"Brain Tumor Detection from MRI Images By Using Segmentation &SVM"

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Abstract- The Brain Tumor is affecting many people worldwide. It is not only limited with the old age people but also detected in the early age. Brain Tumor is the abnormal growth of cell inside the brain cranium which limits the functioning of the brain. in this paper we are using K-Means segmentation with preprocessing of image. Which contains denoising by Median filter and skull masking is used. Also we are using object labeling for more detailed information of tumor region. To make this system an adaptive we are using SVM (Support Vector Machine), SVM is used in unsupervised manner which will use to create and maintain the pattern for future use. Also for patterns we have to find out the feature to train SVM. For that here we have find out the texture feature and color features. It is expected that the experimental results of the proposed system will give better result in comparison to other existing systems.

Keywords- K-Means algorithm, Object Labeling Algorithm, Image segmentation.

I. INTRODUCTION

It is an important to find out tumor from MRI images but it is somewhat time-consuming and difficult task sometime performed manually by medical experts. Large amount of time was spent by radiologist and doctors for identification of tumor and segmenting it from other brain tissues. However, exact labeling brain tumors is a time-consuming task, and considerable variation is observed between doctors [2]. Subsequently, over the last decade, from various research results it is being observed that it is very time consuming method but it will get faster if we use image processing techniques [3]. Primary brain tumors do not spread to other body parts and can be malignant or benign and secondary brain tumors are always malignant. Malignant tumor is more dangerous and life threatening than benign tumor.

The benign tumor is easier to identify than the malignant tumor. Also the first stage tumor may be malignant of benign but after first stage it will change to dangerous malignant tumor which is life threatening [12]. Different brain tumor detection algorithms have been developed in the past few years. Normally, the automatic segmentation problem is very challenging and it is yet to be fully and satisfactorily solved. The main aim of this system is to make an automated system for detecting and identifying the tumor from normal MRI. It takes into account the statistical features of the brain structure to represent it by significant feature points. Most of the early methods obtainable for tumor detection and segmentation may be largely divided into three groupings: region-based, edge-based and fusion of region and edge-based methods. Well known and broadly used segmentation techniques are K-Means clustering algorithm, unsupervised method based on neural network classifier [4]. Also, the time spent to segment the tumor is getting condensed due to the detailed demonstration of the medical image by withdrawal of feature points. Region-based techniques look for the regions satisfying a given homogeneity standards and edge based segmentation methods look for edges between regions with different characteristics [5].

II. LITERATURE REVIEW

Swapnil r. Telrandheet.al: In this Technique, we implemented an automated system for brain tumor detection, the main functionality of this system is divided in some parts are Segmentation, Object Labeling, HOG (Histogram Oriented Gradient), feature extraction and linear SVM implementation. For Segmentation we are using K-means algorithm, for Object Labeling HOG is use, HOG also use to extract texture feature, shape context feature and color feature. Then we are implementing the SVM based on this feature we can train the SVM and further test is on other infected MRI images.

Ashwini a. Mandweet.al: A tumor is a mass of tissue that's formed by an accumulation of abnormal cells. Normally, the cells in your body age, die, and are replaced by new cells. With cancer and other tumors, something disrupts this cycle. Tumor cells grow, even though the body does not need them, and unlike normal old cells, they don't die. As this process goes on, the tumor continues to grow as more and more cells are added to the mass. Image processing is an active research area in which medical image processing is a highly challenging field. Brain tumor analysis is done by doctors but its grading gives different conclusions which may vary from one doctor to another. In this project, it provides a foundation of segmentation and edge detection, as the first step towards brain tumor grading. Current segmentation approaches are reviewed with an emphasis placed on revealing the advantages and disadvantages of these methods for medical imaging applications.

