Identification of Malignant In The Brain MRI Using Deep Learning Algorithm

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Abstract- *The aim of the project to feed the brain images to be preprocessed and the tumor part is segmented usingFuzzy C means algorithm finally Convolutional Neural Network image classification algorithm helps in detecting the tumor at an early stage with high accuracy. And also we analyze the severity of the disease.*

Keywords- Detection of Brain Tumor, Deep Learning Approach.

I. INTRODUCTION

A brain tumor means the aggregation of abnormal cells in some tissues of the brain that may disrupt the brain function. A tumor are often benign or malignant. T When benign or malignant grow, they increase the pressure inside your skull. This will affect your brain parts and it is life-threatening.

In clinical studies on brain anatomy, MRI has become a vital tool. The high resolution, contrast, and clear separation of the soft tissue enable doctors to spot specific diseases accurately. For understanding pathology, for assessing evolutionary trends, for preparation, the simplest surgical method or alternatives possible, a precise segmentation of the pathological and healthy tissues that comprise the resonance image are necessary. Automated segmentation methods are a helpful solution to assist management with unreliable degrees of automation to trace the boundaries of assorted tissue areas, and by allowing automated volumetric of pathologic MRI signal analysis.

The patient who receives professional help within 3-4 hours after first symptoms, usually make a higher and faster recovery. But, unfortunately EMS workers did not recognize 15 percent of strokes, which delays in critical care and increase the danger of fatal outcomes. Here comes the new proposed system named deep learning, which is the subset of machine learning express great process in extracting the images and capturing hidden representations from the abundant number of medical images. This feature extraction improves with better data, thus come up with successful treatment and decreasing mortality.

II. LITERATURE SURVEY

1. The traditional method for detecting the tumor diseases within the human MRI brain images is completed manually by physicians. Automatic classification of tumors of MRI images requires high accuracy, since the non-accurate diagnosis and postponing delivery of the precise diagnosis would cause increase the prevalence of more serious diseases. To avoid that, an automatic system is proposed for tumor classification of MRI images.

2. Shobhana,et[9] made a comparative study of transform techniques namely Discrete Cosine Transform (DCT), Discrete Wavelet Transform (DWT) each separately combined with the Probabilistic Neural Network (PNN) is employed for the classification of tumor. The system consists of three stages for the diagnosis of tumor. within the first stage, MR image is obtained and preprocessing is finished to get rid of the noise and sharpen the image. within the second stage, DCT and DWT is employed for feature extraction .In the third stage, Probabilistic Neural Network with Radial Basis Function distinguishes brains abnormality.Overall, performance of DCT and DWT inbrain tumor prediction is compared using the parameters such as sensitivity rate and precisionrate.

3. It's of great importance to early detect abnormal brains, so as to avoid wasting social resources. However, was a successful feature descriptor that achieved excellent performance in various applications

III. EXISTING SYSTEM

This project is to develop an efficient method to detect the neoplasm at the early stages. the assorted steps within the project are noise removal, morphological operation supported segmentation, feature extraction, Naive Bayes classifier initially the brain image is acquired from the patient. The acquired image is subjected to preprocessing and also the feature extraction is dole out followed by classification. Legendary level sets algorithm is employed for feature extraction. Therefore, we predict the tumor accurately by using Naive Bayes classifier method.

IV. PROPOSEDSYSTEM

This study proposes a computer aided detection approach to diagnose brain tumor in its early stage using new segmentation and classification techniques. In this use Convolutional neural network is used for classify the tumor and normal.

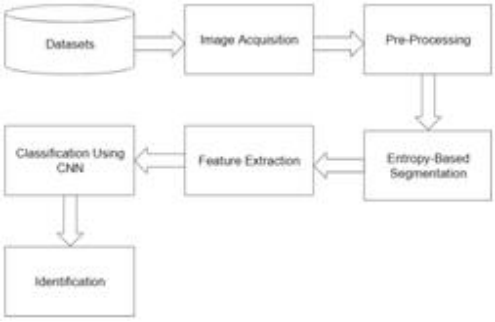

Figure 1 Architecture

First we need to get the brain MRI image, then the image is loaded into the MATLAB code, extracting the features from the image, training the neural network, selecting the brain MRI images for testing, perform testing by using artificial neural network training module and predicting the artificial neural network based output.

We have introduced segmentation algorithm in image processing techniques well known as Fuzzy C means algorithm and Convolutional Neural Network(CNN) which comes under deep learning algorithms.

Fuzzy C means: The aim of the algorithm is to declare the membership to each data pointing to each cluster center. Overall basis to identify the distance between the cluster center and data point. Clearly, summation of membership of each data point should be equal to one.

Convolutional Neural Network: The Convolutional Neural Networks (CNN) are used in a number of tasks which have a great performance in different applications.

