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NOVEL APPROACH FOR DETECTION OF BRAIN TUMOR :A REVIEW

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Abstract - *Automated defect detection in medical imaging has become the evolving field in several medical diagnostic applications. Automated detection of tumor in Magnetic Resonance Imaging (MRI) is very significant as it provides information about abnormal tissues which is necessary for planning treatment. The conventional method for defect detection in magnetic resonance brain images is human inspection. For large amount data the conventional method is unworkable. So, automated tumor detection methods are necessary as it would save radiologist time. The MRI brain tumor detection is difficult task due to complication and variance of tumors. Accuracy in detection of size and location of brain tumor plays a vital role in the diagnosis of tumor. Image processing is an active research area in which medical image processing is a highly challenging field. Image segmentation plays a significant role in image processing as it helps in the extraction of suspicious regions from the medical images. In proposed work pre-processing steps are applied on brain MRI scans. Pre-processing steps include image filtering as medical images consists noise. After pre-processing, segmentation of the image is done with the help of K-mean Clustering. The classification of image is done by SVM algorithm.*

Key Words: **MRI scan, K-mean clustering, brain Support Vector Machine(SVM) algorithm.**

1.INTRODUCTION

A tumor can be characterized as a mass which develops with no control of ordinary powers. A Brain tumor occurs when abnormal cells form within the brain.There are two main types of tumor cancerous tumor or malignant tumor and benign tumor. Cancerous tumor can be classified into primary tumor that start within the brain and secondary tumor that have spread from somewhere, known as brain metastasis tumor. All types of brain tumor may produce symptoms that vary depending on the part of the brain involved. These may include headaches, seizures, problem with vision, vomiting. We are aiming to propose a model of a medical expert system which could help the medical experts to detect the Brain Tumor. Image processing is a process where input image is processed to get output also as an image or attributes of the image. Main aim of all image processing techniques is to identify the image or object under consideration easier visually. Segmentation of images holds a important position in the field of image processing. Segmentation is important for feature extraction, image measurements and image display. Image segmentation can be defined as the partition or segmentation of a digital image into similar regions with a main aim to simplify the image under consideration into something that is more meaningful and easier to analyze visually.

MRI scans are very useful for assessing many brain related disorders. MRI regarded as better tool for brain imaging as MRI provides detail pictures of brain and nerve tissues in multiple planes without obstruction by overlying bones. The task of analyzing a large amount MRI scans daily demanded by medical centres is tiresome and radiologists should have some automatic tools to support it. The proposed automated method is to classify the Brain MRI images into two categories i.e. normal and abnormal.

1.1 RELATED WORK

KNN is the simple method which required low computational cost. An automatic medical image classification technique KNN classifier is used to classify the medical image into normal and abnormal image this concept Presented by R. J. Ramteke et al.[1].

MRI image classification technique based on SVM classifier proposed by Khushboo Singh etal.[2].Advanced classification techniques based on Support Vector. Support vector machine is a supervised learning algorithm. In SVM, the classification is performed by quadratic programming.

An efficient brain tumor detection algorithm using watershed and threshold based segmentation implemented by A .Mustaqeem, et al [3]. This research was conducted to detect brain tumors using medical imaging techniques.

ANN is a mathematical problem which is inspired by the biological nervous system Priyanka et al.[4] proposed a urvey on the brain tumor detection algorithm and its location in the brain.Shweta Jain et al.[5] extract a feature using GLCM technique and extracted features were classified using the artificial neural network.

P.Vasuda and S.Satheesh [6] proposed a technique to detect tumors from MR images using fuzzy clustering technique. This algorithm uses fuzzy C-means but the major drawback of this algorithm is the computational time required.

Sindhushree. K.S, et al [7] have developed a brain tumor segmentation method and validated segmentation on two dimensional MRI data. Also, detected tumors are represented in three dimensional view. High pass filtering,

histogram equalization, thresholding, morphological operations and segmentation using connected component labeling was carried out to detect tumor. The two dimensional extracted tumor images were reconstructed into three dimensional volumetric data and the volume of the tumor was also calculated

Gopal et al [8] proposed a smart system Brain Tumor Through MRI utilizing Image Processing Algorithm, for example, Fuzzy C Means Along with Intelligent Optimization Techniques", diary of IEEE 2010.

It is designed to diagnose brain tumor through MRI using image processing clustering algorithms such as fluffy C Means along with intelligent optimization tools, such as Genetic Algorithm (GA), and Particle Swarm Optimization (PSO). The average results classification error of GA is 0.078%. The average accuracy GA is 89.6%. PSO gives best classification accuracy and average error rate. In this the Average classification error of PSO is 0.059% and the accuracy is 92.8% and tumor detection is 98.87%. Therefore, we saw that average classification error is reduced when the number of sample is increased. This report has provided substantial evidence that for brain tumor segmentation of PSO algorithm performed well.

