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Cancer Detection for Brain in MATLAB Using Deep Learning Algorithm

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ABSTRACT: The Brain Tumor is affecting many people worldwide. An unusual mass of tissue in which some cells multiplies and grows uncontrollably is called brain tumor. It starts growing inside the skull and interpose with the regular functioning of the brain. It needs to be detected at an early stage using MRI images when it is as small as possible because the tumor can possibly result to cancer. This paper, mainly focuses on detecting and localizing the tumor and cancer region existing in the brain by proposed methodology using patient's MRI images. The proposed methodology consists of three stages i.e.image pre-processing, extreme learning machine loacal reptive fields and extraction of affected region and its disease. Pre-processing stage involves converting original image into a grayscale image and removes noise. This is followed by semantic segmentation and feature extraction using deep learning algorithm. Segmentation is applied to clearly display the tumor affected region in the MRI images. Finally, the classification of disease is extracted using deep learning algorithm. Here we have used MATLAB for the development of the project.

KEYWORDS: Brain MRI images, Deep learning, Extreme learning machine-Local receptive fields,Segmentation,Pre-processing, Benign, Malignant.

I. INTRODUCTION

The occurrence of uncontrolled and abnormal growth of cells within the skull is specified as brain tumor. It is basically of two types non-cancerous or benign and cancerous or malignant. However, it would be inappropriate to call benign as non-cancerous because it could be fatal too. The tumor can either damage brain cells directly or even indirectly squeeze different areas of the brain as the tumor grows or swelling inside the brain causing severe pain. It is classified by their location in the brain as well as the tissue they are composed of. Whether the tumor is benign or malignant, the reason for this tumor could be either hereditary or it could be developed before birth such as craniopharyngioma. The reason of brain tumor is not very prominent ultimately. Some of the general symptoms of having it are a headache, vomiting, personality or behavioral changes, intellectual decline, abnormalities of eyes or double vision weakness,etc..

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II. BRAIN TUMOR DETECTION

Diagnosis of brain tumor is done medically. Some of the ways of diagnosing brain tumor are MRI scan, CT scan and biopsy of the head etc. In CT scan technique image of the brain is taken from several angles and is studied altogether. MRI stands for magnetic resonance imaging. In this method, magnetic imaging techniques and the radio waves are utilized to locate as well as to obtain a digital image of tissues present in the brain. A biopsy is a diagnosis technique where a physical portion of the brain or the tumor present inside the brain is extracted and then studied under a microscope.. From the above-mentioned methods, we have used MRI scan technique in which the MRI images will be processed through MATLAB using our proposed algorithm to specify the tumor and then segment the image to clearly view the tumour

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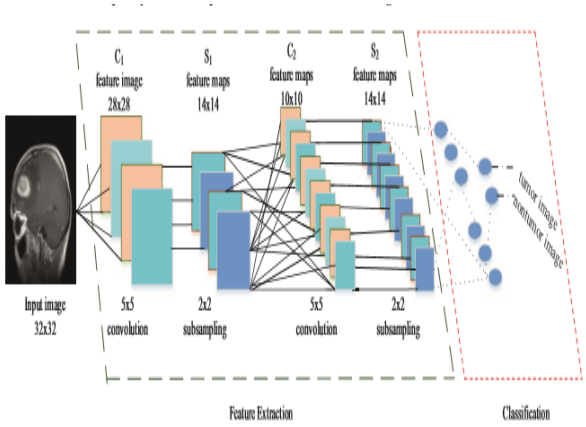
III. DEEP LEARNING

It is usually implemented using a neural network architecture. This learns to perform classification tasks directly from images, text or sound. The term “deep” refers to the number of layers in the network-the more layers, the deeper the network. Traditional neural network contains 2 or 3 layers, while deep networks can have hundreds.

CNN Model
A simple CNN model can be seen in figure 1. The first layer is input layer, the size of the input image is 28h28. The second layer is the convolution layer C2, it can obtain four different feature maps by convolution with the input image. The third layer is the pooling layer P3. It computes the local average or maximum of the input feature maps. The following convolution layer and pooling layer operate in the same way, except the number and size of convolution kernels. The output layer is full connection, the maximum value of output neurons is the result of the classifier in end.



