International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 05 | May 2020 www.irjet.net p-ISSN: 2395-0072

Prediction of Brain Tumor using Machine Learning Algorithm

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Abstract - *The Brain Tumor is affecting many people worldwide. It is not only limited with the old age people but also detected in the early age. Brain Tumor is the abnormal growth of cells inside the brain cranium which limits the functioning of the brain. Early detection of the brain tumor is possible with the advancement of machine learning (ML) and image processing. It helps the medical staff as well as the patient to understand the seriousness of the tumor with the help of different color-labeling for different levels of elevation .A GUI for the contour of the tumor and its boundary can provide information to the medical staff on click of user choice buttons. Keyword- Brain, CT, Contrast Adjust, Structural Element, Erosion, Dilation, Negation, Tumor Detection, Contour, C-label , GUI.*

***Key Words*:Tumor Prediction, Brain, CT Algorithm, MRI, PNN**

I. INTRODUCTION

Brain tumor occurred when the cells were dividing and growing abnormally. It appears to be a solid mass when it is diagnosed with diagnostic medical imaging techniques. There are two types of brain tumor which is primary brain tumor and metastatic brain tumor. Primary brain tumor is the condition when the tumor is formed in the brain and tends to stay there while the metastatic brain tumor is the tumor that is formed elsewhere in the body and spread through the brain.

The symptom of brain tumor depends on the location, size and type of the tumor. It occurs when the tumor compresses the surrounding cells and gives out pressure. Besides, it also occurs when the tumor blocks the fluid headache, nausea and vomiting, and having problems in balancing and walking. Brain tumor can be detected by the diagnostic imaging modalities such as CT scan and MRI. Both of the modalities have advantages in detecting depending on the location type and the purpose of examination needed. In this paper, we prefer to use the CT images because it is easy to examine and gives out accurate calcification and foreign mass location.

Fig 1: Steps for Image Processing

II. LITERATURE SURVEY

In recent years, image processing has applied to process images in medical stream, in cooperating cell detection. Astina Minz, et al. [1] propose Adaboost & Neural Algorithm which can be operated to make tumor detection easier. The MRI deals with the complicated problem of brain tumor detection.

Garima Singh, et al. [2] using a methodology to study and classifying the image denoising filters i.e. Median filter, Adaptive filter, Averaging filter, Unsharp masking filter and Gaussian filter used to remove noises present in the MRI images.

Parveen et al. [3] implements a blend methodology of combining support vector machine and fuzzy-means clustering for classification gives accurate result for identifying the brain tumor.

B.Devkota et al. [5] suggest a new method which noticing brain tumor in their early stages with the help of MRI images which is being implemented for preprocessing by median filter and Fuzzy C-means for segmentation.

Alexander Zotin et al.[6] presents brain tumor edge detection using MRI images that are depend on Fuzzy C-means clustering in biomedical image.

Damandeep Kaur, Surender Singh[7] offer that segmentation proved to be the best method in the group of all different techniques used in different phases of tumor detection.

From the above-mentioned techniques and using other technologies, this research paper focuses on the recognition of brain tumor using image processing techniques.

III. METHODOLOGY

A description of the derivation of the PNN classifier was given. PNNs had been used for classification problems. The PNN classifier presented good accuracy, very small training time, robustness to weight changes, and negligible retraining time. There are 6 stages involved in the proposed model which are starting from the data input to output. The first stage should be the image processing system. Basically in the image processing system, image acquisition and image enhancement are the steps that have to be done. In this paper, these two steps are skipped and all the images are collected from available resources.

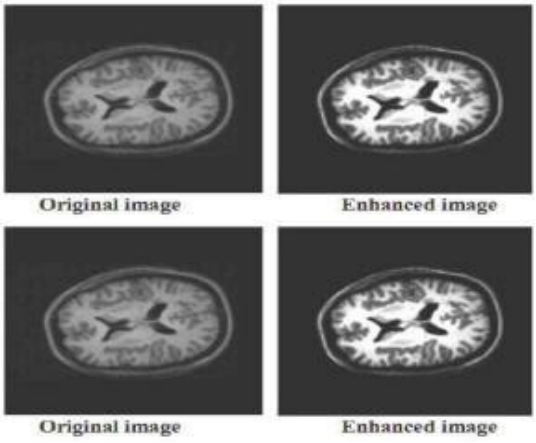

Fig 2: MRI Image

The proposed model requires converting the image into a format capable of being manipulated by the computer. The MR images are converted into matrices by using MATLAB. Then, the PNN is used to classify the MR images. Lastly, performance based on the result will be analyzed at the end of the development phase.

Present System Description

MRI Brain image Classification and anatomical structure analysis are proposed based on:

1. Loading the database to save image feature using graycoprops class.
2. Using PNN-RBF Network for classification.
3. Using K-means clustering for tumor detection and structural analysis.
4. Load the images and extract features and hold in temp variables.