Shubhangi s. Veeret.al An attempt has been made to summarize segmentation techniques which are useful for separation of tumor region from brain tumor MRI images. By selecting a proper segmentation technique, it is possible to segment tumor region accurately, which helps in measuring the area of tumor region from brain tumor MRI image. This is possible by using digital image processing tool. Digital image processing is useful for CT scan, MRI, and Ultrasound type of medical images. Digital image processing improves the quality of these medical images using various enhancement techniques. From this enhanced image the radiologist can easily identify infected region and its location. Digital image processing also able to separate out infected region from MRI

or CT scan images easily which helps radiologist for diagnoses of the disease at earlier stage.

Sonam s. Gavhandeet.al The image processing is an important aspect of medical science to visualize the different anatomical structures of human body. Sometimes it is very difficult or impossible to detect or visualize such hidden abnormal structures by using simple imaging. For such abnormalitical structures, some planar imaging methods are helpful. One of the significant techniques for examining human body is the Magnetic Resonance Imaging (MRI). It is useful for distinguishing and clarifying the neural architecture of human brain. Magnetic resonance imaging (MRI) technique is one of the many imaging modalities that are available to scan and capture the internal soft tissue structures of the body. This paper describes the proposed strategy to detect & extraction of brain tumor from patient's MRI scan images of the brain. It includes some noise removal functions, segmentation and morphological operations which are the basic terms of image processing. By using MATLAB software we can detect and extract tumor from MRI scan images of the brain.

R.Muthukrishnan, et.al Proposed brain tumor detection in which Segmentation separates an image into its component regions or objects. Image segmentation it needs to segment the object from the background to read the image properly and classify the content of the image carefully. In this framework, edge detection was an important tool for image segmentation. In this paper their effort was made to study the performance of most commonly used edge detection techniques for image segmentation and also the comparison of these techniques was carried out with an experiment.

M.Saritha et.al,Proposed approach by integrating wavelet entropy based spider web plots and probabilistic neural network for the classification of Brain MRI. The proposed technique uses two steps for classification i.e. Wavelet entropy based spider web plot for feature withdrawal and probabilistic neural network for classification. The obtained brain MRI, the feature extraction was done by wavelet transform and its entropy value was calculated and spider web plot area calculation was done. With the help of entropy value classification using probabilistic neural network was calculated. Probabilistic neural network provides a general solution for pattern classification problem and its classification accuracy is about 100%.

III. EXISTING METHODOLOGY

3.1Image Processing techniques are used to detect tumor that has mainly following steps – Pre Processing, segmentation, Feature Extraction and Classification. The flowchart of the steps followed in tumor detection and classification is shown in figure

1. Initial stage includes collection of MRI samples. MRI has different weighted images T-1 Weighted, T2 Weighted and Flair -Weighted

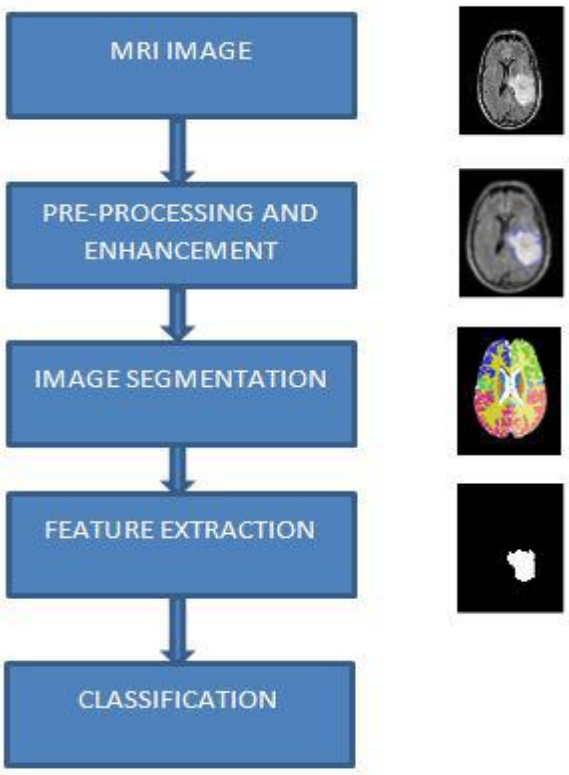


Fig.1: Steps for image processing

This is the first step of image processing it is used to enhance the chances of detecting the suspicious region. Finer details of

the image are enhanced and noise is removed from the image. Clinical MRI when corrupted by noise reduces the accuracy of the image. Various filters are used to remove this noise . Anisotropic filter is used to remove background noise, weighted median filter is used to remove salt and pepper noise. Wavelet based de-noising method makes wavelet and scaling coefficient biased.

