BRAIN TUMOR DETECTION USING LOCAL INDEPENDENT PROJECTION BASED CLASSIFICATION (LIPC)

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Abstract: In past decade, Tumor is one of the dangerous diseases in the world causing death of many people. MRI is one of the imaging technique which is widely used for tumor detection and classification. Also there are various methods for detection of brain tumor other than LIPC. Convolution neural network (CNN) is used in convolving a signal or an image with kernels to obtain feature maps. The image processing techniques such as equalized image, feature extraction and histogram equalization have been developed for extraction of the tumor in the MRI images of the cancer affected patients. Support Vector Machine (SVM) algorithm that works on structural risk minimization to classify the images. The SVM algorithm is applied to MRI images for the tumor extraction and a Simulink model is developed for the tumor classification function. Typical structure for this proposed system has four steps. In The initial stage is pre-processing using Gaussian filter. Thresholding has been employed in the second steps for segmentation. The third step is to check the feature extraction of MRI images. The fourth steps is classification that classified the tumor of MRI images using local independent projection based classification.(LIPC).

Index Terms: MRI images, feature extraction, LIPC.

I. INTRODUCTION

The Human brain is the most amazing and complex thing known in the world. The brain is just like any other organ of the body exposed to many diseases including tumors. Brain tumors are one of dangerous diseases in the world. The detection and determination of the tumor type initial step is very important for the cure of the patient. Magnetic Resonance Imaging (MRI) is one of the essential tools in medical research. Approximately 3,549 peoples and adolescents under age 16-45 are diagnosed with primary brain tumors each year. Brain tumors, either malignant or benign, that originate in the cells of the brain. Brain tumor image have different size, shape and location and image intensities. An automatic segmentation of the MRI image is necessary as a manual segmentation requires more time and can lead to errors. It is necessary to detect the brain tumor because treatment planning is the key method to improve the survival period of oncological patients. Numerous algorithms have been developed for brain tumor detection and segmentation. So we proposed system which is based on local independent projection based classification. The aim of the project is to detect the brain tumor by using biochemical features. based on the decision like true positive, true negative, false positive, false negative accuracy is determined.

II. LITERATURE SURVEY

In [1] In this paper the MRI images are analyzed by using the GLCM features and Multilayer Perceptron neutron. MLP forwards the network with one or more layers between the input and output layer. The proposed approach utilizes a combination of this neural network technique and is composed of several steps including segmentation using thresholding , feature vector extraction using GLCM by stating the four angles-energy ,entropy , contrast and variance and model learning. Thresholding is performed on filtered image or equalized image. Feature Extraction is process of data reduction. Extracted features are consider as input to neural classifier. For the evaluation of the proposed algorithm ISO, 20 brain MRI images are used. Segmentation is followed after histogram equalization to segment the tumor regions from the complete image, and provides a better way to evaluate the tumor region in MRI images.. Also decision is taken on the extracted images.

In [2]In this paper the detection of brain tumor of MRI images is done using the Support Vector Machine(SVM) method. SVM is supervised learning algorithm based on statistical learning. DWT to represent an image. Simulink model is used for SVM classification. This journal presents an prototype for object detection with SVM that can achieve performance while maintaining high detection accuracy. First pre-processing is done means the images are selected for tumor classification. Then feature extraction is done for detection of tumor shape and size. Then SVM training is done on the images. Then SVM classification is done by DICOM format. And finally tumor identification is identified. 82% of accuracy is obtained and the positive predictive values (PPV) 81.48%, Negative predictive value (NPV) are calculated. The True positive cases are 22, True negative 5, False positive 5 and False negative are 22.

