A Novel Biomedical Image Classification Using Kernel Support Vector Machine

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Abstract- ***An accurate and automated type classification of MRI scan based brain images is more extremely important during medical analysis and interpretation of brain. From over past decade various methods have already been implemented. In this Project, we can used a novel method for the classification of a given MRI brain scan image as normal or abnormal. The proposed method that was first perform wavelet transform to extract original features from MRI scanned images, In next step we can apply principle component analysis in order to reduce the dimensions of features. Those features are submitted to a kernel support vector machine (KSVM) for classification of Brain Images for normal and abnormal. The strategy of K-fold stratified cross validation was wont to enhance generalization of KSVM.***

Indexed Terms- Tumor, Digital Signal Processing, Matlab, Gesture MRI Scan. Vector Machine. Kernel.

I. INTRODUCTION

Brain is the most vital part of the body and the center of the human central nervous system. It is made up of nerve cells numbered approximately 50-100 billion forming a gigantic neural network that receives and transmit messages through nerves and controls all the parts of our body. Each cell has their own special function. Many of the cells in the body grow and divide to form a new cell for proper functioning of the human body. As the brain is made up of many cells when the cells grow old and damaged cells die, new cells replace them. Sometimes damaged cells don't die. It gives rise to extra cells which form a mass of tissue called a tumor. The process of growing abnormal tissues in any part of the brain is called a brain tumor.

Broadly tumors are divided into malignant and benign tumors. Benign tumors do not spread quickly over the body as they grow slowly. But as they slowly increase in their size and they can able to cause some pressure on brain and interfere with bodily and mental functions. These tumors can be removed by surgical process and there is less chance of growing again. Malignant tumors grow faster than the benign tumors and it may spread all over the brain and it may also enter the spine. These tumors have a chance of recurring even after the removal of the tumor. To eliminate the noise present in the image filtering method is used. When the image is converted into gray scale images some noise is added to the image. Thus it is essential to use a filtering method to remove unwanted noise. The filtering method removes noises like salt and pepper noise. The image which acquired may have a low contrast. So in order to increase the contrast of an image, enhancement techniques are applied on the image.

II. LITERATURE SURVEY

There are many existing systems that are in existence is helpful to make this project. Some of those existing systems helped us to get an idea for this project. Some of the works that were carried out previously are:

A. IMAGE ACQUISITION:

first stage of this system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks required today [1].

B. IMAGE ENHANCEMENT :

Image enhancement is the process of adjusting digital photos so that the results are more suitable to display further image analysis. For an example, you can remove noise, brighten or sharpen an image, making it easy to identify important features.

C. IMAGE RESTORATION :
The concept of the image restoration is the process of removal or reduction of degradations that are can be included during the acquisition of images. e.g: pixel value 6errors, Noise, camera motion blurring or out of focus blurring using more knowledge of the degradation phenomenon.

D. COLOR IMAGE PROCESSING :
The human visual system can be distinguish in to hundreds of thousands of different color intensities and shades , but it can be stick to only around 100 shades of grey. That's why, in an image, a great deal of extra data may be contained in the color, and extra data can then be used to more simplify image analysis process, e.g. identification and extraction of image based on color.

III. SYSTEM OVERVIEW

First we need to train the kernel sum with many brain MRI scanned images. So, on applying wavelet transform to the image we get many features from image. For further analysis, these feature vectors are of huge number. To reduce these feature vectors, PCA is applied there by we get the reduced dimensions of the feature vectors. Later we save the results. In this way, the same procedure is applied to many brain MRI scanned images.