Badran et al [9], proposed an innovative system which can be used as a second decision for the surgeons and were based on adaptive thresholding. It determines whether an input MRI brain image represents a healthy brain or tumor brain as percentage it defines the tumor type; malignant or benign tumor.

2. PROPOSED ARCHITECTURE

We have proposed segmentation of the brain MRI images for detection of tumors using K-Means clustering technique. A cluster can be defined as a group of pixels where all the pixels in certain group defined by similar relationship. Clustering is also unsupervised classification because the algorithm automatically classifies objects based on user given criteria. Here K-Means clustering algorithm for segmentation of the image is used for tumor detection fromMRI scan .

The proposed system is as shown in figure:

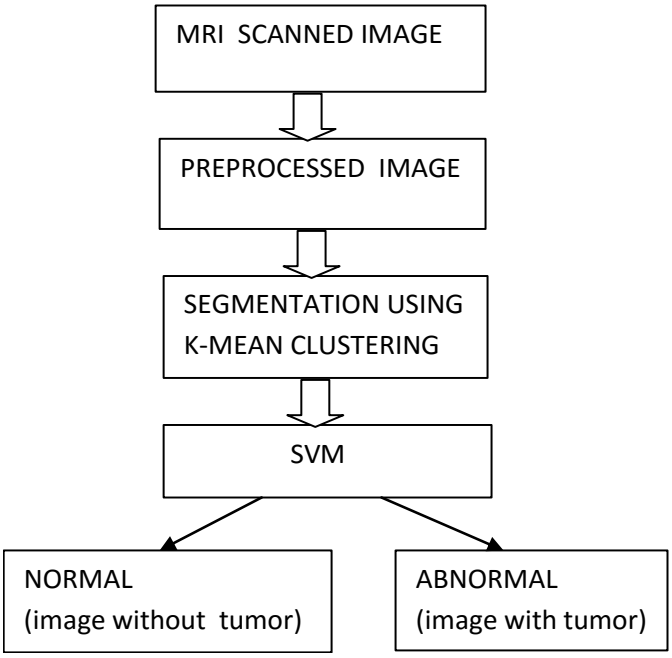

FIG:PROPOSED SYSTEM FOR BRAIN TUMOR DETECTION

2.1 DESCRIPTION

MRI scans of the human brain forms the input images for our system where the grayscale MRI input images are given as the input. Noise present if any, will be removed using a filter. Image enhancement is done for better result. The pre-processed image is given for image segmentation using K-Means clustering algorithm.

Input Image

MRI scan is given as input to the system. MRI scan is preferred as it give the detail picture of nerves tissues and brain in different planes without obstacle and it gives better result than CT(computed tomography)scan.

MRI scanners use strong magnetic fields, electric field gradients, and radio waves to generate images of the organs in the body. MRI does not involve X-rays and the use of ionizing radiation, which distinguishes it from CT or CAT scans.

Pre-processing stage

In this stage image is enhanced in the way that finer details are improved and noise is removed from the image. Most commonly used enhancement and noise reduction techniques are implemented that can give best possible results. Enhancement will result in more prominent edges and a sharpened image is obtained, noise will be reduced thus reducing the blurring effect from the image. Filtering is done to remove noise from the medical images because medical images are somewhat noisy. In proposed work we will use filter to smoothing and removing noise from the

image. In addition to enhancement, image segmentation will also be applied. This improved and enhanced image will help in detecting edges and improving the quality of the overall image. Edge detection will lead to finding the accurate position of tumor.

Segmentation using K-Mean clustering :

Segmentation is an essential process to extract information from complex medical images. The main objective of segmentation is to simplify or change the representation of an image into something that is more meaningful and easier to analyze and the pixels within the region are homogeneous with respect to a predefined criterion. Clustering is division of data into groups of alike objects. Each group consists of objects that are comparable between themselves and dissimilar to objects of other groups.

FEATURE EXTRACTION

In this stage we need to retrieve the valuable information from the MRI images after pre-processing. It is the process of collecting higher-level information of an image such as shape, texture, color, and contrast. In fact, texture analysis is an important parameter of human visual observation and machine learning system. It is used effectively to improve the accuracy of diagnosis system by selecting important features.

CLASSIFICATION:

Support vector machine(SVM) is the linear learning algorithm used for classification. The process of classification forward through training and testing. Support vector machine (SVM) is the linear learning algorithm used for classification. SVM will classify the image into normal and abnormal.

3. CONCLUSIONS

MRI images are best suitable for brain tumor detection. In this study , Digital Image Processing Techniques are important for brain tumor detection for MRI images. The preprocessing techniques include different methods like Filtering, threshold, histogram equalization(CLAHE) is used for image smoothing. Preprocessing is necessary as medical images contains noise. The preprocessed images are used for post processing operations like; feature extraction(shape ,color & texture), segmentation(K-mean), which is then followed by SVM decision making as a final step for classifying every super pixel as tumor or non-tumor respectively.

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