5. KNN is used to classify tumor types.
6. Random Forest are used to classify tumor.
7. SVM is used to classify the tumor and accuracy percentage.

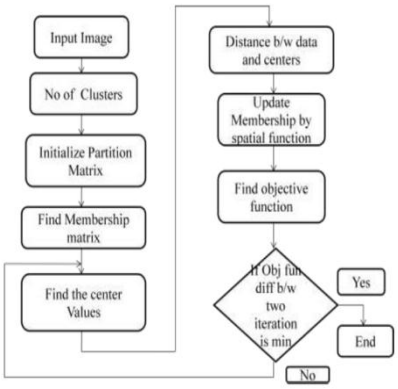

Fig3: Flow Diagram

K-means algorithm	Fuzzy c means algorithm
It is referred as Hard clustering.	It is referred as extended from of hard c means clustering .
This algorithm is applied to analyze data and treat observations of the data . The objects are based on the location and distance between various input data points .	This algorithm is applied for analysis based on distance between various input data points .
Each cluster is has a centre point i.e known as centroid .	Cluster has a cluster centre based on the distance between the data points .
May not be successful to find overlapping clusters .	Objects may be associated with different clusters .

Fig4: K-means v/s Fuzzy c means

Hardware Requirements

For running the real time application to detect driver fatigue, the hardware requirements are:
1. Processor: Intel Pentium IV Processor
2. RAM : 1 GB
3. HDD : 20 GB
4. Webcam : 15 Mega Pixels

Software Requirements

For running the real time application to detect driver fatigue, the software requirements are:
1. Operating System: Windows 95/XP/7
2. Programming Toolbox : MATLAB R2013a

MATLAB

MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment and fourth-generation programming language. Developed by MathWorks, MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, Java, and Fortran.

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed with familiar mathematical notation. Typical uses include:

1. Math and Computation
2. Algorithm Development
3. Data Acquisition
4. Modeling,Simulation,Prototyping
5. Data Analysis,Exploration,Visualisation

IV. RESULT

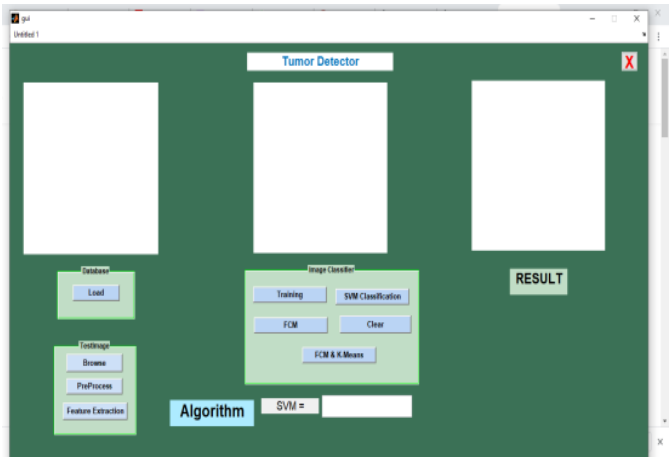

Fig 5: GUI using Matlab

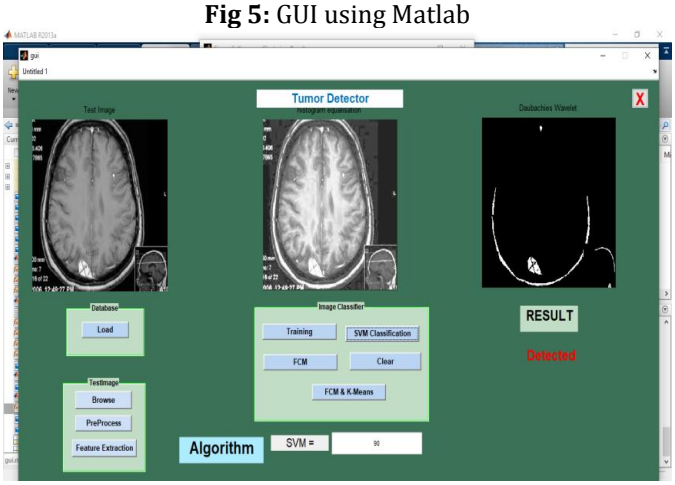

Fig 6: Detection of Tumor

V. CONCLUSION

The proposed algorithm is inputted with gray scale images of the brain that contain tumour/s. The image is processed through various stages of morphological operations like filtering, contra adjustment, erosion, dilation etc. through MATLAB programming. Hence, the tumour is outlined in the original image and clearly demarcated. Contour plot and c-label plot is created to provide 3D visualization from the 2D image. A GUI is also developed which enables the above application with a user friendly interface.

ACKNOWLEDGEMENT

The authors would like to extend their esteemed thanks to Ms. Bindu Rani, Professor, IT Department, Inderprastha Engineering College special thanks to Dr. Pooja Tripathi, HOD, IT Department, Inderprastha Engineering College.

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