They are mostly used in the Image Net Challenge with various combinations of data sets of sketches. Few of the researchers have shown a comparison between the human subject and a trained network's detection abilities on image data sets.

V. IMPLEMENTATION ANDRESULTS

V.1. Preprocessing Approach

Resizing the image pixels with dimension of width=256 and height=256.Converting the image into gray sacle,so when developing an image processing algorithm can be more straight forward. Plotting the noise in the image using 'guassian filter',finally the noise was removed by 'median filter' which produces the image without reducing the sharpness.

V.2. Segmentation using Fuzzy C Means

We perform clustering for pixel sample data sets and then choosing the better initial cluster centers. Plotting the intensityvaluesas(X,Y),Intensity.Inthissegmentationafterdoing allthe computations to identify the cluster center and reshaping the features of an image, then changing the tumor as white pixels and other part as black pixels.(In Figure 2)

Intensity(i,j)	Value
3	1(white pixels)
<3 or >3	0(black pixels)

Figure 2 Intensity Values

V.3. Classification using CNN

We feed the input as segmented images to the input layer for resizing, then passing to the further layers for feature extraction. In Convolution layer, we do image filtering to find out the features from the images. Finally calculating the match feature points during testing. In Pooling layer, we decrease the size of the convoluted feature map. Under this layer, Max-Pooling layer, is passed to plot out the largest element in feature map. We use activation layer as ReLU(Rectified Linear Unit) layer swaps up every negative values from the pooled map to 0. Finally classification process begins to take place in Fully Connected layer. The input image from the previous layers are flattened and fed to this layer. The high-level filtered images are taken and categorize them into labels. To overcome the over-fitting, we use the dropout layer.

V.4. Identification and Calculation of Accuracy

We predict the diagnostic results by computing the absolute value of Fully Connected Layer class values(In Figure 3).To analyze the severity of the disease(malignant),the accuracy calculation takes into account. The calculation progress done by normal distribution functions and then finding out the area which is affected almost in the image by region properties which contains shape measurements.

Values	Predictions
1	Benign
2	Malignant
3	Normal

Figure 3 Class values

V.5. Testing

The importance of software testing and its impact on software cannot be underestimated. Software testing is a fundamental component of software quality assurance and represents a review of specification, design and coding. The greater visibility of software systems and the cost associated with failure are motivatingfactors for planning, through testing.

Epoch	Iteration	Time elapsed(Secs)	Min-Batch Loss	Min-Batch Accuracy	Basic Learning Rate
1	1	8.03	1.1053	27.27%	1.00e-04
2	2	8.87	1.1143	9.09%	1.00e-04
4	4	8.32	1.1026	18.18%	1.00e-04
5	5	8.53	1.0887	45.455	1.00e-04

Figure 4 Level of Accuracy

V.6. Proposed Methods

1. Creating training and testing data set: The super classes images used for training is resized pixels for AlexNet and pixels GoogLeNet and ResNet50, and the data set is divided into two categories i.e. training and validation data sets.
2. Modifying CNN network: Replace the last three layers of the network with fully connected layer, a softmax layer, and a classification output layer. Set the final fully connected layer to have the same size as the number of classes in the training data set. Increase the learning ratefactors of the fully connected layer to train network faster.
3. Train the network: Set the training options, including learning rate, mini-batch size, and validation data according to GPU specification of the system. Train the network using the training data.
4. Test the accuracy of the network: Classify the validation images using the fine-tuned network, and calculate the classification accuracy. Similarly testing the fine tune network on real time video feeds for accurate results.

VI. SYSTEM ANALYSIS

VI.1 Methodology

Here, the input image is either Normal or Benign or malignant brain MRI image. After resizing,color conversion (gray scale) and removing noisy data using noisy median filter from the data set, itispassedtothedeeplearningmodel-CNNfordiagnosticprediction.Thebelowdiagramisthebasicflow diagramrepresentedforidentifyingtypeofabnormalities.

VII. CONCLUSION

The main goal of this research work is to design efficient automatic brain tumor classification with high accuracy, performance and low complexity. In the conventional brain tumor classification is performed by using Fuzzy C Means (FCM) based segmentation, texture and shape feature extraction and CNN based classification are carriedout. The complexity is low. To improve the accuracy and to reduce the computation time, a convolution neural network based classification is introduced in the proposed scheme. Alsotheclassificationresultsaregivenastumorornormalbrainimages.CNN is one of the deep learning methods, which contains sequence of feed forward layers. Also python language is used for implementation. Image net database is used for classification. It is one of the pre-trained models. So the training is performed for only final layer. Also raw pixel value with depth, width and height feature value are extracted from CNN. Finally, the Gradient decent based loss function is applied to achieve high accuracy.

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