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Identification And Recognition Of Brain Tumor At Early Stage With The Help Of Image Processing Technique

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Abstract- A brain tumor is defined as the abnormal growth of cells in the brain. There are many types of brain tumors exist some of them are noncancerous and some are cancerous. If the brain tumor is cancerous, early prediction may leads to cure the tumors. These brain tumors are highly dangerous because they accumulate the pressure on the healthy parts of the brain and starts to spread that leads to serious conditions. The increase in pressure is due to the blockage of fluids that flows around the brain that leads to increase the pressure in entire skull regions. Thus by predicting the brain tumors at the early stage can cure them with appropriate treatments. The proposed system identifies and recognises the brain tumor cells at an early stage with the image processing techniques by identifying the tumor cells with healthy cells.

Keywords : Tumor cells, brain, pressure, image processing technique, feature extraction

I.Introduction

In the central nervous system the brain is the imporatnt organ that controls each and every functions of the body. The bodily activities from head to toe is controlled and functioning by the central nervous system. It receives information from the sense organ from the body and sends the signal to the respective organs [1]. Due to irregular growth of unwanted cells and tissues in the neural system leads to brain tumors. The tumors which are highly cancerous are termed as malignant tumors [2]. The two types of the tumors are benign tumor and malignant tumors. In benign tumors, the expnasion of cells are slower and doest not cause any severe damage to the brain whereas the malignant tumors are highly dangerous due to the hurried develpoment of cells in the brain. They are caused due to various psychiatric complications such as depression and stress. The diagnosis at the early stage may leads to cure the malignant tumors [3]. Machine learning plays a sigificant role in the detection and identification of major aliments through artificial intelligence. The symptoms of brain tumor involves sudden headaches, nausea and vomiting, vision difficulties, prolonged fewer and difficult to move [4]. These are the first stages of brain tumor and by prolonged symptoms leads to several consequences. The brain image analysis is a complex process and it needs more computational time to monitor and detect. The proposed system is developed through the MRI image with image preprocessing,

segmentation of image, feature extraction with image processing [5]. The diagnosis of brain involves the image segmentation into several tiny parts to analyse the defects in the cells and tissues through the artificial neural networks. This system enables by using the functioning as compared to human neural system and providing a appropriate output for diagnosis and identifcation at earlier stage [6].

II.Proposed system

The analysis and detection of the tumor cells is important to find the classification of tumor cells. The analysis and detection of the tumor cells gives the complete details of the central nervous system. To diagnose and identify the tumor cells at the earlier tsge is done through the image processing technology. The image processing technology enables the dectection of the tumors at the earlier stsge by identifying the detected cells and tissues by comparing the actual healthy cells to that of the defected cells. This detection works based on the neural networks. The machine learning is nothing but the ability of the machine to work and perform as similar to the functioning of the human brain through training and testing. Thus the proposed system plays a prominent role in the detection and analysis of the tumor cells at initial stages.

III.Methodology

1.Stages of image processing

The first stage includes preprocessing which is a technique used to convert the raw data by cleaning and organizing by the desired output i.e a clean dataset. This is essential for building and training the new machine learning models [7]. The several stages of preprocessing involves data quality assessment, cleaning data, transformation of the given data into desired data and data reduction. It is a transformation for converting obtained data [8]. It is done before feeding into the algorithm. This is done because the data that feeded to the algorithm must be a proper data to solve the given problem and to obtain the desired output.

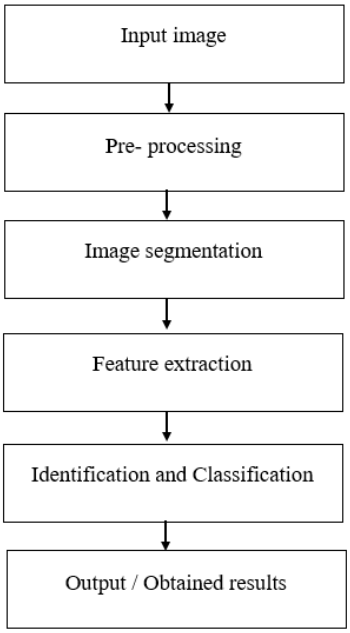

Fig 1: Image processing

The figure 1 represents the image processing stages from input image to the desired and expected results.

2.Analysis of dataset

A dataset is a cumulative of several data that are related with the discrete items of the data that are arranged and depicted based on the data structures. They are classified as based on record data, graph based data and ordered datasets. The figure 2 represents the datasets.

