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BRAIN TUMOR SEGMENTATION BASED ON SFCM USING PROBABILISTIC NEURAL NETWORK WITH RASPBERRY PI

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Abstract: **Calculating automatic defects detection in MR images is essential in many diagnostic and therapeutic applications. Because of high quantity data in MR images and blurred boundaries, tumor segmentation and classification is very hard. This process has detection method to use increase accuracy and decrease diagnosis time. Particular process goal has to classify the tissues into three classes of regular, begin and malignant.**

In MRI images, the amount of data is too much for manual interpretation and analysis. Using brain tumor segmentation used magnetic resonance imaging (MRI), and his used become research area in medical image system . Brain tumor detection method is identified accurately of size and location of brain cancer (Tumor) plays a vital role in the diagnosis of disease. The diagnosis method consists of four stages, pre-processing of MR images, feature extraction, and classification. After MRI Image classification equalization of the image, the features are extracted based using Dual-Tree Complex wavelet transformation (DTCWT). In the last stage, Probability Neural Network (PNN) is employed to classify the Normal and abnormal brain. A practical algorithm is proposed for tumor detection based on the Spatial Fuzzy C-Means Clustering. Raspberry pi kit using sending data to doctor mail id.

Keywords*—Matlab S/ W, Raspberry –pi Kit, Online Database images.*

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I INTRODUCTION

In this tumor is defined as the irregular growth of the tissues.

The brain tumor is an abnormal mass of tissue in which cells grow up and multiply uncontrollably. Brain tumors may be primary or metastatic, and either malignant or benign. A metastatic brain tumor stage is cancer which has spread from anywhere in the body to the brain. MRI brain tumor segmentation provides useful information for surgical planning and medical diagnosis.

Types of Tumor

There are three general types of Tumor:

1. Benign
2. Pre-malignant
3. Malignant

1. **Benign Tumor**:- This particular type doesn't affect neighboring healthy tissues and also does not expand to non-adjacent.

2. **Pre-Malignant Tumor**:- In this types a precancerous stage. It is considered as a disease, if not properly treated it may lead to cancer.

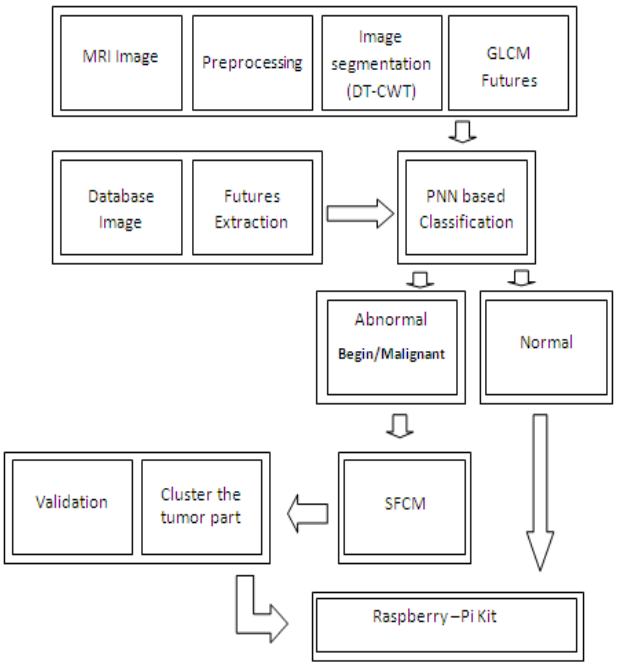
3. **Malignant Tumor**:-In this types which grow worst with the passage of time and ultimately results in the death of a person. The term malignant tumor is typically used for the description of cancer.

In this process, real-time diagnosis of tumors using more reliable algorithms and the primary focus of the latest developments in medical image and detection of a brain tumor in MRI images and CT scan images the process is an active research area.

MRI image is used detect the biomedical structure of the body. This technique use detects the difference in the tissues better than to CT scan. MRI technique as very important for the brain tumor detection MRI uses the strong magnetic field to align the nuclear magnetization then radio frequencies change the alignment of the magnetization which can be detected by the scanner. That signal can be further processed to create the extra information of the body. MR image is safe as compared to CT scan image as it does not affect the human body. In this process MRI image not find an accurate value of brain tumor. The manual calculates not accessible by using MRI image. Because of MRI HD-Image is burred and not calculate the precise value. But MRI –image

used in PNN (Probability Neural Network) to identified to patient witch stage (Benign, Pre-malignant, Malignant)and patient detect brain tumor the output of PNN give to simple fuzzy C-mean(SFCM) algorithm or don't detect brain tumor stop process. SFCM algorithm most using calculate tumor size in percentage (%).This algorithm identified in less time accurate value estimates. The computed value or all information to patient give to the doctor by using Raspberry – Pi. This data transfer to doctor mail id or patient mail id without losing any information. Raspberry-pi kit is easy to interface with computer and laptop, and inbuilt RAM, WIFI – Director, less power consumption, accuracy is more than another processor.