3.2 K-MEANS SEGMENTATION

K-Means is the one of the unsupervised learning algorithm for clusters. Clustering the image is grouping the pixels according to the some characteristics. In this paper input image is converted into Standard format 512 X 512, then find the total no. of pixels using Length = Row X Column. Then covert 2D image into 1D and create no. of clusters depend on user. The k-means algorithm initially it has to define the number of clusters k . Then k-cluster centre are chosen randomly. The distance between the each pixel to each cluster centres are calculated. The distance may be of simple Euclidean function. Single pixel is compared to all cluster centres using the distance formula.The pixel is moved to particular cluster which has shortest distance among all. Then the centroid is re-estimated. Again each pixel is compared to all centroids. The process continuous until the centre converges.

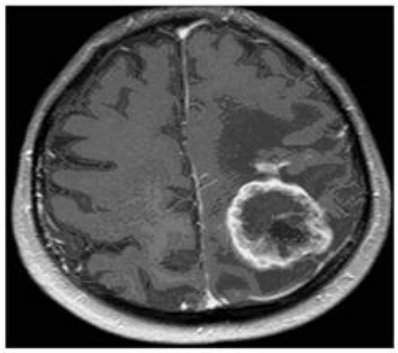
(a)Actual image of Brain tumor (Colored image)

(b)Cluster segmentation 1(Index based)

3.3Non-Linear SVM

In the above discussed cases of SVM classifier. Straight line or hyper plane is used to distinguish between two classes. But datasets or data points are always not separated by drawing a straight line between two classes. For example the data points in the below figure 7. It can't be separable by using above SVMs discussed. So, Kernel functions are used with SVM classifier. Kernel function provides the bridge between from nonlinear to linear. Basic idea behind using kernel function is to map the low dimensional data into the high dimensional feature space where data points are linearly separable [15]. A pattern gratitude network, which is a feed-backward network with tan sigmoid transfer functions in both the hidden layer and the output layer, is used. The network has only one output neuron, as there are 24 input vectors. The hidden layer neurons are 100 and the learning rate is 0.1. The momentum factor is 0.9 and total numbers of epochs are 500. The error is minimized by 0.001 and the performance of the classifier is evaluated by calculating accuracy

