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Detection of Diabetic Retinopathy Using Colour Fundus Images

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Abstract: **The blood vessels are the part of the circulatory system that transports blood throughout the human body. There are three major types of blood vessels: the arteries, which carry the blood away from the heart; the capillaries which enable the actual exchange of water and chemicals between the blood and the tissues; and the veins, which carry blood from the capillaries back toward the heart. Blood vessels in images of the fundus Retinal blood vessel morphology can be an important indicator for diseases such as diabetes In this paper, we address the problem of identifying blood vessel segmentation and exudates segmentation.in this method we also used cany edge detection and neuro fuzzy classifier. Median filtering is used to remove blood vessels and bright regions other than the OD that affect segmentation.in this project contrast limited adaptive histogram equalization. Here median filter is used for getting exudates without noise. The segmentation technique is widely used by the radiologists to segment the input medical image into meaningful regions.**

Keywords: **Contrast Limited Adaptive Histogram Equalization, Neuro Fuzzy classifier.**

I. INTRODUCTION

The main objective of this project is earlier detecting the blood vessels and exudates segmentation. Normally the anatomy of the Blood vessels can be viewed by the MRI scan or CT scan. In this paper the MRI scanned image is taken for the entire process. The MRI scan is more comfortable than CT scan for diagnosis. It does not affect the human body. Because it does not use any radiation. It is based on the magnetic field and radio waves. There are different types of algorithm were developed for blood detection. But they may have some drawback in detection and extraction. In this paper, two algorithms are used for segmentation. So it gives the accurate result for vessels segmentation. Vessels are due to the uncontrolled growth of the tissues in any part of the body. The vessels may be primary or secondary. If it is an origin, then it is known as primary. Normally blood vessels affect OD (Optic disk). The physician gives the treatment for the vessels rather than the treatment for exudates. So detection of vessels is important for that treatment. The lifetime of the person who affected by the blood vessels will increase if it is detected at current stage. That will increase the lifetime about 1 to 2 years.

Normally exudates are of two types. They are soft edge and hard edge. The detection of the soft edge is somewhat difficult to hard edge. For the accurate detection of the hard edge that needs a CLAHE and NF classifier tool. Image segmentation plays a major role in the field of biomedical applications. The segmentation technique is widely used by the radiologists to segment the input medical image into meaningful regions Clustering is one of the widely used image

Segmentation techniques which classify patterns in such a way that samples of the same group are more similar to one another than samples belonging to different groups. Neuro classifier Image segmentation plays a major role in the field of biomedical applications.

The segmentation technique is widely used by the radiologists to segment the input medical image into meaningful regions .Clustering is one of the widely used image segmentation techniques which classify patterns in such a way that samples of the same group are more similar to one another than samples belonging to different groups. Neuro classifier processing and visualization of medical images is a rapidly growing area of research and MRI has provided a means for imaging tissue at very high resolutions providing the desired information for use in fields like reparative surgery,

radiotherapy treatment planning, stereotactic neurosurgery, and others. This project focuses on detection of soft edge detection. The developing platform for the detection is mat lab. Because it is easy to develop and execute. At the end, this method is providing systems that detect the blood vessels and its shape.

II. RELATED WORK

Rajalakshmi.N, Dr.LakshmiPrabha V [1] proposed the recent researches of computer-aided diagnosis (CAD) systems for automatic detection of brain diseases. It is intended to summarize and compare the methods of automatic detection of brain tumor through Magnetic Resonance Image (MRI) used in different stages of Computer Aided Diagnosis System. an extensive comparative analysis is performed to provide the merits and demerits of various available techniques.

Islam, A, Reza, S.M.S, Iftekharuddin, K.M [2] proposed a model for characterizing tumor texture in brain magnetic resonance (MR) images is proposed. The efficiancacy of the model is demonstrated in patient-independent brain tumor texture feature extraction and tumor segmentation in magnetic resonance images (MRIs). Due to complex appearance in MRI, brain tumor texture is formulated using a multiresolution-fractal model known as multifractional Brownian motion (mBm). Furthermore, novel patient-independent tumor segmentation scheme is proposed by extending the well-known Gadabouts algorithm.