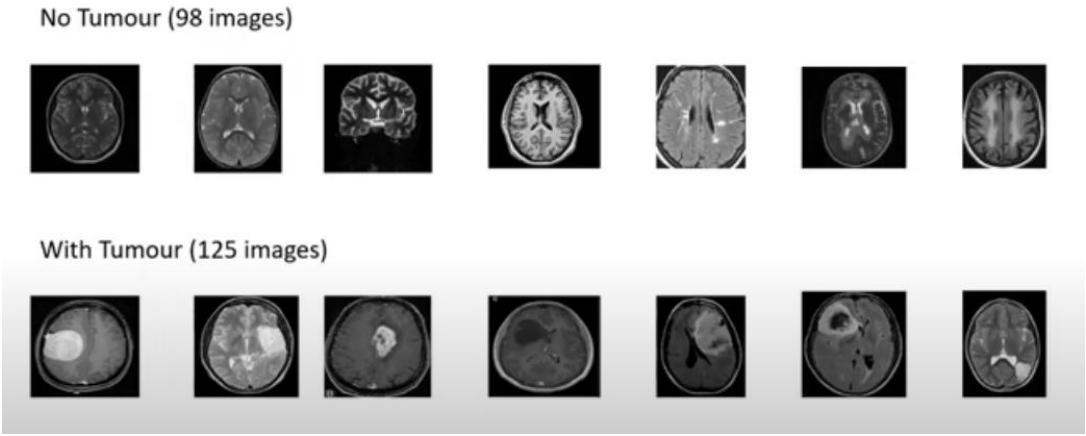

Fig 2: Datasets

3.Preprocessing of image

he MRI images are furthur processed and classified to detect the brain tumors. The preprocessing is the initial stage for the image processing technology. It is obtained by the threshold values. This is done by eliminating the noise using filters and reshape the obtained images to analyse the corrcet desired output [9]. By doing and correcting minute mistake provides the accurate information regarding the desired output.

The furthur noise in the preprocessing step is neglected by using the adaptive filters. The filters used reducing the noise are classified as median filter, mean filter, wiener filter, hybrid filter, hybrid filter and modified hybrid filter [10]. This filters are necessary to obtained a clean dataset. The preprocessing results with original images from dataset and the normalized images are shown in figure 3 and 4.

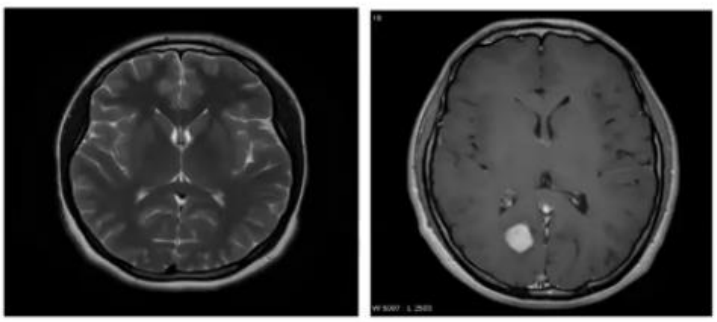

Fig 3: Original images from the dataset

The original images from the dataset gives the information regarding the tumor cells. It holds the complete information which is used for the further stages of image processing techniques

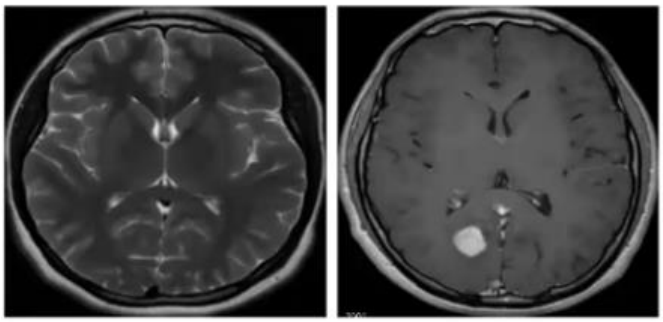

Fig 4: Normalized images

3.Data augmentation

For data augmentation, the ImageDataGenerator by the Keras is used. This uses the original batch with the new datasets that are randomly formed by the updated images from the provided datasets. The figure 5 shows the data augmentation.