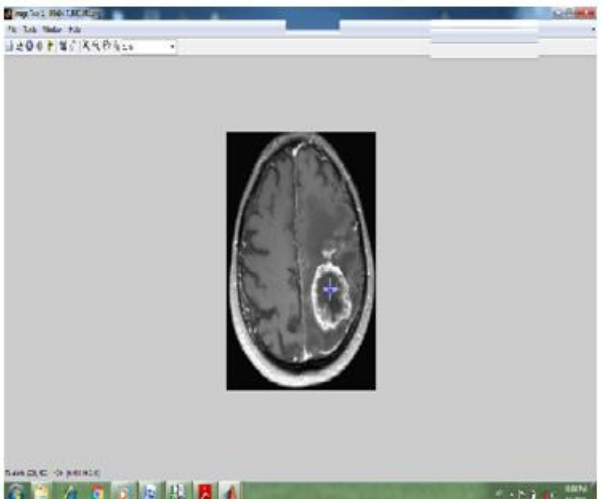
Actual image



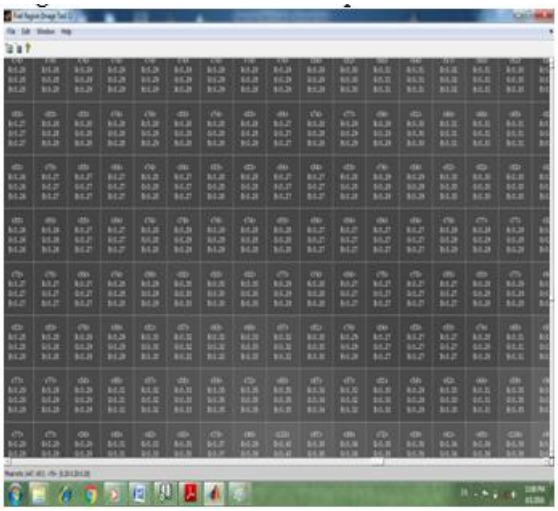
Tumor region

IV. RESULTS AND DISCUSSION

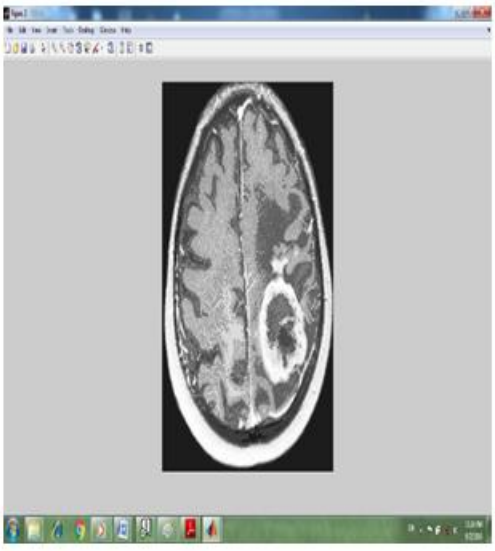
The test of projected technique to discover and segment brain tumor is performed using MR images of diverse longsuffering. Each test image has brain tumor of diverse size, shape and intensity. Manual examination is used to check the correctness of automated segmented tumor area. The experimental result for different MR images containing tumor of different shapes, sizes and intensities.



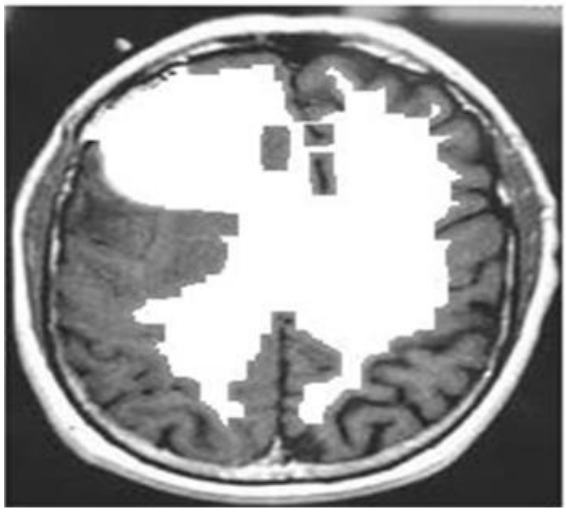
Pixels of image



MRI image of Brain



Noisy image in tumor



Object boundaries superimposed

V. CONCLUSION

Brain tumor detection is done by preprocessing which is first step in that median filter and by using diagonal, ant diagonal masks segmented images get preprocessed and skull masking is done here. After skull masking fatty tissues and other unwanted details get smoothen. Preprocessed image is segmented with the K-Mean segmentation and Object Labeling with HOG, HOG is friendly with feature extraction. So the texture feature and color feature are extracted here in the system which is use to find out the region of interest and SVM is use for pattern mapping and pattern matching process. Also use to learn Neural Network. Image processing has become a very important task in today's world. Today applications of image processing can be originate in number of areas like medical, remote sensing, electronics and so on. If we focus on medical applications, and image segmentation is widely used for diagnosis purpose. In this paper, we have proposed a system that can be used for segmentation of brain MR Images for Detection and identification of brain tumor. We find area of tumor and its type of tumor. Future scope for detection and segmentation of brain tumor is that if we obtained the three dimensional image of brain with tumor then we can also find out its tumor size and also can evaluate its tumor type and also its stage of tumor.

VI. REFERENCES

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