Rohit S.Kabade, Gaikwad M. S [3] proposed a model in which a simple algorithm for detecting the range and shape of tumor in brain MR Images is described. Generally, CT scan or MRI that is directed into intracranial cavity produces a complete image of brain. This image is visually examined by the physician for detection and diagnosis of brain tumor. To avoid that, this project uses computer aided method for segmentation (detection) of brain tumor based on the combination of two algorithms. This method allows the segmentation of tumor tissue with accuracy and reproducibility comparable to manual segmentation. In addition, it also reduces the time for analysis

Matthew C. Clark, Lawrence O. Hall, Dmitry B. GoldgofRobert Velthuizen, F. Reed Muztagh, and Martin S. Silbiger [4] the author proposed the FUZZY C-MEANS algorithm which is used for image segmentation and detecting the tumor objects that are found in the MR brain image. The brain is a highly specialized organ. It serves as the control center for functions of the body. Words, actions, thoughts, and feelings are centered in the brain. A color based segmentation method that uses the k-means clustering technique is to track the tumor objects in the Magnetic Resonance (MR) brain images. The key concept in color-based segmentation algorithm with K-means is to convert a given gray-level MR image into a color space image and then separate the position of tumor objects from other items of an MR image by using K-means clustering and histogram-clustering.

Zacharaki, E.I, Bezerianos. A [5] the author introduces a novel for abnormality detection and segmentation in medical images. In abnormality detection, a vector is characterized as anomalous if it does not comply with the probability distribution obtained from normal data. The estimation of the probability density function, however, is usually not feasible due to large data dimensionality. In order to overcome this challenge, it treats every image as a network of locally coherent image partitions by overlapping blocks. It formulate and maximize a strictly concave likelihood function estimating abnormality for each partition and fuse the local estimates into a globally optimal estimate that satisfies the consistency constraints, based on a distributed estimation

III. METHODOLOGY

A. K-Means Clustering Algorithm:

K-Means Clustering is one of the simplest unsupervised learning algorithms that solve the well known clustering problem. The procedure follows a simple and easy way to classify a given data set through a certain number of clusters (assume k clusters) fixed a priori. The main idea is to define k centroids, one for each cluster. So, the better choice is to place them as much as possible far away from each other. The next step is to take each point belonging to a given data set and associate it to the nearest centroid. When no point is pending, the first step is completed and an early group age is done. At this point it is necessary to re-calculate k new centroids as bar centers of the clusters resulting from

The previous step. After obtaining these k new centroids, a new binding has to be done between the same data set points and the nearest new centroid. A loop has been generated. As a result of this loop, one may notice that the k centroids change their location step by step until no more changes are done. In other words centroids do not move any more. Finally, this algorithm aims at minimizing an objective function, in this case a squared error function

Following are the Steps for executing K-Means Algorithm:

1. Give the no of cluster value as k.
2. Randomly choose the k cluster centres.
3. Calculate mean or center of the cluster.
4. Calculate the distance b/w each pixel to each cluster center.
5. If the distance is near to the center then move to that cluster.
6. Otherwise move to next cluster.
7. Re-estimate the center.
8. Repeat the process until the center doesn't move.

In FCM Clustering method, the entire image is splitter into two halves by which each row and column is divided by two. The mean value and Euclidean distance for the first portion of the image is found similar to the K-means method. Similarly the Euclidean distance and mean for the second portion of the image is found and these steps are repeated for both the portions as above until a high intensity value is obtained for both the clusters.

This algorithm is examined to analyze based on the distance between the various input data points. The clusters are formed according to the distance between data points and cluster centers are formed for each cluster. The Algorithm Fuzzy C-means (FCM) is a method of clustering which allows one piece of data to belong to two or more clusters.

