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"Artificial Neural Network based Classification of Brain Tumor from MRI using FCM and Bounding Box Method"

Meghana N[1] ,
[1]M Tech Student ,
Dept of ECE, SJBIT
Uttarahalli Main Road, Kengeri,Bangalore-60,
Karnataka

Dr Rekha K R[2]
[2] Professor,
Dept of ECE SJBIT, Bangalore
Uttarahalli Main Road, Kengeri, Bangalore-60,
Karnataka

Abstract- **Brain tumor segmentation consists of separating the different tumor tissues or active tumor, from normal brain tisssues.The detection of edema is done simultaneously with tumor segmentation, as the knowledge of the extent of edema is important for diagnosis, planning and treatment. Magnetic resonance image technique (MRI) is used in medical diagnosis.MRI Scanners uses magnetic fields to form images of brain tumor for its detection. Accurate analysis for location and size of tumor is approached.FCM and bounding box based segmentation of brain images is prescribed. Bounding box is a fast segmentation technique that includes symmetry to enclose a tumours or edema by a bounding box within an axial brain MR image.segmented tumor is classified using Artificial neural network training**

Keywords: MRI, Fuzzy C Means, Bounding box, Bhattacharya co-efficient,Histogram co-relation,Neural network training.

I.INTRODUCTION

Accurate estimation of tumor size and its area is important for diagnosis e.g., treatment planning and therapy evaluation. A tumour can be defined as a mass which grows without any control of normal forces. Magnetic resonance (MR) imaging and computer tomography (CT) scanning of the brain are the two most common tests undertaken to confirm the presence of brain tumour and to identify its location for selected specialist treatment options. Real time diagnosis of tumours by using more reliable algorithms has been the main focus of the latest developments in medical imaging. The detection of brain tumour in MR images and CT scan images has been an active research area. The tumor may be primary or secondary. If the part of the tumor is spread to another place and grown as its own then it is known as secondary. Normally the brain tumor affects CSF (Cerebral Spinal Fluid).It causes Strokes.

II.EXISTING SYSTEM

The fuzzy logic is a way to processing the data by giving the partial membership value to each pixel in the image. The membership value of the fuzzy set ranges from 0 to 1. Fuzzy clustering is basically a multi valued logic that allows intermediate values i.e., member of one fuzzy Set can also be member of other fuzzy sets in the same image. Apriority specification of the number of clusters. Most of the fuzzy models work well only for hyper intensity (fully enhanced) tumors and exhibit poor performance on detecting non-enhanced tumors. This is because these fuzzy models typically use thresholding techniques or morphological operations (erosion or dilation) as pre- or post-processing leading to the border enhancing or non-enhancing tumors having very few bright pixels

III.LITERATURE SURVEY

[1] A novel fast Fuzzy C means clustering technique for segmentation of human brain MRI.
This approach calculates cluster centre in each iteration by new formula. A type of averaging among cluster centres is applied in each iteration step however; membership function is a fuzzy coefficient.

[2] Comparative study of brain tumour segmentation techniques for extracting brain tumour from MRI.

Bounding box segmentation technique is used. Segmentation is based on histogram analysis and Bhattacharya co-effiecents.

[3] Brain tumour detection using K-means and Fuzzy C means Clustering algorithm.

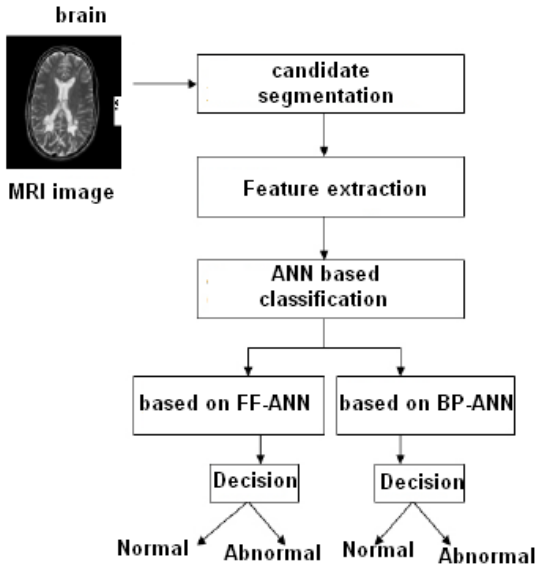
This algorithm clusters data by iteratively computing mean intensity for each class and segmentating the image by classifying each pixel in the class with closest mean.

[4] Neural network based brain tumor detection using MR images
The boundary detection problem is formulated as an optimization process that seeks the boundary points to minimize an energy functional based on an active contour model

IV.PROPOSED METHODOLOGY

Our aim is to achieve a high accuracy in discriminating the type of tumor through a combination of several techniques for image segmentation, feature extraction and classification. The proposed technique has the potential of assisting clinical diagnosis. We present an automatic, fast, and approximate segmentation technique that avoids these problems by locating a "bounding box" – i. e., an axis-parallel rectangle, around the tumor or edema on an MR slice. We can then use this bounding box to answer subsequent queries that ask about tumor position and size

Proposed Block Diagram



FCM

Fcm allows one set of data to belong to 2 or more clusters.FCM is introduced by Dunn and later extended by Bezdek.It is an iterative clustering method that produces an optimal C partition by minimizing the weighted within group.
The objective function is an optimizing function that calculates weighted within group sum of squared error.