II PROPOSED METHOD



Pre-processing:-

The bias field distortion alters MRI images. His makes the intensity of the same tissues to varying across the image. To correct it, we applied the N4ITK method. However, this is not enough to ensure that the intensity distribution of a tissue type is in a similar intensity scale across different subjects for the same MRI sequence, which is an explicit or implicit assumption in most segmentation methods. In fact, it can vary even if the image of the same patient is acquired in the same scanner in different time points, or in the presence of pathology. So, to make the contrast and intensity range more similar across patients and acquisitions, we apply the intensity normalization method proposed by Nyul´ et al. on each sequence. In this intensity normalization method, a set of intensity landmarks IL = fpc1; ip10 ; ip20 ; ; ip90 ; pc2g are learned for each sequence from the training set. pc1 and pc2 are chosen for each MRI sequence as described. April represents the intensity at the nth percentile.

After training, the intensity normalization is accomplished by linearly transforming the original intensities between two landmarks into the corresponding learned landmarks. In this way, the histogram of each sequence is more similar across subjects. After normalizing the MRI images, we compute the mean intensity value and standard deviation across all training patches extracted for each sequence. Then, we normalize the patches on each sequence to have zero mean and unit variance1. 1The mean and standard deviation computed in the training patches are used to normalize the testing patches.

Dual-Tree Wavelet Transforms

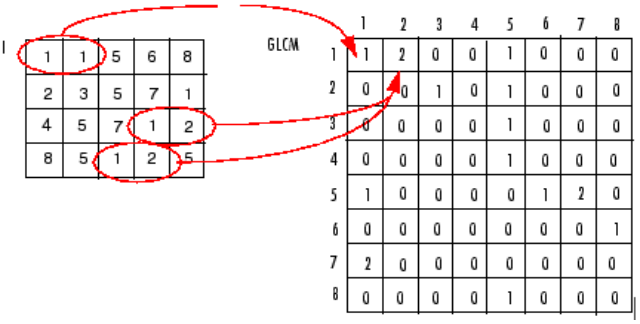
Image fusion ends up very famous for its application in various real lifestyles applications such as remote sensing packages, clinical image analysis. The non-idle nature of sensible imaging structures the capture pics is corrupted by noise. Consequently, Fusion of pics is an included technique in which the reduction of noise is essential. Discrete Wavelet rework (DWT) has an extensive range of application in the noise photographs. But shift-invariance is vital in making sure strong sub-band fusion. To conquer this, dual-tree complex Wavelet remodels (DT-CWT) is delivered for fusion of noise pictures. Complicated wavelet rework is complicated valued extension of the usual wavelet. Experiments are finished on some of the photographs like SAR pics, MRI photographs, doll photos and toy images to evaluate the performance of the proposed technique. Effects show that the DT-CWT technique is higher than that of DWT technique in phrases of first-class measures peak signal-to-noise ratio, pass correlation and image visual great.

Gray-Level Co-Occurrence Matrix

This process using creates a GLCM, use the gray co-matrix function. Particular function form gray level Co-occurrence matrix GLCM by calculation how often a specific pixel with the intensity value I occur in a specific spatial relationship to a pixel with the value j. This process number of gray levels in the image determines the size of the GLCM. By default, gray co-matrix uses scaling to reduce the number of intensity values in an image to eight, and you can use the Num Levels and the Gray Limits parameters to control this scaling of gray levels. In GLCM has revealed specific properties about the spatial distribution of the gray levels in the texture image.

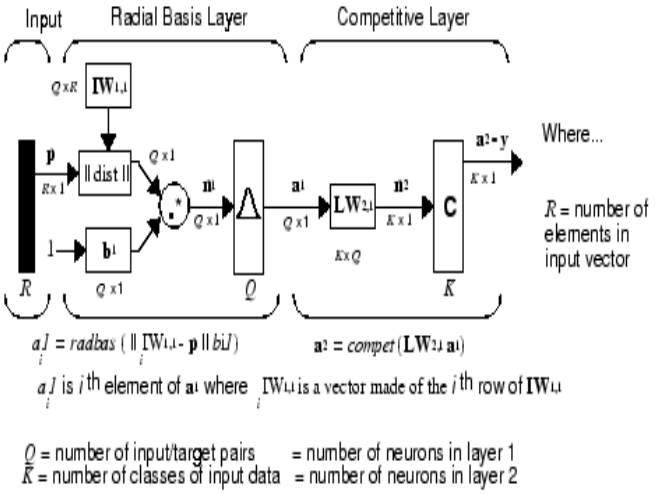
For example, the GLCM is concentrated along the diagonal and texture is coarse concerning the specified offset .in GLCM can also derive stoical measures, and the derive statistics from GLCM and more information from plot correlation .show in the following fig. how to gray co-matrix

calculate the 1st three value in given GLCM.