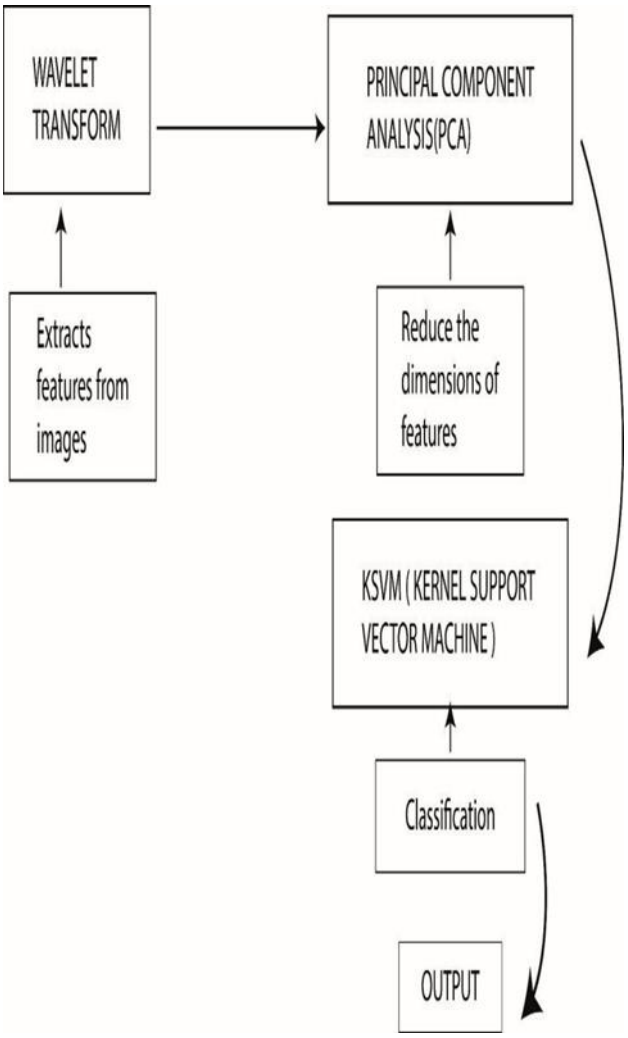
In this classification stage, a new MRI image is given to sum to verify whether the image consists of benign tumor or malignant tumor. Our system gives the accurate or exact results. The system overview is shown in figure.

The main blocks of system overview are

A. Wavelet Transform :
Wavelet transform itself represents the next logical step known as windowing technique with variable size. Which can preserves both frequency and time information of that signal.

B. Extract features from image:
The most conventional tool of signal analysis is Fourier transform, which breaks down a time domain signal into constituent sinusoids of various frequencies, thus, transforming the signal from time domain to frequency domain.

C. Kernel SVM:
The introduction of support vector machine (SVM) is a landmark in the field of machine learning. Advantages of kernel include high elegant, accuracy mathematical direct geometric interpretation



IV. DESIGN METHODOLOGY

The design methodology consists of mainly five steps and these steps are given below

Step 1: The given MRI image of the brain is in black and white form which is converted into gray level image.
Step 2: The noises are removed using a filtering

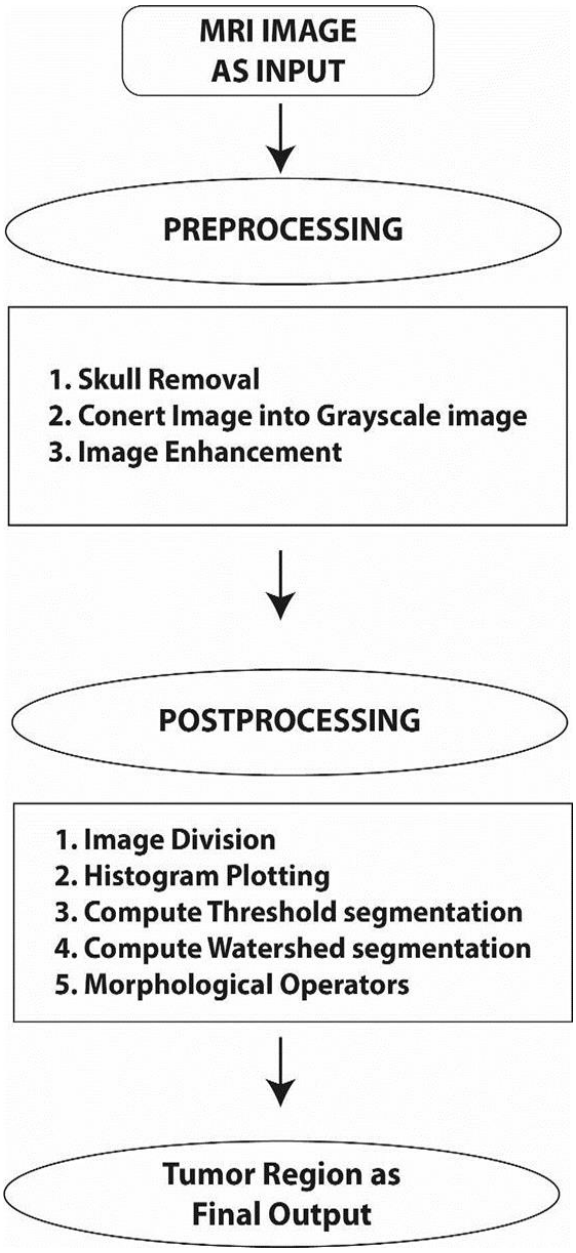
method.