Bounding box

The geometrical axis of symmetry of the skull is sufficient for our BB method to localize brain tumor or edema accurately, and finding the geometrical axis of symmetry is easier than finding the actual axis of symmetry of the skull. The novelty of the FBB segmentation technique lies in a proposed score function that locates the bounding boxes. The score function is based on Bhattacharya coefficient of gray scale intensity histograms. We prove that under reasonable assumptions, this score function admits a very fast linear time search technique to locate the bounding boxes

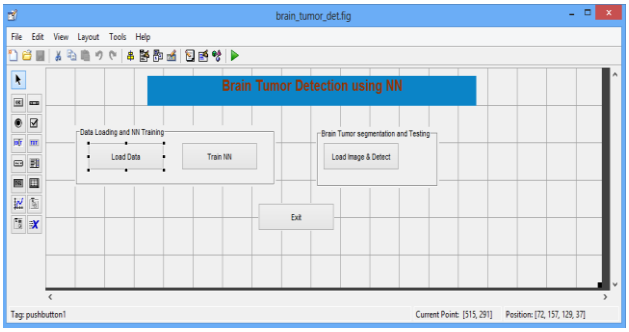
Classification using ANN

An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurons) working in unison to solve specific problems.

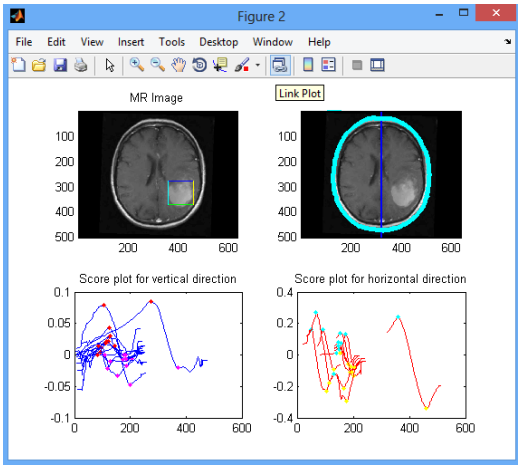
V.RESULTS AND DISCUSSION

The proposed work is implemented on MATLAB 7.11.0(R2010b).

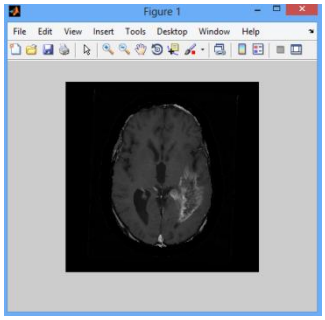
(a) GUI for Brain tumor detection using neural network



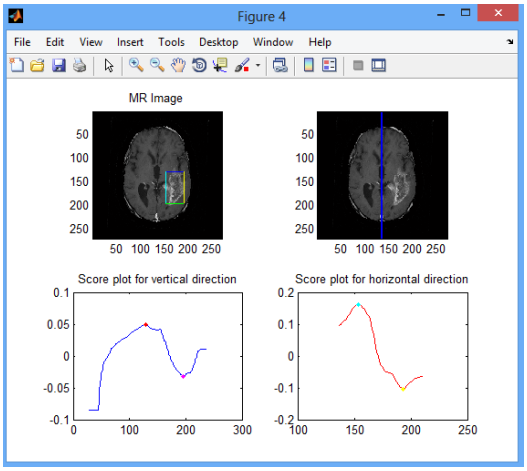
(b) Bounding box segmentation for trained images



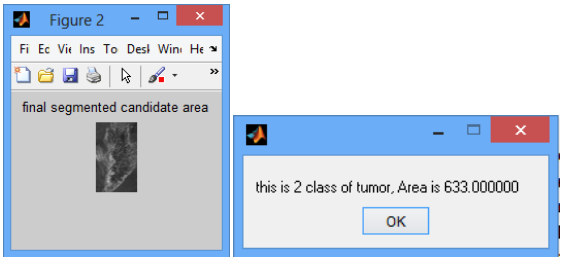
(c) Quiery Image for testing



(d) Bounding box segmentation



(d) Segmented area and class



Area Calculation is made by the simple calculation of knowing the properties of image.[11] Mostly the image has 256*256 pixels. Area of an image is the total number of the pixels present in the area which can be calculated in the length units by multiplying the number of pixels with the dimension of one pixel.

Image, I = Σ 255w=0Σ 255H=0[f(0) + f(1)]
Pixels = Width (W) X Height (H) = 256 X 256
f (0) = white pixel (digit 0)
f (l) = black pixel (digit 1)
No_ of_ white pixel P = Σ 255w=0Σ 255H=0[f(0)]
Where,
P = number of white pixel (width*height)

VI.CONCLUSION

For accurate diagnosis of brain tumour patients, proper segmentation method is required to be used for MR images to carry out an improved diagnosis and treatment. There are different types of tumours available. They may be as mass in brain or malignant over the brain. Suppose if it is a mass then K- means algorithm is enough to extract it from the brain cells. FBB is a novel fast segmentation technique that uses symmetry to enclose an anomaly (typically, tumours or edema) by a bounding box within an axial brain MR image.ANN is used for classification of the segmented area.The networks were categorized into feed-forward neural networks and Back propagation neural Network. The purpose is to develop tools for discriminating malignant tumors from benign ones assisting decision making in clinical diagnosis.

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