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SVM BASED METHOD FOR AUTOMATIC DETECTION OF DIABETIC EYE DISEASE USING THERMAL IMAGES

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Abstract: -: One of the big concerns worldwide is diabetic eye disease. This can cause severe deterioration of the eyes, including permanent vision loss. Early detection of eye disorders, by effective treatment, improves the risk of survival. The proposed approach is to explore the technique of machine learning to detect diabetic patients using thermographic images of an eye and to incorporate the effect of thermal variation of abnormality in the eye structure as a diagnostic imaging tool that is helpful for clinical diagnosis by ophthalmologists. Thermal images are pre-processed and then texture characteristics based on the Gray Level Cooccurrence Matrix (GLCM) from gray images are extracted and categorized using a classifier with a variety of features. The gray-level co-occurrence matrix (GLCM), also known as the gray-level spatial dependency matrix, is a statistical method of analyzing texture that considers the spatial relationship of pixels. RGB is the most commonly used color space, and we have already addressed it in past tutorials. RGB stands for red, blue and green. What the RGB model states is that three distinct images actually make up each color image. Blue image, red image, black image. Only one matrix can characterize a normal gray scale image, but a color image is actually made up of three. The HSI color model represents each color with three components: hue (H), saturation (S), intensity (I). Various matrices.

Keywords: *Machine learning, CNN, image processing , Feature extraction*

I INTRODUCTION

Accurate diagnosis has attained in medical procedure by identifying the symptoms using emerging imaging modalities. There are different diagnostic modalities including fluorescein angiography and optical coherence tomography. Fundus Photography is mostly used for the evaluation of diabetic patient eye diseases. The present modalities of medical imaging are invasive and painful for patients as well. Infrared thermography is emerging nonionizing technique which is non-invasive method and is successfully accepted for diagnosis. Thermal imaging modality recently used in breast cancer detection, diabetic foot and various eye diseases such as dry eye, glaucoma, Meibomian gland dysfunction and thyroid eye diseases. Diabetic eye disease is a chronic disease affects various organs of human body including the eye. One of the big concerns worldwide is diabetic eye disease. This can cause severe deterioration of the eyes, including permanent vision loss. Early detection of eye disorders, by effective treatment, improves the risk of survival. The proposed approach is to explore the technique of machine learning to detect diabetic patients using thermographic images of an eye and to incorporate the effect of thermal variation of abnormality in the eye structure as a diagnostic imaging tool that is helpful for clinical diagnosis by ophthalmologists. Thermal images are pre-processed and then texture characteristics based on the Gray Level Cooccurrence Matrix (GLCM) from gray images are extracted and categorized using a classifier with a variety of features. The graylevel co-occurrence matrix (GLCM), also known as the gray-level spatial dependency matrix, is a statistical method of analyzing texture that considers the spatial relationship of pixels. RGB is the most commonly used color space, and we have already addressed it in past tutorials. RGB stands for red, blue and green. What the RGB model states is that three distinct images actually make up each color image. Blue image, red image, black image. Only one matrix can characterize a normal grayscale image, but a color image is actually made up of three

II LITERATURE SURVEY:

1)Paper Name : Blood Vessels Extraction from Retinal Images Using Combined 2D Gabor Wavelet Transform with Local Entropy Thresholding and Alternative Sequential Filter

Authors :Abdullah Biran, Pooya Sobhe Bidari,

Description : The extraction of retinal blood vessels is a primary step in detecting eye disorders that cause blindness, including diabetic retinopathy. It also simplifies other methods for image processing, such as grouping. Since manual extraction is a long task and training is necessary, several automated techniques have been proposed. An algorithm to remove blood vessels from fundus images has been proposed in this paper. The algorithm is based on the Gabor twodimensional filter, the threshold for local entropy and the alternative sequential filter. The approach proposed has been tested using

MATLAB codes on fundus images from the Standardized Study of Retina and Digital Retinal Images for Vessel Extraction (DRIVE) databases. The findings indicate that this mechanism is completely capable of removing blood vessels.

2) Paper Name : A Deep Learning Method for Microaneurysm Detection in Fundus Images.

Authors: Juan Shan

Description : The main cause of blindness in the working-age population is diabetic retinopathy. Microaneurysms are the early symptoms of DR due to leakage from retina blood vessels. However, due to the small size of MA lesions and the poor contrast between the lesion and its retinal history, automatic detection of MA is difficult. For automatic feature extraction and classification problems, especially for image analysis, deep learning strategies have been used recently. For MA detection in Fundus images, a Stacked Sparse Autoencoder, an example of a DL strategy, is presented in this paper. From the original Fundus images, small image patches are created. In order to classify distinguishing characteristics of MA, the SSAE learns highlevel features from pixel intensities alone. To categorize each image patch as MA or nonMA, the high-level characteristics learned from SSAE are fed into a classifier. To include the training/testing data and ground facts, the public benchmark DIARETDB is used. Among the 89 images, a total of 2182 image patches with MA lesions serve as positive data, and a random sliding window operation produces another 6230 image patches without MA lesions to serve as negative data. SSAE learned directly from the raw image patches without any blood vessel removal or complex preprocessing operations, and automatically extracted the distinguishing features to identify the patches using the Softmax Classifier. Using 10-fold cross-validation, an improved Fmeasure 91.3 and an average area under the ROC curve (AFC) 96.2 were achieved by using the fine-tuning operation.

