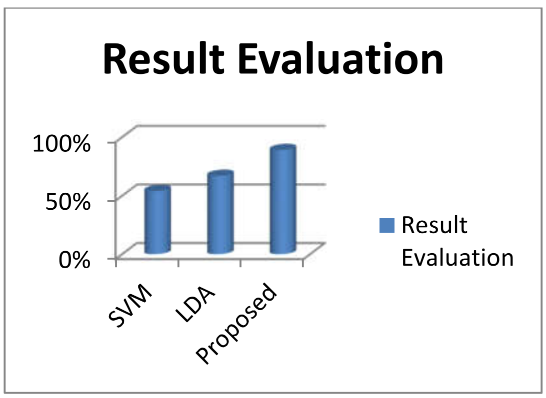
5.COMPARISON

The comparison between the SVM, ELM and the graph based proposed approach was compared to find which produce the good result.

Table 1: *Comparison Result.*

Methods	Result
SVM	54%
ELM	67%
Proposed	89%

The above Table 1 denotes the comparison result of previous mechanism and proposed one. The observed result show the image classification using proposed mechanism produces the accurate result. The Table 1 data is further representing the graphical diagram to evaluate the process shown in Graph 1.



Graph 1: *Result Evaluation using graph.*

In Graph 1 the data evaluated by using proposed method produces better result. Existing method such as SVM, LDA produce low quality result. Using the proposed graphical Approach efficiency is achieved.

6. CONCLUSION

Finally, our proposed system implemented successfully with accurate identification of true vessels to obtain correct retinal ophthalmology measurements. It is used to track all true vessels and find the optimal Disc. We can overcome wrong diagnosis of crossovers by using simultaneous identification of blood vessels from retina. The final goal of the proposed method is to make easier the early detection of diabetic diseases related to the blood vessels of retina. Next, based on the node types, the links that belongs to a particular vessel should be detected using A/V classes. First, it is focused on the use of a first grey image as input obtained to a LDA which combines the relevant information of the three RGB components. Secondly, the operations based on mathematical morphology are implemented with the aim of locating the OD. Its main advantage is the full automation of the algorithm since it may not necessary for the requirement of clinicians, and reduces the consultation time; hence its use in primary care is facilitated.

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