IV. LITERATURE SURVEY

Qeethara Kadhim Al-Shayea (Feb 2016) proposed evaluate artificial neural network in disease diagnosis. Two cases are studied. The first one is acute nephritis disease; data is the disease symptoms. The second is the heart disease; data is on cardiac Single Proton Emission Computed Tomography (SPECT) images. Each patient classified into two categories: infected and non-infected.
Mohd Khalid Awang1 et.all(June 2017) proposed to assess the application of artificial neural network in predicting the presence of heart disease, mainly the angina in patients. The prediction and detection of angina are significant in determining the most appropriate form of treatment for the
affected patients..
Selvakumar,.rajagopalan.s.p(Sep 2017) proposed the benefits and overhead of various neural network models for heart disease prediction. The generated information systems typically consist of large amount of data. Health care organizations must have ability to analyze these data. The Health care system includes data such as resource management, patient centric and transformed data. Data mining techniques are used to explore, analyze and extract these data using complex algorithms in order to discover unknown patterns. Many data mining techniques have been used in the diagnosis of heart disease with good accuracy

V. PROPOSED METHODOLOGY

MRI image of the brain is processed for the detection of the tumor using MATLAB. The proposed methodology employed here comprises of three stages. Initially pre-processing of given MRI image is done then the extreme learning machine local receptive fields (ELM-LRF) based tumor classification.Finally extraction of the type of disease is made.

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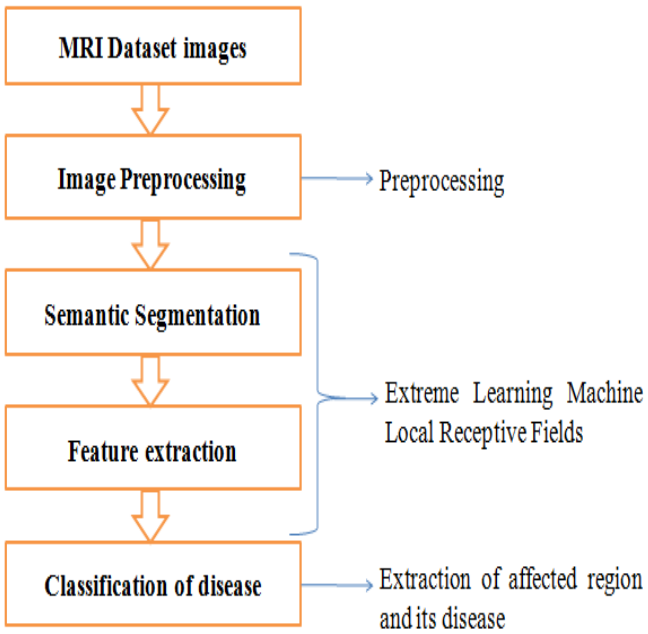
VI. IMAGE PRE-PROCESSING

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. 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. 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.

BLOCK DIAGRAM:



1. EXTERNAL LEARNING MACHINE-LOCAL RECEPTIVE FIELDS:

ELM is a single hidden layered feed forward neural network whose input weights are calculated randomly and output weights are calculated analytically using deep learning algorithm. The ELM/LRF structure was also compared with AlexNet, which is well-known deep neural network structure. The CNN model has 5 convolutional layers and 3 fully connected layers. The first convolution layer employs 64 filters of size 11 × 11. The convolution stride was 4 pixels. Rectification linear unit (RELU) and local response normalization layers follow the first and second convolution layers. There were 5 max pooling layers in the architecture, which follow some of the convolution layers. The pooling operation was performed over a 3 × 3 pixel window, with stride 2. The second convolution layer filters the output of the previous layer by using 256 filters. These filters' size was 5 × 5. The convolution stride was 1 pixel and spatial padding was 2 pixels. The third convolutional layer also employs 256 filters. These filters' size was 3 × 3. The convolution stride and spatial padding is 1 pixel. There is only a RELU layer, which follows the third convolutional layer. The fourth and fifth convolutional layers have the same structure of the third convolutional layer. As we mentioned earlier, three fully connected layers follow the convolutional layers. All fully connected layers have 4096 channels. There are two dropout layers, which come after first and second fully connected layers, with probability of 0.5. Finally, a loss layer was used in the last layer.

