Computer Vision Based Tumor Detection using MRI Images

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ABSTRACT—Brain is one of the most important organs in the human body that controls the actions of all the body parts. Recognition of brain tumor using Magnetic resonance imaging (MRI) is a difficult task because of complexity of size and location variability. Today it affecting many people worldwide, that is caused due to the abnormal growth of cells inside the brain cranium which limits the functioning of the brain. This paper presents a survey of different approaches used by the researchers to detect brain tumor.

*Keywords-***Brain Tumor Detection, Segmentation, Magnetic resonance imaging (MRI)**

I.INTRODUCTION:

Human brain is highly specialized organ made of highly soft and spongy tissues, is technically called as the central processing unit of the human body. Our brain only helps us to articulate the words, execute our actions, and share views, ideas and feelings. Under certain alter conditions- brain growth of the tissue is uncontrolled. This abnormal gain in mass of tissues is called tumor and if it's inside the brain, it is called as brain tumor. Tumors have a tendency to form new blood vessels. The detection of the malignant tumor is some- what difficult to mass tumor. For the accurate detection of the malignant tumor that needs a 3 - D representation of brain and 3 - D analyzer tool.

Figure 1 gives the normal brain and brain with the tumor.

Normally the brain tumor affects CSF(Cerebral Spinal Fluid). It causes Strokes. So early detection and diagnosis properly on time is necessary.

The basic symptom for Brain tumor is headache but every head ache may not lead to brain tumor. It is better to contact the specialist and follow proper medication to reduce the effect of brain tumor.

Figure 1: (a) Healthy Brain (b) Brain with Tumor

There are two types of tumors:
   a. Primary tumors start at a part in the brain when normal cells acquire errors or damages due to DNA defects. These errors cause irregularities in cell normal life cycle.
   b. Secondary tumors start at any part of the body and spreads to the brain. Secondary tumors are cancers. Cancer can affect any part of the body.

In most of the cases patients suffer with secondary brain tumors. So there is need for the system that detect the tumor correctly using computer technologies like image processing which is basically a technique of processing those captured images into digital format for

ner details, color and clarity. Using the principle of image processing, MRI (Magnetic Resonance Imaging) -a scan based imaging technique is used for detecting brain tumor. Such technique is not limited for detecting tumor inside the brain but is able to scan the whole internal structure of the human body to detect any tumor.

The normal steps of image processing for detection of tumor are shown in System Architecture

II.LITERATURE SURVEY:

Sunil L. Bangare et al. [1] gives a research on Human Brain Tumor which uses the MRI imaging technique to capture the image. Here brain tumor area is calculated to de□ne the Stage or level of seriousness of the tumor. Image Processing techniques are used for the brain tumor area calculation. K-Means [7] and Fuzzy C-Means [7] are used efficiently to estimate the area and stage of brain tumor. Which conquer the drawbacks of thresholding and region growing algorithms? The output of the K-Means algorithm is used as input for the Fuzzy C-Means which leads to accuracy of edge of the tumor.

Pallavi Shrivastava et al. propose Brain Tumor Analysis and Classi□cation system with fuzzy logic and neural networks. To analyze, extract and transform the hidden facts in Brain Tumor technique which generate Devising Classi□ers software artefacts to build formal models such as Integrated Framework to Analyze and Classify Brain Tumor is used.

Md. Rezwanul Islam et al. [3] proposed a computer aided image processing based method for brain tumor detection along with the calculation of the tumor size i.e. surface area of the tumor and its location. Brain tumor is detected from MRI images by integrated thresholding and morphological process with histogram based method. The proposed method can give 86.84% detection accuracy.

Rajeshwar Nalbalwar et al. [4] Proposed a Brain Cancer Detection and Classi□cation System. The system uses computer based procedures to detect tumor blocks and classify the type of tumor using Arti□cial Neural Network in MRI images of different patients with astrocytoma type of brain tumors. The image processing techniques such as histogram equalization, image segmentation, image enhancement, and feature extraction have been developed for the detection of the brain tumor in the MRI images. Alexis Arnaudet al. [6] proposed a fully automated method that performs both localization and characterization. The system uses Discriminative multivariate features extracted from brain MRI image.

