

Brain Tumor Detection Using Segmentation and Classification Technique

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Abstract- The main purpose of the brain tumor detection system is to design and detect brain tumor of patient and it helps in prevention. This system is designed with the help of MATLAB. The segmentation and classification of brain tumor images and tumor tissues. The brain tumor segmentation detects the tumor cell and area which is occupied by tumor. For segmentation process gray scale image are taken in to the consideration. The Support vector machine (SVM) classifier is used to classify the tumor.

Keywords- MATLAB software, classification using SVM, Segmentation methods, Feature Extraction,

I. INTRODUCTION

Brain tumor classification remains a demanding part for scientists. Brain tumor classification technique is found in medical field for doctor's help. Large database exhibit large variation in identification of tumor region and type. Identification accuracy of tumor affected by various methods of image captured such as CT scan, X-ray, and MRI. When rays pass through the body, dense objects such as bones appear white on film. These images are used for these system as data base.

Image processing is essential and most beneficial in medical field. Medical diagnostics can easily provide image in digital formats. In medical image analysis image segmentation is the fundamental step. Segmentation is a procedure to separate similar portion and showing resemblance of image in different features like shape, size, color, etc. The segmentation process involves more than one region to be segmented.

The abnormal and uncontrolled growing cells that means brain tumor. They are divided in to two types, namely primary and secondary. Primary tumors are originated in the brain itself. Secondary tumors are those that spread to the brain.

Feature extraction is used to extract the features from image. Feature extraction also helps in classification of normal and abnormal image.

Our system uses software (computer-based procedure) to detect the type and region of brain tumor. The major goal of medical field is to cure the brain tumor, but development of new treatments takes time and money. The level of brain tumor we can see by comparing the image with another modality image. Reliable and fast detection and classification of brain tumor is of major technical and economic importance for the doctors.

II. METHODOLOGY

Brain tumor system mainly depends on two methodologies namely segmentation and classification. There are various methods for segmentation and classification of image.

Segmentation:

There are four main methods of segmentation namely Thresholding, Edge Based, region Based, Clustering. We use Otsu's method. It is a sub type of Thresholding method of segmentation.

Classification:

There are main three methods of classification namely Supervised Method, Feed Forward Network, Feed Back Network

We use Support Vector Machine classifier. It is a type of Supervised Method of classification.

III. BLOCK DIAGRAM

The images in the format of JPG are used for processing. Brain tumor images are different in size, color etc. To remove the noise present in the image filter is used. For segmentation gray images are used. Thus those images present in color are converted in to gray images. Unwanted parts are

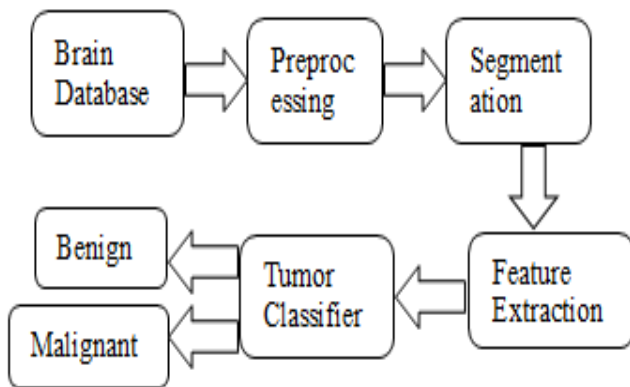


Fig 1. Block Diagram

1. BRAIN DATABASE:

The MRI brain images are considered for dataset. Dataset having near about 100 images. It contains different images of tumorous and non-tumorous images that is normal and abnormal. The dataset is trained for classification purpose

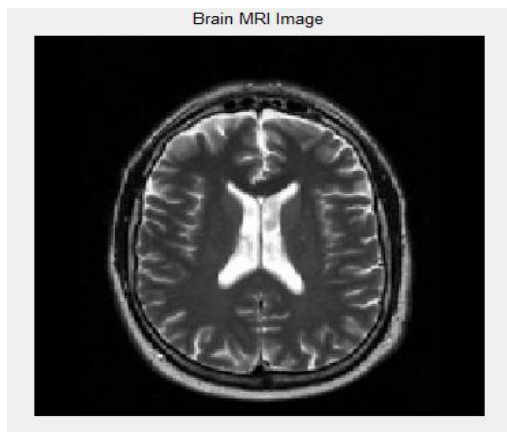


Fig 2. Brain MRI Images

2. IMAGE PREPROCSSING:

Image preprocessing is used to improve the quality of images. For accurate observations for given application it is important to have good quality images. Median filter is simple to understand and LPF is used to remove the noise. It preserves brightness differences resulting in minimal blurring of regional boundaries. From the database MRI images are taken i.e. training database. After that image is filtered to reduce the noise in image.

3. SEGMENTATION:

Segmentation is a procedure to separate similar portion of images. It identifies the position of tumor by

considering level set approach. We use the Otsu’s method for segmentation.

- **Otsu’s Method:** In this method the image is converted from grey to binary image. The grey image consists of 256 values(0-255) from which it selects one value that is the threshold. All pixels of the grey image are converted into the pixel value 0 and 1. All values below the threshold value are converted into the pixel 0 that is they are white in color. All values below the threshold value are converted into the pixel 1 that is they are black in color.

The manual segmentation of the different section of brain tumor will becomes a failure and time wasting task for the adroit and produces improvised results in a way. Semi-automatic brain tumor segmentation chiefly subsists of the customer, synergy, and software figure out. The software computing is design at the recognition of brain tumor segmentation algorithms. In fully automatic brain tumor segmentation computer regulate the segmentation of brain tumor without any human cooperation. This segmentation algorithm combines artificial brilliance and previous knowledge.

