A Medical Image Classification using Id3 Classifier

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ABSTRACT

Segmentation and classification of brain tumors using Magnetic Resonance Imaging(MRI) and Computed Tomography(CT) is a difficult task due to the various complexity of tumors.This paper presents ID3 classifier with association rule mining for solving classification problems of the MRI images.The proposed method consists of mainly three stages, Preprocessing, Association Rule Mining and Classification.ID3 classifier is used for predicting classification based on sensitivity,specificity and accuracy.The main goal of this method is to achieve the higher accuracy rate and lower error rate.

Keywords: *Image Segmentation, ID3, Association Rule mining, Classification.*

I INTRODUCTION

Medical Imaging problems mostly involved in Image demarcation and Image codification as a main component.Object boundaries are obtained by classifying the different types of tasks.The challenges in Image classification is large Intra-class deviation and Inter-class equivocal.The same class class images have similar emergence and different class images have different visual characteristics .These properties are used to classified the image easily and effective.In real life,same class images can display quite inequality features due to a class containing multiple types of visual patterns.Different class images also be difficult to distinguish because of low contrast between different tissues and structures. This disorder is commonly seen in medical imaging and cause difficulties in image classification. Brain cancer is a complex disease, classified into different types. So called non malignant (Benign) brain tumors can be just as life-minatory as malignant tumors, as they embrace out normal brain tissue and disrupt function.

Feature extrication and classification are the two stages in image classification. Feature extrication mainly converge on raising the descriptiveness and discriminative power of features by designing a new descriptive features. A classification process can be defined by a feature set and defining a feature space decision surface.There are various classification methods to tackle the issues in medical imaging.Segmentation process improves the quality of images by using multiscale techniques.It is also used to extract the complex information from the medical images such as brain and lung nodules.There are different methods used for segmentation and detection for tumour.The classification and decision tree construction of extracted images can be a very important method for the Diagnosis.

II LITERATURE SURVEY

[1] Hong zeng et al proposed a stationary matrix logistic regression approach that directly optimizes the discriminative classifiers and robustness against the non-stationary of the ECG data. This method optimizes the robustness of the classifier in a single objective function. It improves the performance, in particular for the subject which have difficulty in controlling BCI (Brain Computer Interface) and also weakens the influences of non-stationaries.

[2] Saif Dawood Salman Al-Shaikhi et al suggested a Dictionary learning and sparse coding classification using K-SVD algorithm. This Novel

approach combines the texture features to build and learn a dictionary. The topological feature provides information about normal or abnormal based on the topology of normal brain is fixed. Compare to other methods, this sparse coding based classification outperforms and achieves the higher classification accuracy.

[3] Sergio Pereira et al proposed a Convolutional Neural Networks as a automatic segmentation method. The concepts in the context of CNN are Initialization, Activation Function, Pooling, Regularization, Data Augmentation and Loss Function. This CNN based segmentation method proves to be very effective for brain tumour segmentation.

[4] V.Anitha et al presented a two tier classifier with adaptive segmentation technique which classified the brain tumors in double training process. In this system, initially the brain images are preprocessed to removes the noise and K-Means clustering algorithm are used. By using this new two-tier classification system, it increases the overall system performance and accuracy than other classification techniques.

[5] Hari Babu Nandpuru et al proposed an classification technique with a support vector machine to identifies normal and abnormal brain images. Support Vector Machine uses the trained image and test image to classify the tumor. This classifiers improves the accuracy rate and gives an lower error rate.

III OVERVIEW OF THE PROPOSED METHOD

The proposed method classifies the CT-Scan brain images into three types: Malignant , benign and normal. The normal images depict the cells of healthy patients, benign cells are like cancerous cells but not originally cancerous and third type is malignant cells that depict the original steps for classifying the CT-Scan brain images into the cancerous cells.

The proposed method processed with four steps, first step is preprocessing method, second is feature extraction, the third step is tumor segmentation using classification method and last step is 3D slicer concept. The classifier methods are used to improve the accuracy.