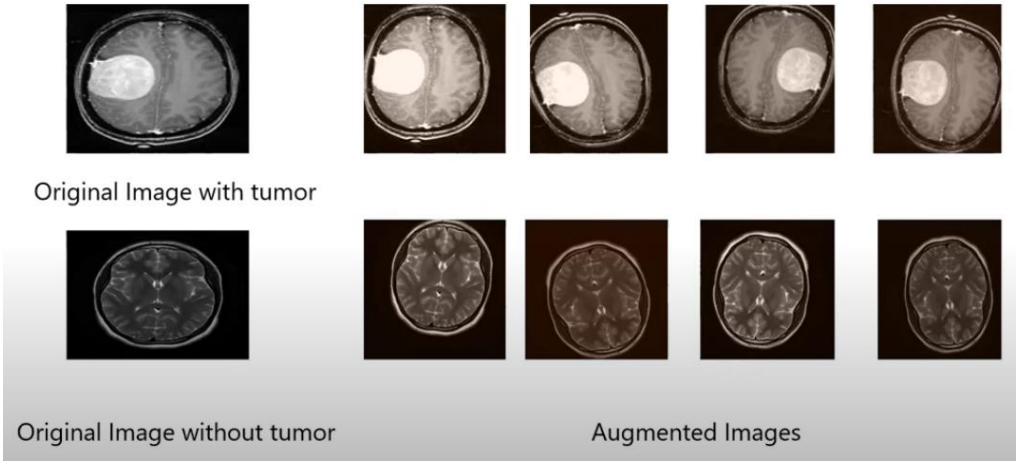

Fig 5: Data augmentation

4.Network selection

The selection of a network is based on higher test proceeded with higher validation accuracy. Here the networks used are the artificial neural networks that functions and computes based on the biological neural networks. They are formed through the connected nodes are called neurons [11]. This is a computational model that consists of several processing models which contain input and output and gives the desired results. It is also capable of pattern recognition [12].

The types of neural networks are modular neural network, feedforward neural network, self organizing neural network and convolution neural network. This series of algorithm enables to obtain the desired results by the uderlying relationships in the given data set [13-15].

IV.Simulation Results

The data set with training and testing is don eto obtain the higher efficiency in detecting the tumor cells are detected in the figure 6 shown below

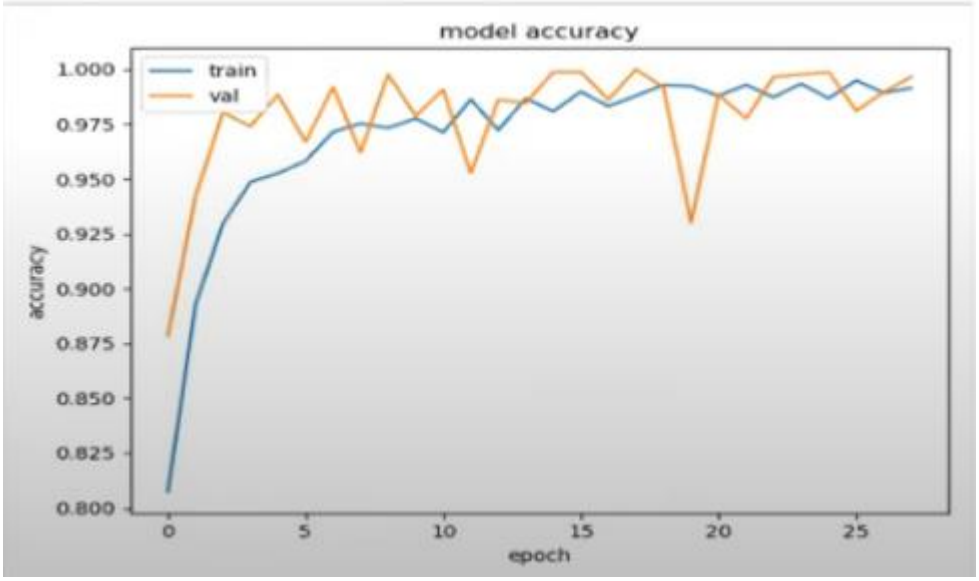

Fig 6: Training and testing of datasets

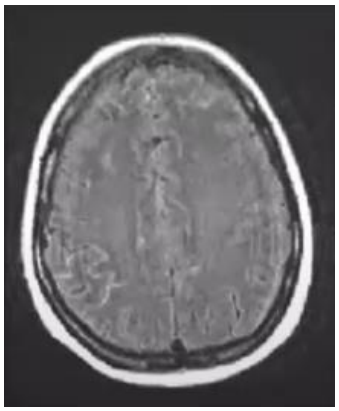

Fig 7: Tumor image

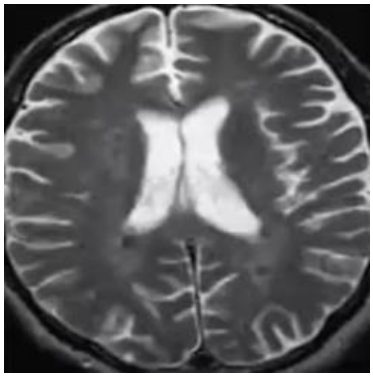

Fig 8: No tumor image

The above figure 8 represents the tumor and non tumor images from the preprocessing stage proceeded by the feature extraction methods. Thus by using the image processing technique the tumor cells are detected.

V.Conclusion

The objective of the system is to analyse and identify the tumor cells to that of the original healthier cells through the image processing technique. This identification of the tumor cells at the early stage helps in the diagnosis for speedy recovery. Thus this system plays a prominent role in the detection of the tumor cells. In this methodology, the tumor cells can be detected through greater accuracy at higher speed. This proposed system gives a complete outcome to know about the central nervous system.

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