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Enhanced Image Segmentation Model for the Detection of Brain Tumor with Dimensions

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Abstract:

In this paper New Content Based MRI Brain Image Retrieval method is designed along with MRI brain classification and tumor detection. Two different scenarios are considered in this method. In the First scenario, Images are classified in normal and tumorous category using SVM with RBF kernel. The parameter of RBF kernel is found using 10 fold cross validation method. The accuracy achieved is 98.33% in this method. The proposed method is also compared by using different kernals of SVM and different authors' method. Result shows that RBF kernel gives better result in image classification and gives good accuracy. In second scenario, Tumor is detected using ISNN and invariant moment. The method is tested on Sixty MRI Brain tumor images those have tumor with different size and at different location. In forty eight MRI images the tumor is correctly detected. The accuracy achieved is 80.00% in tumor detection. The proposed method gives robust result for both classification and tumor detection.

I.INTRODUCTION:

In image segmentation, one challenge is how to deal with the nonlinearity of real data distribution, which often makes segmentation methods need more human interactions and make unsatisfied segmentation results. Medical image segmentation plays an instrumental role in clinical diagnosis. An ideal medical image segmentation scheme should possess some preferred properties such as minimum user interaction, fast computation, and accurate and robust segmentation results.

Image segmentation is an image analysis process that aims at partitioning an image into several regions according to a homogeneity criterion. Image segmentation is a very complex task, which benefits from computer assistance, and yet no general algorithm exists. It has been a research field in computer science for more than 40 years now, and the early hope to find general algorithms that would achieve perfect segmentations independently from the type of input data has been replaced by the active development of a wide range of very specialized techniques. Most of the existing segmentation algorithms are highly specific to a certain type of data, and some research is pursued to develop generic frameworks integrating these techniques. Segmentation can be a fully automatic process, but it achieves its best results with semi-automatic algorithms, i.e. algorithms that are guided by a human operator. This concept of semi-automatic process naturally involves an environment in which the human operator will interact with the algorithms and the data in order to produce optimal segmentations. The simplest example of the need of a human intervention during the task of segmentation results from the specificity of the existing algorithms. Depending on the type of input data, the operator will have to carefully pick the best adapted algorithm, which most of the time cannot be done in an automatic way. The subjective point of view of the human is required.

II. PROPOSED WORK:

In this paper Content Based MRI Brain Image Retrieval (CBIR) method is designed along with MRI brain classification and tumor detection.

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This results in a partitioning of the data space into Voronoi cells The problem is computationally difficult (NP-hard); however, there are efficient heuristic algorithms that are commonly employed and converge quickly to a local optimum. These are usually similar to the expectation-maximization algorithm for mixtures of Gaussian distributions via an iterative refinement approach employed by both algorithms. Additionally, they both use cluster centers to model the data; however, k-means clustering tends to find clusters of comparable spatial extent, while the expectation-maximization mechanism allows clusters to have different shapes. The algorithm has a loose relationship to the k-nearest neighbor classifier, a popular machine learning technique for classification that is often confused with k-means because of the k in the name.

One can apply the 1-nearest neighbor classifier on the cluster centers obtained by k-means to classify new data into the existing clusters. This is known as nearest centroid classifier or Rocchio algorithm.

SVM Steps:

1. consider an input from MIRDB data base folder
2. Apply the rgb2gray conversion means mxnxp to mxn
3. Convert it into double precession matrix
4. Apply the segmentation in 7 levels using morphological operations
5. Apply the calculation of k means for feature vector generation
6. Apply the calculation of SVM for feature vector generations
7. Use those feature vectors for classification of similar image retrievals and detection of tumor area
8. At last we are displaying the parameters of shape and area of detected tumor

III. RESULTS:

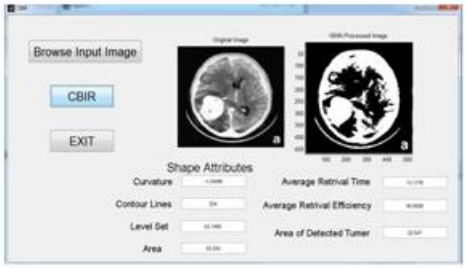

Fig: 15 Shape Attributes

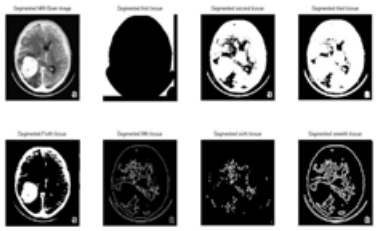

Fig : Segmentation

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Fig: Tumor Detected

Method MSE PSNR Entropy Mean
K Means1.49 46.41 0.10 0.46
SVM 0.08 59.09 0.28 112.21

VI. CONCLUSION:

In this Paper, we proposed a new approach to image segmentation using Pillar K-means algorithm. The system applies the k-means algorithm optimized after Pillar. Pillar algorithm considers the placement of pillars should be located as far from each other to resist the pressure distribution of a roof, as same as the number of centroids between the data distribution. This algorithm is able to optimize the K-means clustering for image segmentation in the aspects of accuracy and computation time. A series of experiments with four different color spaces with restricted variance and execution conducted. The experimental results show that our proposed approach for image segmentation using Pillar-KMeans algorithm is able to improve the accuracy and enhance the quality of image segmentation in all color spaces. We also made the computation time faster than K-means and maintaining the quality of results. In future for image classification we can emphasize on the analysis and usage of different advanced classification techniques like Artificial Neural Networks, Support Vector Machines, Fuzzy Measures, Genetic algorithms and their combinations for digital image classification . In digital image classification the conventional statistical approaches for image classification use only the gray values. Different advanced techniques in image classification like Artificial Neural Networks (ANN), Support Vector Machines (SVM), Fuzzy measures, Genetic Algorithms (GA), and Genetic Algorithms with Neural Networks can be developed for image classification for better and efficient retrieval results.

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