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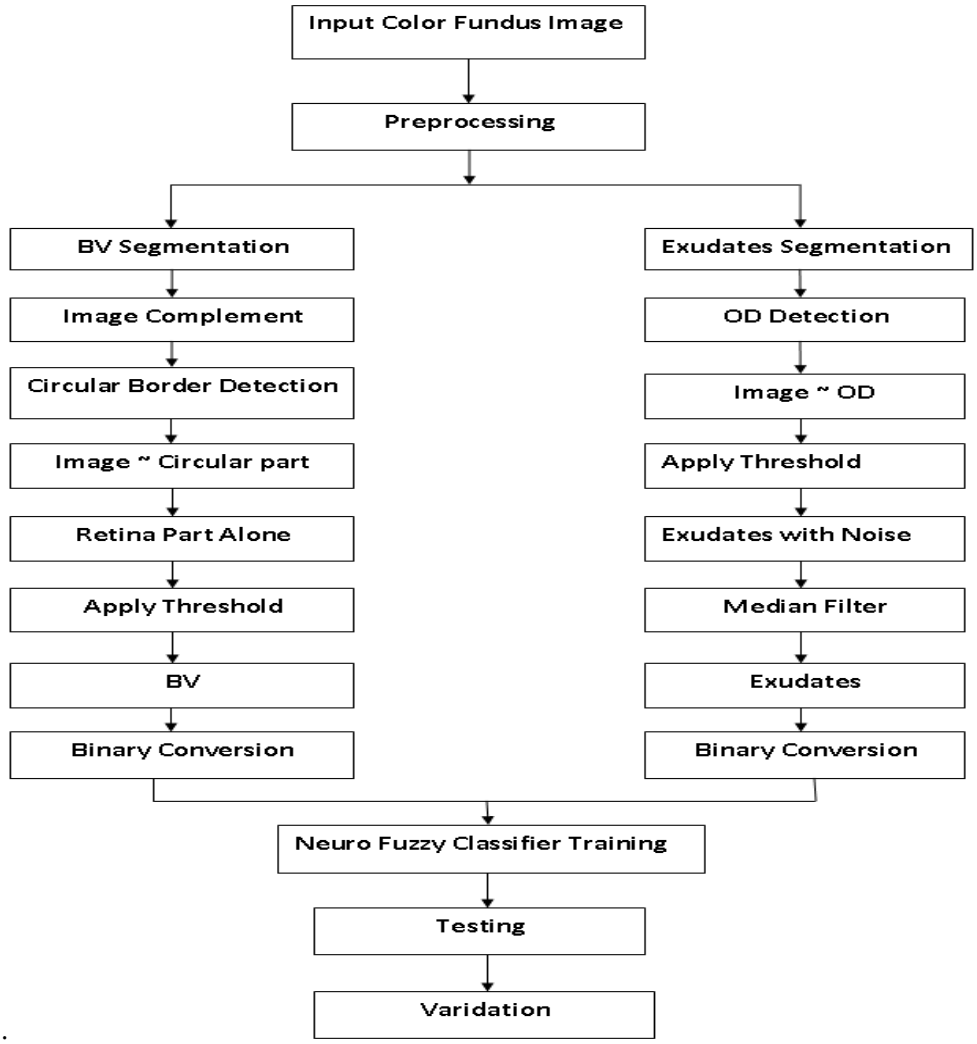
Fuzzy clustering plays an important role in solving problems in the areas of pattern recognition and fuzzy model identification. A variety of fuzzy clustering methods have been proposed and most of them are based upon distance criteria. It uses reciprocal distance to compute fuzzy weights. A more efficient algorithm is the new FCFM (The fuzzy clustering and fuzzy merging).

