International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 04, April-2019

DRUM-Diabetic Retinography Detection using Multi-Language Application

V. G. Prabhu
Student, Biometrics and Cyber security
PSG College of Technology
Coimbatore –Tamil Nadu

Dr. R .Manimegalai
Professor, Information Technology,
PSG College of Technology
Coimbatore –Tamil Nadu

***Abstract*— Digital devices emit UV rays that can cause visual impairment which leads to diabetic retinography. Diabetic Retinography is the major cause of blindness for digital device user and working-aged people. It accounts for about 5% of blindness worldwide and it is considered as a priority eye disease by the World Health Organization (WHO). Retinography occurs due to harm in the blood vessels of tissues to be found at the back of the retina. Retinography leads to visual debilitation that is incited by inconveniences of mellitus and there will be no symptoms until the patient's visual loss develops. A system should be developed so that it can be utilized by non-specialists to analyze a basic level of visual loss caused by Diabetic Retinography. The system developed should also reduce the specialist's workload and increase the effectiveness of viability of preventive conventions and early therapeutic treatments. The developed application should be language independent with backward compatibility for the platform developed. The developed system should be accurate and fast enough so that it can be compatible for non-specialist users. Moreover, the system should result in financial advantages for public health systems, since cost effective treatments associated with early illness detection leads to remarkable cost saving. The results can be further processed for analysis if the patient's results are considerably over the midrange value.**

Keywords- Android Application, Diabetic Retinography, Multi-language application, Visual loss detection.

I. INTRODUCTION

Diabetic Retinography is the major cause of blindness for digital device users. It was initially caused to diabetic patients as their blood vessels get affected due to abnormal blood flow. The diabetic population is estimated to be two hundred million individuals and it is expected to attain a growth of three hundred and twenty million in the year of 2030 by the world health organization. As a consequence of diabetes, much pathology has a maximum likelihood to get affected to retina. Initially diabetic Retinography was caused due to age-related devolution, more and more frequent in older adults and recently it affects every thirty digital device users. This is caused mainly because of digital devices as these devices expose huge hazardous radiation which directly affects the retina region resulting in vision loss. Digital imaging in android and pc process resources are increasing in every year helping in analyzing the data. Diabetic Retinography can be detected by using retinography images that can be acquired only through fundus camera. The camera captures the back portion of the eye that cannot be seen through naked eye. These images are then used for processing and detecting retinography. The image is the complete structure of the retinal vessels that associates the indicator of circulatory system issues. Android application is one of the most important aspects that are to be considered for every android operating system update. These android applications should perform as a normal android inbuilt application that gets synchronized with every android update. Android application should be developed for multi-processing as the user devices are more effective and performable with higher specifications. Application should be language independent and application should be developed with multi-language platform so that they will be more effective for every android version update and android backward compatibility.

II. LITERATURE SURVEY

Advanced Technological growth has taken place in recent years result in huge growth of awareness and care for the protection of eye vision as these digital devices directly affects human vision. The work done in [1] discusses about diabetics cause and effects in the body stating a solution for the same. Sayed et al. also discusses about diabetic Retinography causes which leads to damage of retina entering through the optic disc which results in loss of sight and also describes that the cause of damage cannot be initially find as there will be no loss in vision unless the defect increases with time and lack of diabetes. In this work the author elaborates that lack of vision will raise to about 642 million in 2040 so it in one of the important aspect to determine the early stage of diabetic Retinography which is also known as Non proliferative diabetic Retinography and this paper detect the diabetic Retinography in fundus image by performing image processing and machine learning technique adopting two famous algorithms Support Vector Machine(SVM) and Probabilistic Neural Network(PNN) for analyzing achieving accuracy of 90% in Support Vector Machine and 80% in Probabilistic Neural Network. In this work a maximum accuracy is achieved by pre-processing the image using Grayscale conversion, Adaptive Histogram Equalization, Discrete Wavelet Transform, Matched filter and Fuzzy C-means segmentation. The Paper concludes the result stating SVM is considerably more effective than PNN that helps to diagnose the disease at early state so that early precaution can be taken. The paper describes Augmented Reality (AR) can be used by specialist in detection of diabetic Retinography as a future scope.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 04, April-2019