1. PREPROCESSING METHOD: Median Filter

The preprocessing method uses the median filter to removes the noises present in the images. Averaging filter and median filter are similar, averaging filter is a simple, intuitive and easy to implement method of smoothing images, reducing the amount of intensity variation between one pixel and next pixel. In median filtering the value of an output pixel is determined by the median of the neighboring pixel, rather than the mean

The difference between median and mean is median is a less sensitive than the mean to extreme values. The best method called median filters to remove the outliers of the images without reducing the sharpness of the images. Median filtering uses the medfilt2 function to implement.

Fig 1 Preprocessing image

Edge Detection

Edge information is often used to determine the boundaries of an object. This is mainly used for analysis to derive similarity criterion for a predetermined object. The incidences of cerebral compression reduce the edge. Canny Edge detection is the optimal edge detector with the threshold value 0 to be used.Edge feature along with the color feature

gives the good efficiency.The combination of edge and color features describes the boundaries and inner regions of tumor cells.Mostly,Edge Detection techniques are used to reduce the amount of data in the image and also the structural properties of an image can also be preserver for further analysis.In this paper,Canny Edge Detection technique used with the Detection and Localization

Fig 2 Segmented image

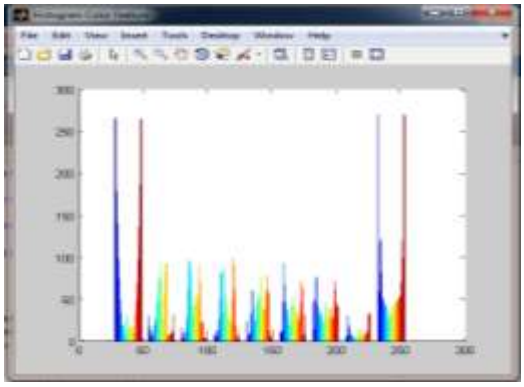


Fig 3 Histogram image

2. FEATURE EXTRACTION

Image intensities in MRI images do not have a fixed meaning and widely vary within or between subjects so before extracting image features, intensity normalization and image inhomogeneity correction should be performed. In feature exteaction, it can also be used to find specific shapes in an image and also smoothes the contour of an object.

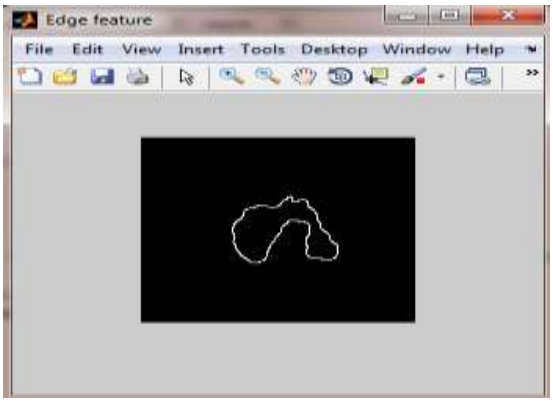


Fig 4 Edge Detected image

3. CLASSIFICATION

In the proposed system, the ID3 classifier with association rule mining method provides a better option for the physicians to classify the normal and malignant images. It is done by comparing the maximum frequent items generated by the association rules in the training image have been compared with the maximum frequent items of the test image and hence the diagnosis can be made easily.

1. Calculate the entropy of every attribute using the data set S.

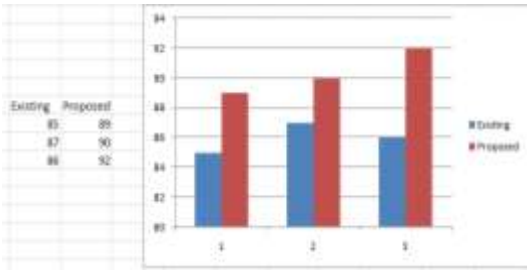
2. Split the set S into subsets using the attribute for which entropy is minimum (or, equivalently, information gain is maximum).

3. Make a decision tree node containing that attribute.

4. Recurse on subsets using remaining attributes.

Fig 5 Classification result

IV EXPERIMENTAL RESULTS



V CONCLUSION

The proposed method is used to solve the segmentation and classification problem. Using Classification method, the brain images are classified into normal and malignant images.

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