In future enhancement another algorithm called Expectation minimization can be proposed to develop a module which is will be more accurate than the Fuzzy c-means algorithm, where the accuracy of finding the normally exudates are of two types. They are soft edge and hard edge. The detection of the soft edge is somewhat difficult to hard edge. For the accurate detection of the hard edge that needs a CLAHE and NF classifier tool. Image segmentation plays a major role in the field of biomedical applications. The segmentation technique is widely used by the radiologists to segment the input medical image into meaningful regions Clustering is one of the widely used image. Segmentation techniques which classify patterns in such a way that samples of the same group are more similar to one another than samples belonging to different groups. Neuro classifier Image segmentation plays a major role in the field of biomedical applications. This algorithm is examined to analyze based on the distance between the various input data points. The clusters are formed according to the distance between data points and cluster centers are formed for each cluster. The Algorithm Fuzzy C-means (FCM) is a method of clustering which allows one piece of data to belong to two or more clusters. This algorithm is examined to analyze based on the distance between the various input data points. The clusters are formed according to the distance between data points and cluster centers are formed for each cluster.

Comparison results show that the FCM Clustering is best when comparing K-Means Clustering. As primary. Normally blood vessels affect OD (Optic disk). The physician gives the treatment for the vessels rather than the treatment for Similarly the Fuzzy C-means algorithm is useful in extracting the malignant tumors and thresholding of output in feature extraction. The experimental results are compared with other algorithms for the better results. The proposed method gives us the accurate result.



Realities of tumor will be greater than 95%

IV. RESULTS AND DISCUSSION

A. Simulation result for input image:

The input image is taken as sample from the database. Input images can be of different types, such as

1. Normal input image and

2. Abnormal input image.

Input image should be an MRI brain image and should be of proper dimension as shown in Fig.3

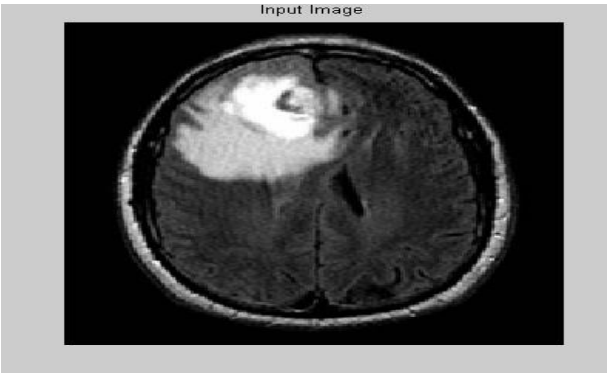


Fig.3 Input image taken for sample

B. Simulation result for denoised image:

This stage of output as shown in Fig.4 is obtained from the pre-processing stage of input image. In pre-processing the de noising technique is implemented. To remove the unwanted noise signals from the input MR image

C. Simulation result for K-Means clustering:

The K-Means Clustering output as shown in Fig.5 is mainly suited for mass tumour detection. Feature extraction results such as Mean square error, Signal to noise ratio, Peak signal to noise ratio can be calculated from this result. By determining the sensitivity, Specificity the Accuracy values can be obtained-Means Clustering output is not accurate.

A text message gets displayed if the image is said to be normal or abnormal. Feature extraction results such as Mean square error, Signal to noise ratio, Peak signal to noise ratio can be calculated from this result. A text message gets displayed if the image is said to be normal or abnormal. Feature extraction results such as Mean square error, Signal to noise ratio, Peak signal to noise ratio can be calculated from this result. A text message gets displayed if the image is said to be normal or abnormal. Feature extraction results such as Mean square error, Signal to noise ratio, Peak signal to noise ratio can be calculated from this result.