Samriti et al. [8]gives brain Tumor Detection system Using Image Segmentation. MRI (mag- the genetic resonance imaging) used for diagnosis of brain and other medical images. The system gives delay using watershed and contrast technique. SONU SUHAG et al. proposed fuzzy c - mean s (FCM) Segmentation which can improve medical image segmentation. The approach presented here involves Pre-processing, Segmentation, feature extraction and detection of tumor from MRI scanned brain images. The developing platform for the detection is Matlab. Because it is easy to develop and execute

Sergio Pereira et al.[10] had proposed a novel Convolutional Neural Network (CNN) based method for brain tumor segmentation in MR images. The 3∗3 bit CNN is used as deep CNN architecture. High Grade Glioma (HGG) & Low Grade Glioma (LGG) tumor samples are used for test. During training, the numbers of training patches are augmented arti□cially by rotat- ing training patches and rare samples of LGG augmented by samples of HGG.

Asra Aslam et al. [11] had proposed an enhanced edge detection algorithm for cerebrum tumor segmentation. The proposed strategy is a mix of Sobel technique with image independent Thresholding method. Close contour technique is utilized which decrease the rate of false edges. In the last, tumor extracted from the image based on intensity of pixels within closed contours. Brain tumours extracted from proposed method are better than the tumor extracted from sobel edge detection.

III.COMPARATIVE ANALYSIS:

Sr no	Paper name	Year	Author	Techniques	Advantages	Problems
1.	A Novel Unsupervised Segmentation Approach Quantifies Tumor Tissue Populations Using Multiparametric MRI: First Results with Histological Validation	2017	P. Katiyar, M. R. Divine, U. Kohlhofer, L. Quintanilla Martinez,.	Multiparametric MRI,gaussian mixture modeling	Provide accurate segmentation	Not portable
2.	Deep Learning for Brain MRI Segmentation: State of the Art and Future directions	2017	Z. Akkus, A. Galimzianova, A. Hoogi, D. L. Rubin	Deep learning,CNN	Provide high quality features	Huge quantity of data is needed
3.	Model-based clustering using copulas with applications	2016	. Kosmidis and D. Karlis	Multivariate discrete data Mixed-domain data	Ability to obtain a range of exotic shapes for the clusters	Does not establish relationship
4.	Devising Classifiers for Analyzing and Classifying Brain Tumor Using Integrated Framework PNN	2015	Dr. Pallavi Shrivastava, Dr. Akhilesh Upadhyay, Dr. Akhil Khare	Probabilistic Neural Network ,artificial neural network	Optimal classification	More memory space

IV.ALGORITHM

1.Logistic regression algorithm
2. Binarization
3. Line segmentation algorithm
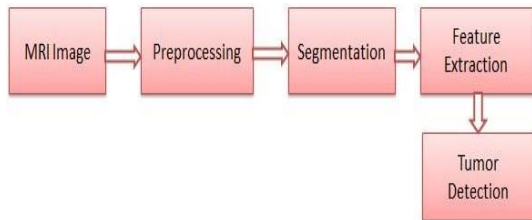4. Image thresholding

V.SYSTEM ARCHITECTURE

Figure2: Steps in Image Processing

VI.RESULT ANALYSIS:

According to the result, we conclude that, the logistic regression model that can identify the factor which affect status of tumor patients and also predict status of tumor patients.Thus,further interesting studies could be applying this method to be used with other disease and also applying other statistical method to analyze data and compare results.

VII.CONCLUSION:

This paper gives the different methodologies used by the researcher to detect the brain tumor using MRI images. The above used method gives the conclusion that machine learning shows an important role in the detection of brain tumor and classification with appropriate segmentation approach.

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