The work done in [2] discusses about the medical field that requires CAD system for investigate and analyze the disease so that the disease can be prevented at early stage. In this work the author elaborates automatic optic disc detection for analyzing and diagnosing the severity level of fundus image by detecting and removing the optic disc as it has abnormal feature like exudates by background subtraction and contour detection method. This work initiates the processing with histogram equalization and processes the steps of removing the optic discs since optic disc is the brighter part of the captured image. In this work the author proposes an effective method in determining the optic disc and tracks the list of features from retinal fundus image with an efficiency of 98.12% by comparing with the existing method of OD detection that has an efficiency of 97.61%. Dhiravidachelvi et al. calculates the efficiency by True Positive Rate and False Positive Rate and describes pre-processing and post-processing of the same proposed method will improve the result.

The work done in [3] is about a recent survey where nearly 22% of diabetic patients' disease results in vision loss and also states that eye exams must be done less than annually so that vision loss can be easily identified and preventive measures can be taken. In this work the author stimulates the detection system using morphological and image segmentation methods to facilitate the ophthalmologists to take preliminary decision. In this work the author divides the classification method into two classes where normal retina classification can be performed by image processing technique and the other abnormal retinal classification is be to normalized by Artificial Neural Network (ANN) and perform the image processing technique. The classification is done by pre-processing by detecting the optical disk and if the preprocessing is successful it is forwarded to normal retinal classification method else it is considered as abnormal classification. This paper measures the accuracy by the total number of accurate classifications compared to overall amount of classification achieving the result of 85%.

The work done in [4] is about a proposal of algorithm for diagnosis of diabetic Retinography based on rapid sensitivity of human visual system by detecting the direction and color determining values of the visual system. In this work the author proposes a method with a performance value of 0.9012 using ROC curve and calculating AUC of the generated model. This work was based on basic image processing technique with some pre-processing technique like sobel edge detection, K-Nearest Algorithm, histogram thresholding and the classification is based on data mining technique like decision tree. This paper proves that this working reduces the cost of identification and allows early diagnosis of retinal disease. Masoud et al. consider that effective treatment in early stage help in the probability of reducing the loss of vision and propose a new method for acquiring retina images with better clarity, which makes it easier to analyze the images. The author concludes the results by comparing the system with various other processed results and extends the future scope of developing this method with MRI and CT scans.

The work done in [5] is about retinography as crippling consistent aliment occurs due to change in vein structure in light of vessel narrowing resulting in blockage of veins of remarkable centrality. In this work the author proposes a robotized technique for accessing the veins in retinal pictures and also uses 2-D Gabor wavelet for vessel change as their ability updates the directional structure, hence the robotized framework can identify the Retinography at early stage. This work also describes that the defect in vision causing retinography can be decreased at a very basic stage. This work implements 2-D Gabor wavelet transform and adaptive histogram equalization as pre-processing technique and remove the optic disk by morphological operators. This work extracts the features like blood vessels and exudates using discrete wavelet transform and train the system using SVM classifier and stored as training database which is used for perform evaluation. The work achieves a result of 94.88% using Gabor transform and SVM classifier and can be extended when further preprocessing technique is applied.

The work done in [6] is about retinography detection using image processing analysis where retinography can be detected by image processing techniques like Image Enhancement, Segmentation, Image Fusion, Morphology, Classification, and registration. This paper presents a review of image processing technique that can be applied to retinography feature detection. This work describes about the challenges faced and issues during retinography analysis and better algorithms that can be utilized while analyzing. This paper also compares some image processing techniques used for analyzing the retinography helping in choosing a better analyzing algorithm. This work analyzes different algorithm with different input stating a better result for selecting the algorithm based on the selection of input data and it concludes that early diagnosis can reduce 50% of the vision loss and provide hybrid methodology that can determine diabetic retinography accurately.

The work done in [7] describes about the cause of blindness among working-age adults and proposes a convolutional neural network on color fundus images that can recognize diabetic retinography at initial stage. This paper results with 95% validation sensitivity achieved by test metric performance. This work also involves in additional explored multinomial classification modals that help to detect error in the misclassification of mild disease due to CNN incapability in detecting subtle features. This work also extends the results by performing some preprocessing techniques and improves the results some deep learning modals like Google Net and Alex Net from ImageNet modals which helps the authors to reach maximum accuracy.