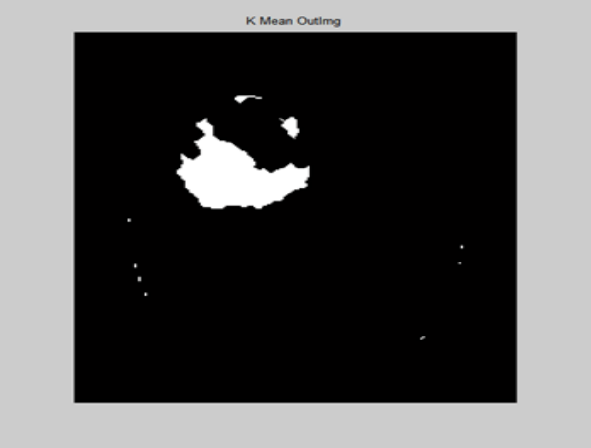


Fig.5 Output of K-Means Algorithm

D. Simulation result for Fuzzy C-Means clustering:

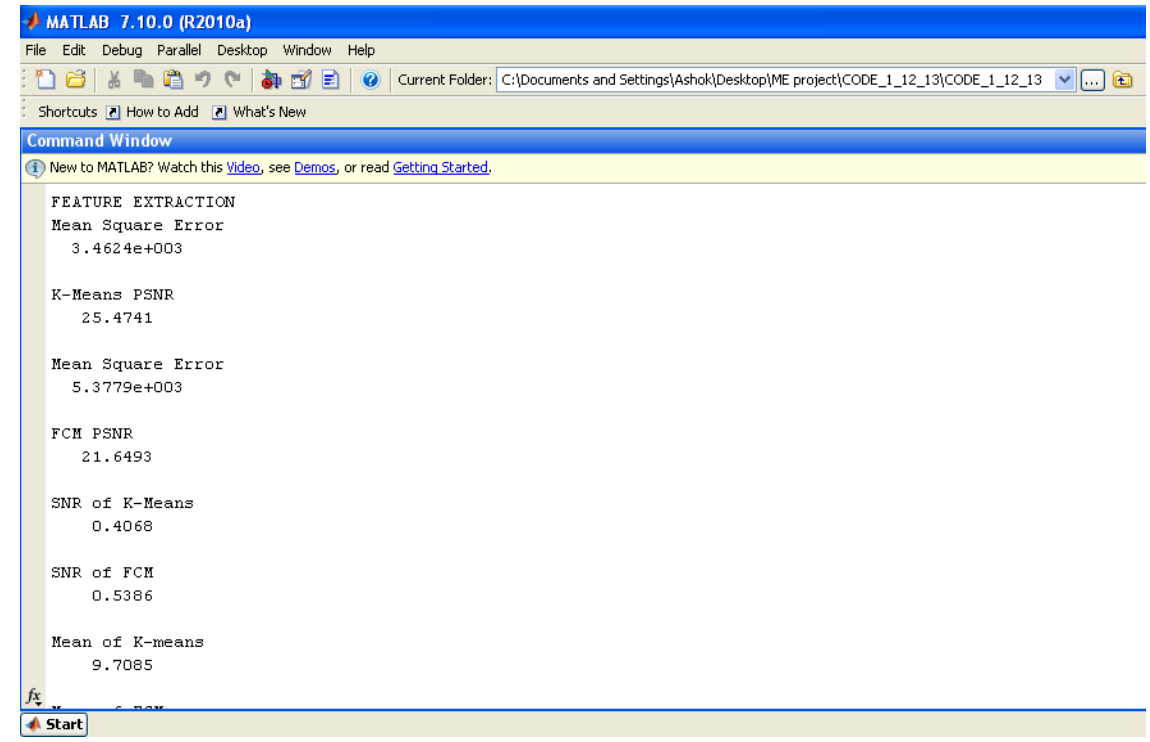
From the FCM result it is clear from the Fig,6, that if the accuracy is greater than 90% it is evident that the brain image is said to be abnormal. A text message gets displayed if the image is said to be normal or Abnormal. Feature extraction results such as Mean square error, Signal to noise ratio, Peak signal to noise ratio can be calculated from this result. Comparison results show that the FCM Clustering is best when comparing K-Means Clustering. As primary. Normally blood vessels affect OD (Optic disk). The physician gives the treatment for the vessels rather than the treatment for Similarly the Fuzzy C-means algorithm is useful in extracting the malignant tumours and thresholding of output in feature extraction. The experimental results are compared with other algorithms for the better results. The proposed method gives us the accurate result. The results show us the fuzzy c-means is more accurate than the k

Fig.6 Output of FCM Algorithm

E. Feature selection result of K-Means and Fuzzy C-Means Algorithm:

Mean square error determines the Number of error pixels from the sample taken from the observation the FCM shows more error pixels than K-Means.PSNR is most easily defined via the mean squared error (MSE).The SNR and PSNR are used to measure the quality of an image after the reconstruction. So, the larger the standard deviation, the better the result**.** With higher specificity, fewer healthy portions are labelled as abnormal. With higher sensitivity, fewer actual cases of tumours go undetected; hence sensitivity should be high as shown in Fig.7.