In [3]In this paper the MRI images are detected using convolution neutral network(CNN) method. The MRI images required for brain tumor detection are processed to improve the accuracy. CNN is made up of neurons and convolution layers. Clustering is used to identify natural grouping of data from large data set to produce a concise representation of a system's behaviour. Purpose of

clustering is to identify the grouping of data. Patch extraction is performed to identify the parts of tumor in the images. The architecture of CNN is designed to take advantage of the 2 dimensional structure of an input image. Post-processing includes the segmentation , detection and extraction of MRI images. Advantages of this system is to increase the segmentation level. The accuracy is 88% of the MRI images. The accuracy is more increased using the neural network.

In [4] In this paper the MRI images are detected using Recurrent network(RNN) method. BP NN is the type of activation function chosen in the first was Log sigmoid for increasing and decreasing the nodes. Log sigmoid function is used to achieve a number of nodes in hidden layer were first increased to 270 and then decreased to 230. The number of nodes has finally increased to 300, which has been found to provide the ideal performance for RNN. Elman network is used for performance. Performance error increase when the number of nodes increase. The duration and accuracy level were high when using the Elman network during the recognition process compared to other ANN systems. The performance ration was 76.47% while for Elman it was 88.24%.

III. PROBLEM STATEMENT

Brain tumor is the unwanted growth of cells inside the human brain growing in uncontrolled manner. As it is predicted that 2020 the no of deaths are due to brain tumor i-e 50,00,000 so there is a need of automation of tumor detection .We introduce the system of brain tumor detection using machine learning technique.To reduce the death of tumor our system is a prototype to help the patients who are suffering from this type of disease.

IV. PROPOSED SYSTEM

In existing system median filtering method was used for detecting the images. We are using the Gaussian filtering method to detect the images In proposed system we are comparing the LIPC method with PNN method. Also we are comparing the two filters for the better result and smoothening. Then we are performing the segmentation to get the accuracy. Segmentation method used is Thresholding .We are applying this method on the MRI images to get the result that whether there is a tumor or not. Therefore we are developing this system as a prototype for the patients who are suffering from the tumor

V. METHODOLOGY



Figure 1.Overflow of the project

I. Pre-Processing

This step is performed for brain tumor detection on MRI images. These MRI images are not visible to the human eye. so we are performing filtering process. In this gaussian filter is apply on the MRI images. In this stage removal of noise is perform to make the image smooth. On that filtered image further processing is done.

II. Gaussian filter

Gaussian Filter is used to blur images and remove noise and detail. In one dimension, the Gaussian function is :

$$\mathbf{G}(\mathbf{x}) = \frac{1}{\sqrt{2\pi\sigma^2}} e \frac{x^2}{2\sigma^2}$$

Where σ is the standard deviation of the distribution. The distribution is assumed to have a mean of 0. The Gaussian filter is used in numerous research areas :

• It defines a probability distribution for noise or data.

• It is a smoothing operator.

III. LIPC

The segmentation of brain tumor can be considered as a multiclass classification problem. To solve this problem, a one-versus-all (OvA) strategy can be used. In the One versus all strategy, a classifier is trained per class to distinguish a class from all other classes. Therefore, N classifiers N real classification scores are computed using learned classifiers For this proposed method, the following assumption was considered as the base for LIPC. Each Sample is located on different nonlinear sub manifolds according to their classes, and a sample can be approximately represented as a linear combination of several nearest neighbours from its corresponding sub manifold.

IV. Thresholding

Thresholding is performed so as to additionally improve the determination of the delta outline gray scale. Thresholding is one of the method for segmentation which is perform on MRI images. In this tumor which is present in the images is highlighted .It converts the grayscale image into binary images. Thresholding can be used to extract subset of image structure which will passed along other operator in image processing.

V. Post-Processing

Brain tumor forms a large connected region .So the post -processing includes tumor detection, extraction from MRI images.in this stage it detects the tumor with the help of segmentation.

VI. CONCLUSION

Brain cancer is the most dangerous diseases, so early detection of this diseases is necessary. But the detection of brain cancer is most difficult task. Our proposed method follows an approach in which the stages are pre-processing using Gaussian filter, thresholding, feature extraction and then these features are used to train and test the LIPC and finally tumor is detected.

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