The work done in [8] is about an investigation of the clinical report for the cause of diabetic retinography where more than ten percent of the people have risk of losing their visibility and also describes that it is a tedious process when machine learning algorithms are used in determining the diabetic retinography. This work discusses about the preprocessing technique like extracting green channel, image enhancement, histogram equalization and

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 04, April-2019

resizing techniques. This paper achieves the result by considering the mean and standard deviation evaluating the result based on three classes namely mild, normal and severe. This paper discusses about seven most significant feature that are to be considered while processing so that better results can be achieved and also acts as a evident that these features can be enough for processing and achieving the results expected. The features used in this study are detailed due to their biological significance and previously reported results and also details the other attributes that can be used such as red lesions, Kapoor entropy, edema as a future scope. The work done in [9] is about the android applications interactivity with the user and advantage of these applications. The author also describes the action that the user will perform and provide the necessary actions to be taken for the users' action. This work also initiated the system by developing a language-based application such that the user will convert a script from one language to another language. This work involves actions performed for the developed application and a case study was also studied for the user input and these study helps in determining a complete picture that the user performs for the developed application. This paper work involves in developing an application on XML language for the user interaction and also provides the advantage of using this language in XML language. This work is completely developed on the basis of session interaction that helps the user to ensure secure data transfer between pages.

The work done in [10] is about an advancement of the mobile application that has enabled features that are found only in android core developed applications. This works involves in the development of application using several platforms or using cross-platform approaches. This approach was developed as Progressive Web Application and these applications are unifying technology for web apps and native apps. This application is developed as two cross-platform mobile apps and one Progressive Web App for comparison purposes which helps in providing an open source repository for results' validity verification. This paper mainly works in traditional mobile application development involving reusability of code between native apps, the web, and mobile platforms and has an advantage of interoperable code bases by avoiding application developed as separate projects and developer environment by support for multiple mobile platforms and operating systems.

III. PROPOSED METHOD OF DRUM

This project aims in the development of an android application that detects diabetic retinography from the fundus image. The application performs some basic preprocessing so that noiseless images are obtained for processing so that better results are achieved. The developed android application is a multiple language application that performs image processing for the given image. The application is divided in to two sengements where is the base platform is developed in a language and other functionalities are developed in a different language so that better performance are achieved. This type are development is called as multi-language application developed where the base platform is of one language and the other processing are of another language.

This project performs a high level development by developing a diabetic retinography image processing android application developed in multi-language. The develped application performs pre-processing, image segmentation, image analysis and update the result based on a threshold value. The process invloves the accessing of the image from the root storage performing pre-processing followed by the image processing technique applied for diabetic retinography. The activity processed required for communication between android activity manager is performed by the base language and the other process required for diabetic retinography is performed as a plugin process by the home language.

IV. EXPERIMENTAL RESULT OF DRUM

A. *Work Flow*

The proposed methodology involves in determining diabetic retinography in multi-language application. The complete process involves in user action over the application.Fig.1 describes the workflow of the application where the application manager takes care of management files required that are accessed during installation and are called during application start-up, Application activity manager takes care of user's action over the application. The tasks that are performed are comprised inside the Execution of Given Task block.

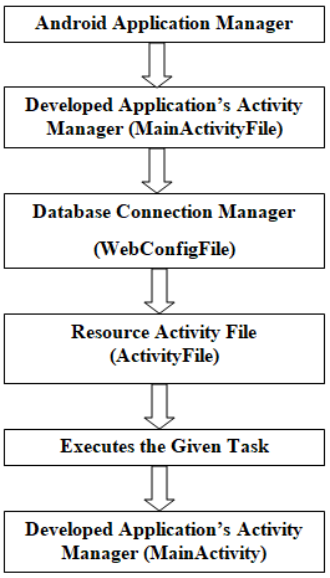

Figure 1 Work Flow of DRUM

B. *Binarization*

Binarization is the process of converting color image into a binary image i.e. 1-bit image. Processing involves in the processing of texture-based information over the image so details over the image are not much needed and it also helps in the processing of removal of unnecessary noise that are present in the image and help in analyzing the image easily. So binarization is applied over the image and this is virtually equivalent to thresholding.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 04, April-2019

C. *Mathematical Morphology*

Mathematical Morphology is the process of analyzing the image in terms of different shape. This simply means that morphology is the process of rotating the shape of image at different angles for analyzing and comparison of with existing image. Morphology has several advantages over other techniques particularly when applied to image processing as it works by determining the shape or the pattern in the given image and it is one of the computational efficient algorithms.