Step 3: Pre-processing (including feature extraction and feature reduction).

Step 4: Post- processing (Training the kernel SVM).

Step 5: Submit new MRI brains to the trained kernel SVM, and output the prediction

V. FLOW CHART



VI. RESULTS

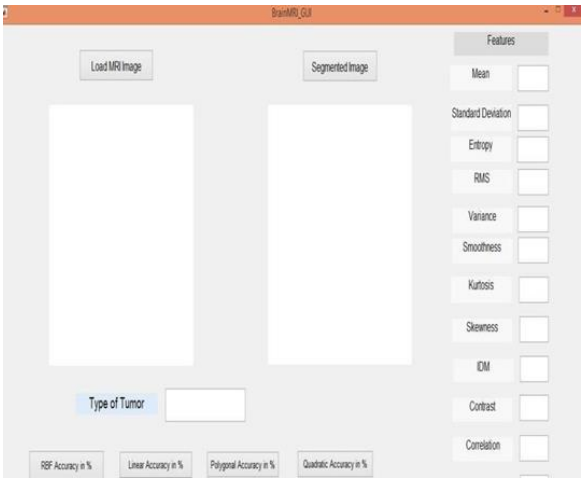


Fig 1: A display screen after running it.

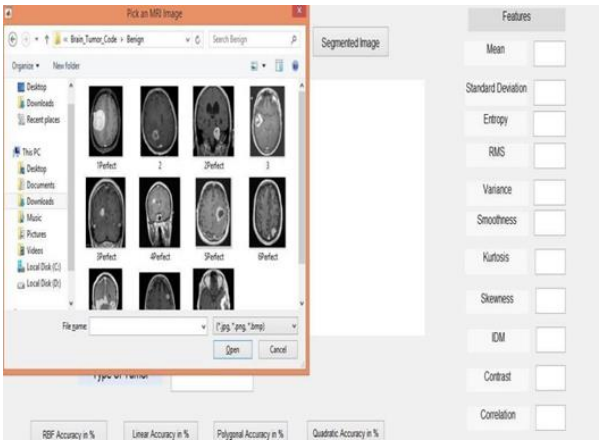


Fig 2: Selection of an image from database.

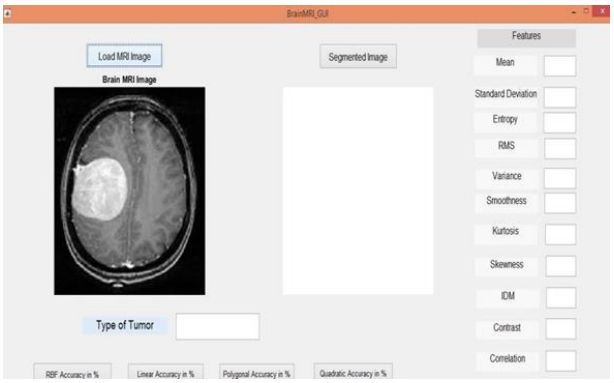


Fig 3: Input as an MRI image.

