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Brain Tumor Detection using K-means Technology

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Abstract

Brain tumor is an abnormal growth caused by cells reproducing themselves in a controlled manner. K-means is a device for diagnosis. The amount of data is too much for manual interpretation and analysis. During the past few years, brain tumor segmentation has become an emergent research area in the field of medical imaging systems. Accurate detection of size and location of brain tumor plays a vital role in the diagnosis of tumor. In our project the algorithm is proposed for tumor detection based on segmentation of brain using K-means technique. Generally, CT scan or MRI that is directed into intracranial cavity produces a complete image of brain. This image is visually examined by the physician for detection & diagnosis of brain tumor. However this method of detection resists the accurate determination of stage & size of tumor. To avoid that, this work uses computer aided method for segmentation (detection) of brain tumor based on the K-means algorithms. This method allows the segmentation of tumor tissue with accuracy and reproducibility comparable to manual segmentation.

Keywords*: Abnormalities, Magnetic Resonance Imaging (MRI), Brain tumor, Pre-processing, K-means, Thresholding.*

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1. Introduction

Brain Tumor: A Brain tumor is a growth of cells in the brain that multiplies in an abnormal, uncontrollable way. It can either be cancerous or non-cancerous.
Symptoms: Headache, generally in early morning, personality or memory changes, vomiting, and fatigue.
Side Effects: Poor memory, sleepiness, lack of energy, a worsening of your old symptoms, and confusion.

The brain can be viewed by the MRI scan or CT scan. In this paper the MRI scanned image is taken for the entire process. The MRI scan is more comfortable than CT scan for diagnosis. It does not affect the human body because it doesn't have any radiation. It is based on the magnetic field and radio waves. There are different types of algorithm were developed for brain tumor detection. K-means algorithm is used for segmentation. It gives the accurate result for tumor segmentation. Tumor is due to the uncontrolled growth of the tissues in any part of the body. If it is an origin, then it is known as primary. If the part of the tumor is spread to another place and grown as its own affects Cerebral Spinal Fluid (CSF). It causes strokes. The physician gives the treatment for the strokes rather than the treatment for tumor. So, the person who is affected by brain tumor, their tumor will increase if it is detected at current stage. Normally tumor cells are of two types. They are Mass and Malignant. The detection of the malignant tumor is somewhat difficult to mass tumor. Malignant tumor can be accurately detected by a 3-D representation of brain and 3-D analyser tool. The paper focuses on detection of mass tumor detection.

2. K-means Clustering Algorithm

Following are the steps for clustering of K-means algorithm:

a) Read the image.
b) Randomly select K pixels and let their intensities be initial K-means for the K clusters.
c) For each pixel in the image, compute distance with K-means and assign the pixel to the Kth cluster for which distance is minimum.
d) Update the mean of each cluster.
e) Repeat the steps (c) and (d) until there is no change in the K clusters means.
f) Display the segmented image.

3. Segmentation using K-means Algorithm

K-Means is one of the simplest unsupervised learning algorithms that solve the well-known clustering problem. The procedure follows a simple and easy way to classify a given data set through a certain number of clusters (assume k clusters) fixed a priori. The main idea is to define k centroids, one for each cluster. These centroids should be placed in a cunning way because of different location causes different result. So, the better choice is to place them as much as possible far away from each other [4]. The next step is to take each point belonging to a given data set and associate it to the nearest centroid. When no point is pending, the first step is completed and an early group age is done. At this point it is necessary to re-calculate k new centroids as bar centers of the clusters resulting from the previous step. After obtaining these k new centroids, a new binding has to be done between the same data set points and the nearest new centroid. A loop has been generated. As a result of this loop, one may notice that the k centroids change their location step by step until no more changes are done. In other words centroids do not move any more. Finally, this algorithm aims at minimizing an objective function, in this case a squared error function.