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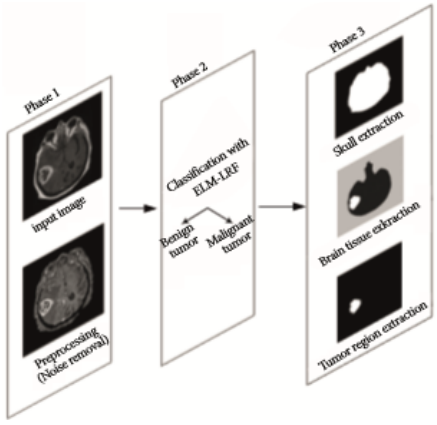

A. SEMANTIC SEGMENTATION:

Semantic Segmentation Generally, The threshold used in the process of segmentation by putting all the pixels that are higher than the threshold level to a foreground while the other pixels to the background value. Any dynamic change according to the pixel intensity cannot be achieved when using threshold method. In proposed method we used Adaptive threshold that usually take the gray or color images as input and outputs in the form of binary image representing segmentation. Adaptive thresholding techniques used to separate the object of an image from its background. The main different between threshold and Adaptive thresholding is that the Adaptive threshold value is calculated for each pixel in the image. This technique provides more robustness to changes in illumination. After used adaptive thresholding, the region detection process is performed on the binary image that results from an adaptive thresholding step. Region detection in segmentation technique that classifies pixels in the image to one or several separate areas or blob which is an area of touching pixels with the same logic state. The region detection consists of scanning and labeling any new regions, but also merging old regions when they prove to be connected on a lower row. Therefore, the image is scanned and every pixel is individually labeled with an identifier which signifies the region to which it belongs. The binary image result has many object beside the object of tumor, by using the region detection method the biggest area object are extracted (this object is the tumor) and put it in a separate image

B. FEATURE EXTRACTION:

After the completion of image segmentation stage, Shapes features are performed on the segmented objects or regions in the scene. For each shape in the binary image the Matlab function region have a number of properties. In this paper used six shape properties which include Mean,StandardDeviation,Entropy,RMS,Varience,Smoothness,Kurtosis,Skewness,IDM,Contrast,Correlation,Energy,Homogeneity In the classification stage, the ELM-LRF was used. Brain tumors were classified as benign or malignant. Convolution and pooling operations were applied to the images in the input layer. The input layer weights were selected randomly. The weights between the hidden layer and the output layer were calculated analytically by using the least square method.

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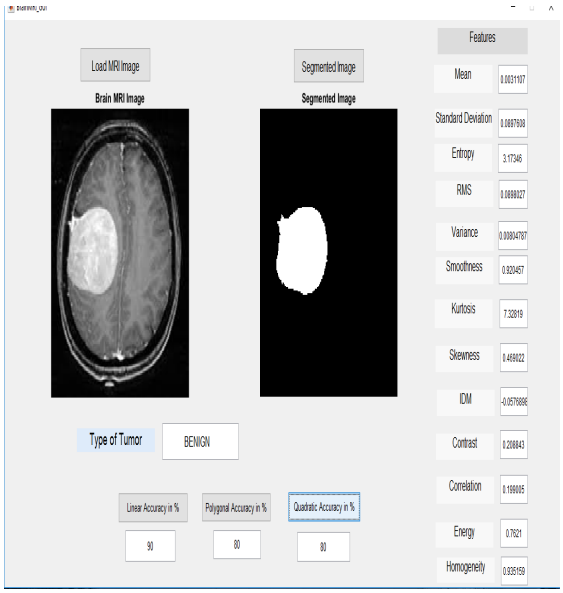
VII.CLASSIFICATION OF DISEASE

Therefore classification of disease is made through MRI images using deep learning algorithm and it is shown below,



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REFERENCES

1. Anitha and S. Murugavalli, “Brain tumour classification using two-tier classifier with adaptive segmentation technique,” IET Computer Vision, 2016, vol. 10(1), pp. 917.
2. Sandabad Sara; Benba Achraf; Sayd Tahri Yassine; Hammouch Ahmed “New method of tumor extraction using a histogram study ”SAI Intelligent Systems Conference (IntelliSys), 2015, Issue 10-11 Nov. 2015.
3. Nailah Afshan ,Shaima Qureshi,Syed Mujtiba Hussain, ”Comparative study of tumor detection algorithms”International Conference on Medical Imaging, m-Health and Emerging Communication Systems (MedCom) 2014.
4. Dilpreet Kaur, Yadwinder Kaur “Intelligent Medical Image Segmentation Using FCM, GA and PSO ” International Journal of Computer Science and Information Technologies, Vol. 5 (5) , 2014, 6089-6093.
5. A.Sindhu1 , S.Meera2 “A Survey on Detecting Brain Tumor in mri Images Using Image Processing Techniques ”International Journal of Innovative Research in Computer and Communication EngineeringVol. 3, Issue 1, January 2015.
6. Sompong C, Wongthanavasu S. Brain tumor segmentation using cellular automata-based fuzzy c-means. In: 13th International Joint Conference on Computer Science and Software Engineering (JCSSE); 13-15 July 2016; Khon Kaen, Thailand. pp. 1-6.