D. *Image Buffer*

Image Buffer helps in retrieve of image if any change of image occurs (i.e. Color to Gray scale image or Gray scale to binary image) or filtering the particle in the image so that if image process fails the process can be restarted from the initial process. This process helps in retrieving the same image by adding this process before the process, which needs the original image i.e. the original image before any changes were made.

E. *Convolution*

Convolution is the method of applying convolution filter over the image to enhance image details. Kernel is a 2D array that contains the convolution matrix applied over the image. The size of the convolution is determined by the size of input image. If the kernel size is less than three rows or three columns, no convolution is performed. Rounding mode is the method used to specify the type of rounding when dividing image pixels. Kernel sum is a normalization factor that is applied to the sum the obtained products. If this value is not equal to 0, the elements internal to the matrix are summed and then divided by this normalization factor.

VI. CONCLUSIONS

The proposed method is used to determine diabetic Retinography developed in a multi-language android application. The developed application works in multiple platforms as a plug-in with a base language. The developed application is developed by considering the user data security and performance effective application. It is also developed as a cost-effective connectivity android application. Since the application supports multiple languages it is backward compactable android application. The developed android application performs as a normal android inbuilt application that gets synchronized with every android update and it also performs multi-processing which are more effective and performable with higher specification.

VII. REFERENCE

[1] Salman Sayed, Dr. Vandana Inamdar, Sangram Kapre, “Detection of Diabetic Retinography using Image Processing and Machine Learning”, 2017, International Journal of Innovative Research in Science, Engineering and Technology, pp. 106–131.

[2] E.Dhiravidachelvi, Dr. V. Rajamani, “Computerized Detection of Optic Disc in Diabetic Retinal Images using Background Subtraction Model”, 2014, International Journal of Innovative Research in Science, p. 72.

[3] Ratikanlaya Tanthuwapathom, Narit Hnoohom, “Detection of Diabetic Retinography Using Image Processing”, 2018, International Journal of Application or Innovation in Engineering & Management, pp. 145–154.

[4] Masoud Khazaee Fadafen, Nasser Mehrshad, Seyyed Mohammad Razavi, “Detection of Diabetic Retinography Using Computational Model of Human Visual System”, 2018, International Journal of Biomedical Research, pp. 523–540.

[5] Sailee M. Shendkar, Prof. Rajashri R. Itkarkar, “Detection of Diabetic Retinography using Image Processing Techniques”, 2016, International Journal of Innovative Research in Computer and Communication Engineering, Vol-4 Issue 8, pp. 523–540.

[6] Muhammad Waseem Khan, “Diabetic Retinography Detection using Image Processing: A Survey”, 2013, International Journal of Emerging Technology & Research, Volume 1 Issue 1, ISSN (E): 2347-5900 ISSN p. 2347-6079.

[7] Carson Lam, Darvin Yi, Margaret Guo, Tony Lindsey, “Automated Detection of Diabetic Retinography using Deep Learning”,2018, AMIA Jt Summits Transl Sci Proc.,.pp.147–155.

[8] Dilip Singh Sisodia, Shruti Nair, Pooja Khobragade, “Diabetic Retinal Fundus Images: Preprocessing and Feature Extraction for Early Detection of Diabetic Retinography”, International Journal of Biomedical and Pharmacology, Vol. 10(2), pp. 615-626 (2017)

[9] Christopher Dong, Xing Liu, “Development of Android Application for Language Studies”, International Journal on Electronic Engineering and Computer Science, 2013, pp. 148–160

[10] Andreas Biørn-Hansen, Tim A. Majchrzak and Tor-Morten Grønli, “Progressive Web Apps: The Possible Web-native Unifier for Mobile Development”, International Conference on Web Information Systems and Technologies, 2017, pp. 335–350.