4. Results

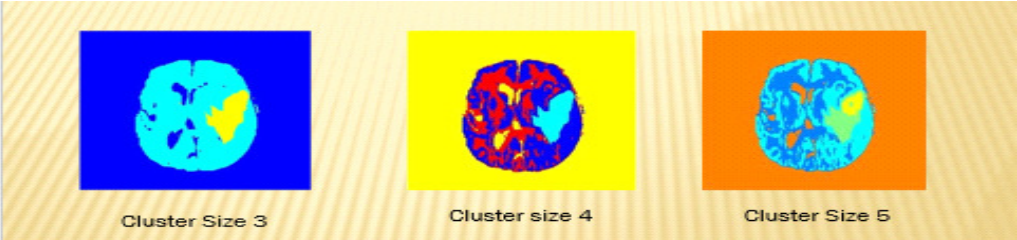

Fig.1: Segmented picture using K-means

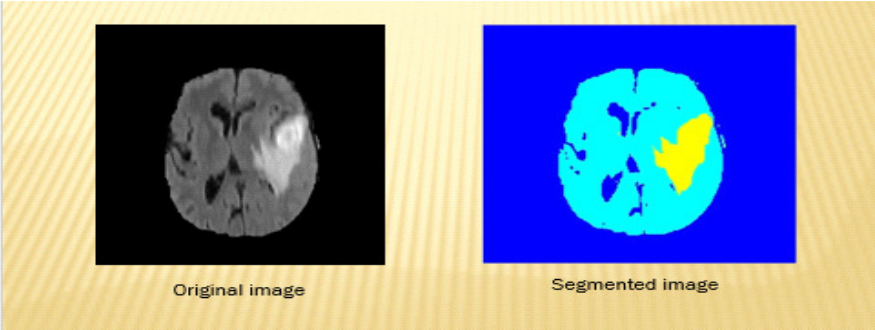

Fig. 2: Image segmentation using K-means clustering

5. Conclusions and Future Work

They may be as mass in brain or malignant over the brain. Suppose if it is a mass then K-means algorithm is enough to extract it from the brain cells. If there is any noise is present in the MR image, it should be removed before the K-means process. The noise free image is given as an input to the K-means and tumor is extracted from the MRI image. And then segmentation using Fuzzy C means for accurate tumor shape extraction of malignant tumor. The proposed method gives more accurate result. In future 3D assessment of brain using 3D slicers with MATLAB can be developed. K-means is used for the clustering, the output image is not segmented properly as compared to the FCM or K-means but the edge detection of the images is better than the latter's. The two-layered method proposed uses a large variable set and various inputs are required during the simulation, but the average overall time taken to run the simulation is less when compared to FCM alone for clustering. Future research in the segmentation of medical images will strive towards improving the accuracy, precision and computational speeds of segmentation methods, as well as reducing the amount of manual interaction.

References

[1] Zarandia, MHF, Zarinbala, M., Izadi, M. (2011). Systematic image processing for diagnosing brain tumors: a Type-II fuzzy expert system approach. *Applied Soft Computing*.

[2] S M Praveena, I Vennila. (2010). Optimization fusion approach for image segmentation using K-means algorithm. *International Journal of Computer Applications*.

[3] MM Ahmed, & DB Mohammad. (2010). Segmentation of Brain MR images for tumor extraction by combining K-means clustering and Perona-Malik anisotropic diffusion model. *International Journal of Image Processing*.

[4] M Bhagwat, RK Krishna, & VE Pise. (2010). Image segmentation by improved watershed transformation in programming environment MATLAB. *Inter. Jr. of Com Sci & Communication*.

[5] Tse-Wei Chen, Yi-Ling Chen, Shao-Yi Chien. (2010). Fast image segmentation based on K-means clustering with histograms in HSV color space. *Journal of Scientific Research*.

[6] Anil Z Chaitade. (2010). Colour based image segmentation using K-means clustering. *International Journal of Computer Science and Technology*.

[7] SZ Beevi, M. Sathik. (2010). An effective approach for segmentation of MRI images combining spatial information with fuzzy c-means clustering. *European Jr. of Scientific Research*.

[8] K.S. Ravichandran, & B. Ananthi. (2009). Color skin segmentation using K-means cluster. *International Journal of Computational and Applied Mathematics*. 4(2), pp.153-157.

[9] A. Suman Tatiraju. (2008). Image segmentation using K-means clustering, EM and Normalized cuts. *Symposium of Discrete Algorithm*.

[10] AR Kavitha, C. Chellamuthu, Kavin Rupa. (2012). An efficient approach for brain tumor detection based on modified region growing and network in MRI images. *IEEE*.