Probabilistic Neural Network

In this process of probabilistic neural networks is used in for classification problems. PNN input is present, the first layer computes distances from the input vector to the training input vectors and produces a vector whose elements indicate how close the information is to a training input. It is second stage sum 0f the calibration for each class input to produces net output a particular vector of probabilities. The final stage to compute transfer function given out stage. In second stage pick going maximum prospects. His delivers one for class and zero used other courses. Show below process architecture system.



Fuzzy C-mean clustering:-

C- mean Clusters are identified via similarity measures. In this similarity tests using rules include distance, connectivity & intensity. Finding different similarity to based on data or app simple fuzzy c-means algorithm his very similar to K – means algorithm. A fuzzy cluster is all point degree of belonging to a group in the fuzzy logic or his related entirely just one cluster. This point edge of the cluster is to the lesser degree to the points in the center of the group. Overview of comparison of the different fuzzy clustering algorithm is available.

Fuzzy c-means clustering

The FCM algorithm is most widely used fuzzy clustering algorithms. The FCM algorithm attempts to partition a finite collection of elements X={,...,} into a collection of c fuzzy clusters concerning some given criterion. The algorithm is based on minimization of the following objective function:

$$J_m = \sum_{i=1}^{N}\sum_{j=1}^{C} u_{ij}^{m} \left\| x_i - c_j \right\|^2$$

where m (the Fuzziness Exponent) is any real number greater than 1, N is the number of data, C is the number of clusters, uij is the degree of membership of xi in the cluster j, xi is the Ith of d-dimensional measured data, CJ is the d dimension center of the cluster, and ||*|| is any norm expressing the similarity between any measured data and the center. {\display style \varepsilon }

◦ Given a finite set of data, the algorithm returns a list of c cluster centers V, such that

V=vi, i =1, 2, ... , c

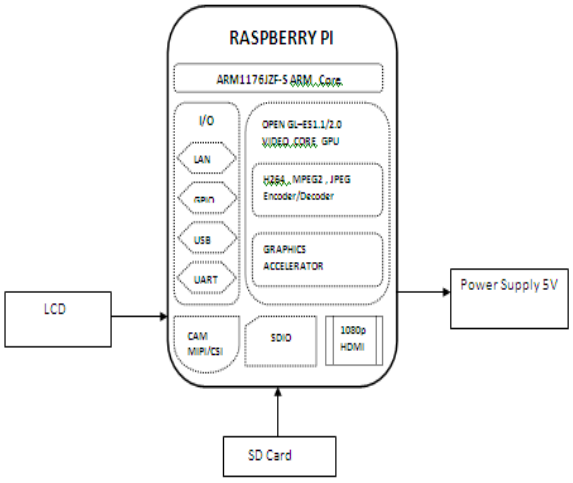
◦ and a membership matrix U such that

U = uij , i =1, ..., c , j =1,..., n

◦ Where uij is a numerical value in [0, 1] that tells the degree to which the element xj belongs to the i-th cluster.

◦ Summation of membership of each data point should be equal to one.

III RASPBERRY- PI SYSTEM



This model is very important part of communication between the computer to Human, less time to transmitted information regarding brain tumor give to doctor mail id. Without losing information . this model using less power consume and inbuilt WI-FI model to communicate to brain detection H/W to Computer .Above given basic diagram model for raspberry - pi.

Advantages

- It can segment the Brain regions from the image accurately.
- Classifying the Brain Tumour images for accurate detection is used.
- Brain Tumor will be seen at an early stages
- These techniques allow us to identify even the smallest abnormalities in the human body.
- The various types of medical imaging processes available to us, MRI is the most reliable and safe

Disadvantages

- Over all process more time required.

Application

- Brain Tumor diagnosis system for medical application

IV CONCLUSION

Here an automated brain detection method using PNN and Spatial Fuzzy algorithm is proposed in this work.The experimental results regarding qualitative and quantitative metrics of the proposed algorithm and another state of art technique are prepared with better performance of a proposed neural network is demonstrated. In our future work, we are doing it to implement in the FPGA board for the efficient use of them in the proposed architecture.

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