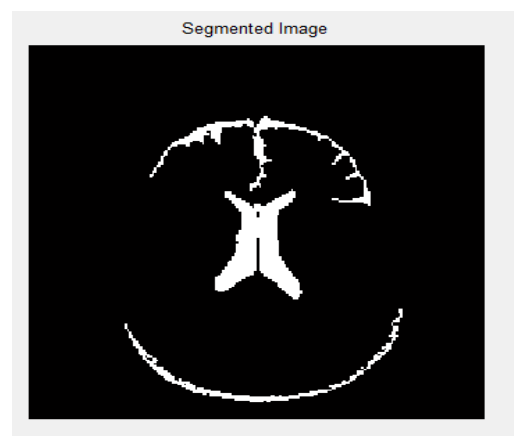


Fig 3. Segmented Image

4. FEATURE EXTRACTION:

The different features are used for further processing of image. Such as Mean Standard Deviation, Entropy, RMS, etc. Segmentation algorithm used to locate the extracted area. By using these we conclude the classification of tumor. Features will be extracted from the tumor regions from MRI images. It involves reducing the amount of data required to describe a large set of data accurately. Features are used to classifiers as input that assign them to class that they represent. The intention of feature extraction is to reduce the original data by measuring positive properties or features that

discriminate one input sample from another sample. The texture extraction means extracting the homogeneity of an image and similarity between regions of an image. Texture feature classifies MRI of brain helps in detection of tumor in brain MRI image.

5. TUMOR CLASSIFIER:

To identify the class of tumor we use SVM classifier. SVM stands for Support Vector Machine.

- SVM: It separates the images into different classes such that all the images of one group are in the same class. It has best separating line. When a test image is given it compares the test images with all the images that are there in the database and find the closest distance of the test image from the input image. By maximizing margins performance of conventional classifiers can be improved.

Finally, the browsed image from database is compared with the trained data and the classification is done and class of tumor is classified as benign tumor or malignant tumor.

IV. GRAPHICAL USER INTERFACE

Graphical User Interface is used to display the output of the MATLAB code in proper format. By using these we can take input also. With the help of the functions like push button, slider, radio button, check box, static text, pop-up menu, listbox, etc. we can create the GUI.

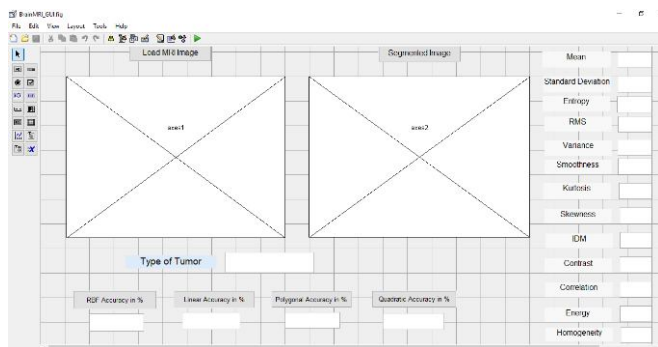


Fig4. Generation Of GUI

V. SIMULATION RESULT

After the code in MATLAB is executed the GUI file also runs and displays the GUI in new window. By pressing the push button we can add the MRI image which is present in database. After pressing each button, we get output in respective block.

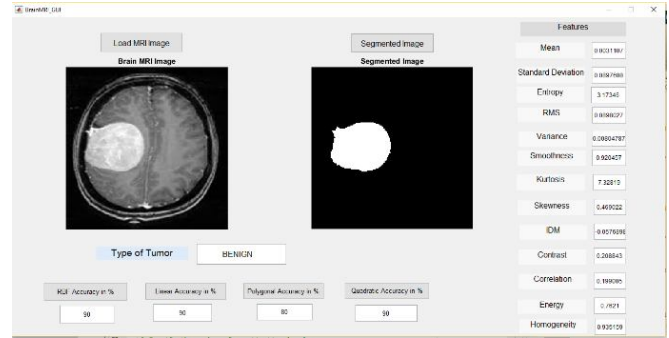


Fig 5. Actual Output

VI. CONCLUSION

As the brain tumor cases are increases day by day, to help the Doctor in the detection and identify the type of tumor image processing technique is used. This system can take a MRI image as input and process it finally gives output as type of tumor and features.

REFERENCE

- [1] Neha Tirpude, R. R. Welekar, “A Study of Brain Magnetic Resonance Image Segmentation Techniques”, International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 1, January 2013.
- [2] Chinnu A, “MRI Brain Tumor Classification Using SVM and Histogram Based Image Segmentation”, International Journal of Computer Science and Information Technologies, Vol. 6 (2) , 2015, 1505-1508.
- [3] A. M. Khan, Ravi. S, “Image Segmentation Methods: A Comparative Study”, International Journal of SoftComputing and Engineering (IJSCE) ISSN: 2231-2307, Volume-3, Issue-4, September 2013
- [4] S. Sridhar, “Digital Image Processing”, oxford higher education, sixth impression 2014, page no 288
- [5] D. Selvaraj & R. Dhanasekaran, “A Review on Current MRI Brain Tissue Segmentation, Feature Extraction AND Classification Techniques”, International Journal of Electronics, Communication & Instrumentation Engineering Research and Development (IJECIERD) ISSN(P): 2249-684X; ISSN(E): 2249-7951 Vol. 3, Issue 5, 2013, Dec 2013, 11-30.