3)Paper Name :A Brief Review of the Detection of Diabetic Retinopathy in Human Eyes Using Pre-Processing Segmentation Techniques

Authors: Yogesh Kumaran, Chandrashekar M. Patil

Description : A brief insight into the identification of DR in human eyes using different forms of segmentation techniques for preprocessing is provided in this research article. Once the retinal nerve fibers are segmented, there are a variety of methods of segmenting the blood vessels found in the retina that can detect whether or not the eyes are affected by diabetic retinopathy. This detection actually depends on the region of the network of the RNFL. If the total area of the nerve fiber is smaller, if the area of the nerve network is greater, it is affected by diabetic retinopathy (DR), therefore the eyes are not affected by diabetic retinopathy and hence it is usual. It is a well-known fact that diabetics have a crucial role in influencing each and every organ in the health of human beings. In the human eye, one such organ. This DR will result in a loss of vision in the human eye as the optic nerve is connected to the brain. In disease-affected images, retinal fundus images are widely used for the identification of disease diagnosis. Raw photos of the retinal fundus are difficult to interpret by machine learning algae.

4)Paper Name :Microaneurysm Detection Using Principal Component Analysis and Machine Learning Methods

Authors : Wen Cao*, Juan Shan

Description : A brief insight into the identification of DR in human eyes using different forms of segmentation techniques for preprocessing is provided in this research article. Once the retinal nerve fibers are segmented, there are a variety of methods of segmenting the blood vessels found in the retina that can detect whether or not the eyes are affected by diabetic retinopathy. This detection actually depends on the region of the network of the RNFL. If the total area of the nerve fiber is smaller, if the area of the nerve network is greater, it is affected by diabetic retinopathy (DR), therefore the eyes are not affected by diabetic retinopathy and hence it is usual. It is a well-known fact that diabetics have a crucial role in influencing each and every organ in the health of human beings. In the human eye, one such organ. This DR will result in a loss of vision in the human eye as the optic nerve is connected to the brain. For the identification of disease analysis in diseaseaffected images, retinal fundus images are widely used. Raw photos of the retinal fundus are difficult to interpret by machine learning algae.

III EXISTING SYSTEM:

It is prospective approach for evaluating treatments clinical consequence to identity the symptom responders and non-respondents to the treatments by means of the response analysis. Meibomian gland syndrome (MGD) patients has higher margin temperature in eyelid part. The temperature ratio is calculated by the 8 region of interest in the margin of eyelid

IV PROPOSED SYSTEM:

The proposed system uses supervised machine learning techniques to classify the thermal images of an eye into “Normal” or “Diabetic Diseased Eye”.The color conversion model is very important to extract the required features.

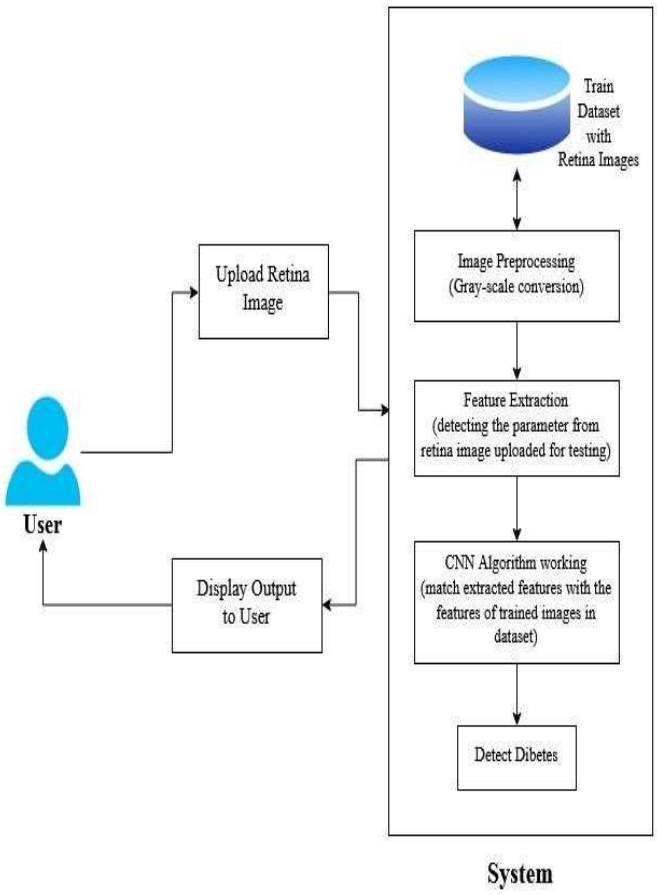
In this work, two conversion such as RGB to Gray and RGB to HSI are done and RGB, Gray and HSI color model are used as an input images for feature extraction module. Feature Extraction is the most important step in the analysis of images.

It is a process of gathering distinguishable information from the image itself from an object or group of objects. The system focuses on a tool that can be used in the localized language to

overcome this limitation, to support local patients in their native language. The native language provided would be English, Hindi and Marathi.

The system is divided into four modules Registration of Profile, Base Input, Symptom analyzer, and Recommendation algorithm. Recommendation algorithm is used for consultancy on healthcare issues. Machine learning algorithms are used to train the system for classifying the disease on basis of symptoms.

V SYSTEM ARCHITECTURE DIAGRAM:



VI CONCLUSION:

In the proposed work, a non-invasive procedure has been presented to evaluate the presence of diabetic diseases in the eye. The classification of diabetic diseased and normal eye IR images is done through Support Vector Machine classifier using various combination of texture and statistical features The simulation results indicate that the classifier in the detection of diabetic diseased eye performed in the accepted level and provide accuracy, sensitivity SVM classifier. A non-invasive procedure has been presented in the proposed work to evaluate the presence of diabetic diseases in the eye.

The classification of diabetic diseased and normal eye IR images is carried out using different combinations of texture and statistical characteristics through the Support Vector Machine classifier The simulation results indicate that the classifier performs at the accepted level in the detection of diabetic diseased eye and provides accuracy, sensitivity, specificity using the SVM classifier

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