Similarly the Euclidean distance and mean for the second portion of the image is found and these steps are repeated for both the portions as above until a high intensity value is obtained for both the clusters. This algorithm is examined to analyze based on the distance between the various input data points. The clusters are formed according to the distance between data points and cluster centers are formed for each cluster. The Algorithm Fuzzy C-means (FCM) is a method of clustering which allows one piece of data to belong to two or more clusters.



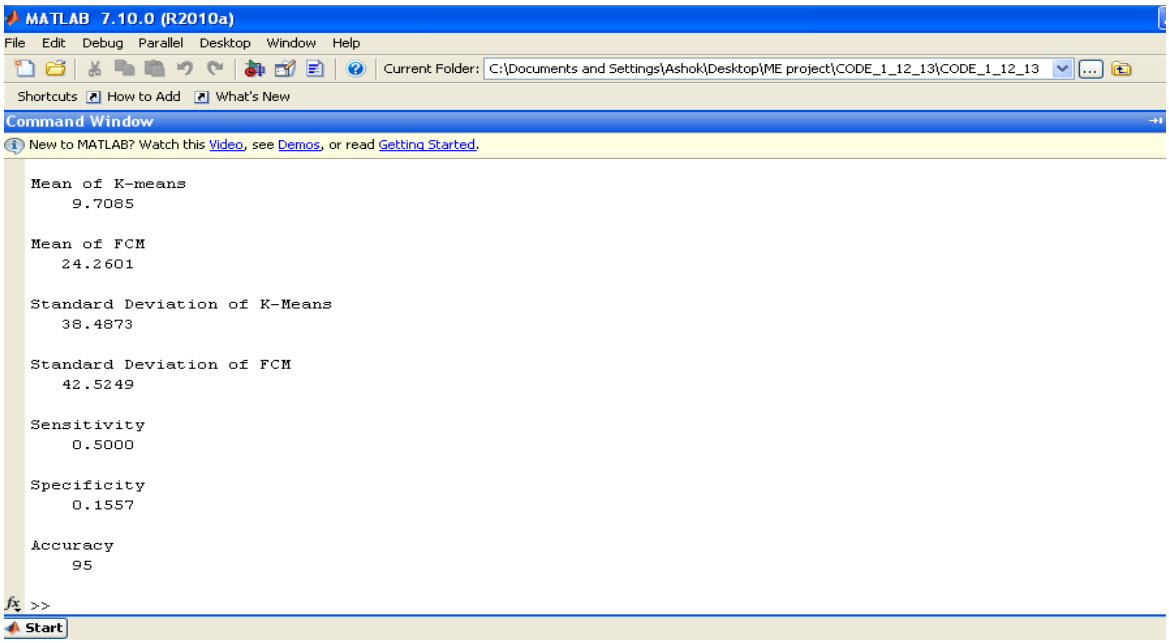


Fig.7. Feature selection result of K-Means and Fuzzy C-Means Algorithm

V. CONCLUSION

Different types of tumors are available such as Mass in brain or Malignant over the brain. Mass tumors can be found easily by K-means algorithm, if there is any noise present in the image it is found easy by K-means. Similarly the Fuzzy C-means algorithm is useful in extracting the malignant tumors and thresholding of output in feature extraction. The experimental results are compared with other algorithms for the better results. The proposed method gives us the accurate result. The results show us the fuzzy c-means is more accurate than the k-

In future enhancement another algorithm called Expectation minimization can be proposed to develop a module which is will be more accurate than the Fuzzy c-means algorithm, where the accuracy of finding the abnormalities of tumor will be greater than 95%.

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