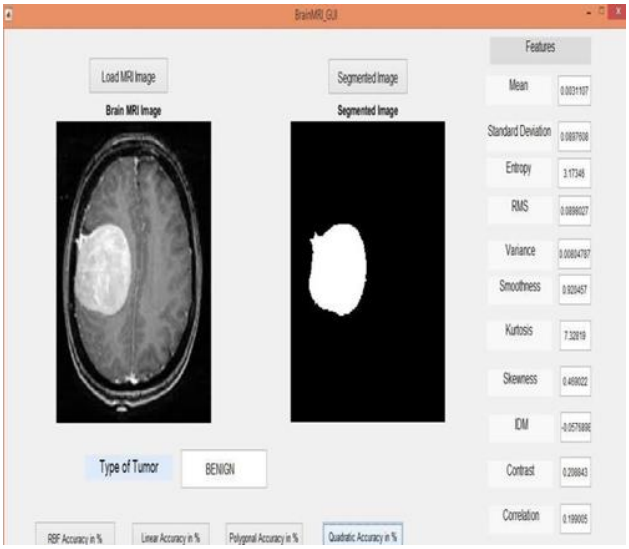


Fig 4: Image shown with tumor as highlighted.

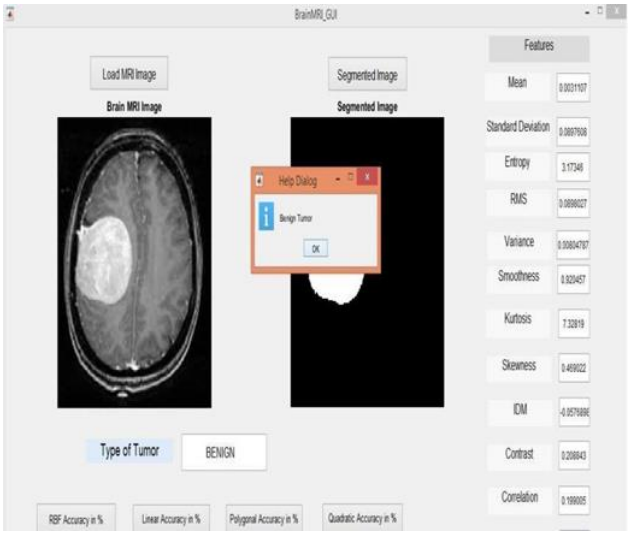


Fig 5: A dialogue box showing the type of tumor.

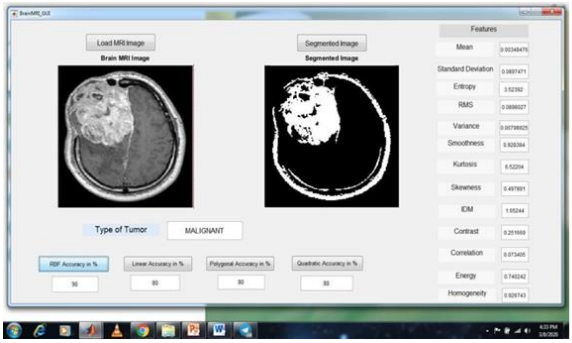


Fig 6: Display screen showing all the features.

Fig 7: Showing the display of malignant tumor.

VII. FUTURE WORK

1. In future, different techniques can be used to increase the efficiency and accuracy by combining more efficient segmentation and also feature extraction techniques can be used with the help of using large data set coverings.
2. We can enhance this project by the help of algorithm which can be able to specify the grade of tumor.
3. Main purpose of brain tumor grading system to indicate the growth rate and this whole process is taken care by world health organization.

CONCLUSION

MRI images are mainly preferred for identifying the brain tumor. Here, we mainly analyzed various image processing techniques and have discussed its requirements and properties in the context of brain tumor detection on MRI scanned images. Application of edge and segmentation detection is directly useful for medical diagnosis. In order to distinguish the tumor affected spots from different brain tissues we have employed the thresholding segmentation concept. Using the proposed algorithm, identification of the brain tumor regions is done efficiently.

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