A Novel Fuzzy and CNN Combined Approach for Brain Tumor Segmentation

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INTRODUCTION

A tumor may be primary or secondary. If it is the origin, then it is known as primary. If the part of the tumor spreads to another place and growson its own, then it is known as secondary. The brain tumor affects CSF (Cerebral Spinal Fluid) and causes strokes. The physician gives the treatment for the strokes rather than the treatment for tumors. So the detection of the tumor is important for that treatment. The life expectancy of the personaffected by the brain tumor will increase if it is detected at an earlier stage. Normally tumor cells are of two types Mass and Malignant. The detection of the malignant tumor is somewhat difficult to mass tumor. For the accurate recognition of the malignant a 3-D representation of brain and 3-D analyser tool is required. This paper focuses on the detection of mass tumor. The development platform for the detection is matlab because it is easy to develop and execute. At the end, we are providing systems that detect the tumor and its shape. An image is an array or a matrix of square pixels (picture elements) arranged in columns and rows. In Image processing,the input is an image, such as a photo or video frame the output of image processing may be either an image or a set of features or parameters related to the image. The techniques for image-processing involve treating the image as a two-dimensionalsignal and then applying standard signal-processing techniques to it. Image processing generally refers to digital image processing, but visual and analog image processing are also possible. The acquisition of images (producing the input image) is referred to as imaging. Digital Image composes of finite number of elements(as picture elements, image elements, pels, and pixels) each havinga particular location and value. Pixel is the most widely used term for denoting the elements of the digital image. Image processing involves varying the nature of an image in order to either to improve its pictorial information for human interpretation or render it more suitable for autonomous machine perception. The image will have ranging from 1 to 256 each and the brightness values also ranging from 0 (black) to 255 (white). A digital image is a collection of a large array of separate dots, each of which has a brightness related with it

EXISTING SYSTEM

Image processing is any form, of information processing, in which the input is an image. The existing method is based on the threshold and region growing. At the threshold based segmentation the image is considered as having only two values either black or white. But the bitmap image contains 0 to 255 gray scale values. So it ignores the tumor cells also. In [1]case of the region growing based segmentation it needs more user interaction for the selection of the seed. Seed is nothing but the center of the tumor cells; it may cause intensity inhomogeneity problems. And also it will not provide the acceptable result for all the images. • The regional growing method ignored the spatial characteristics. • Normally spatial characteristics are important for malignant tumor detection. • In [4] thresholding based segmentation the image is considered as having only two values either black or white. This is the main problem of the current system, due to that proposed technique for brain tumor segmentation.

PROPOSED SYSTEM

The proposed system has mainly four modules namely Pre-processing, segmentation using k-means and fuzzy c-means, Feature extraction, and approximate reasoning.According to the need of the next level the pre-processing step converts the image. It performs filtering of noise and other artifacts in the image and sharpening the edges in the image. RGB to gray conversion and Reshaping also takes place here. It includes a median filter for noise removal.The feature extraction is extracting the cluster, which shows the predicted tumor at the FCM (Fuzzy C-means) output. The extracted cluster is given to the threshold process. It applies a binary mask over the entire image. In the approximate reasoning step the tumor area is calculated using the binarization method making the dark pixel darker and white brighter. In threshold coding, each transform coefficient is compared with a threshold and if its less than the threshold value, it is considered as zero or else one. In the approximate reasoning step the tumor area is calculated using the binarization method. That is the image having only two values either black or white (0 or 1). Here 256x256 JPEG image is a maximum image size. The binary image can be

represented as a summation of total number of white and black pixels. Pre-processing is done by filtering. Segmentation [1] is carried out by advanced K-means and Fuzzy C-means algorithm. The feature extraction is done by considering the threshold and finally, approximatingthe reasoning method to recognize the tumor shape and position in MRI image using edge detection method. The proposed method is combinations of two algorithms were established for segmentation. But they are not decent for all kinds of the MRI images. • The proposed method is done by filtering. • Noises are reduced. • The proposed method uses k-means and fuzzy c-means algorithms which are very accurate to detect the tumor affected area. • It shrinks the time for analysis.

Preprocessing

Pre-processing step translate the image, it completes filtering of noise and other artifacts in the image and sharpening the edges in the image. The RGB to grey conversion and Reshaping also takes place here. It includes a median filter for noise deduction. The opportunities of arrival of noise in modern MRI scan [6] are very less. It may reach due to the thermal effect. The aim of this paper is to detect and segment the tumor cells, but for the complete stage it needs the process of noise removal. For better understanding the function of median filter we added the salt and pepper noise artificially and removing it using median filter.

CONCLUSION

There are different types of tumors available. They may be mass in the 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 present in the MR image it is removed before the K-means process. The noise free image is given as input to the k-means and tumors are extracted from the MRI image. The performance of brain tumor segmentation is evaluated based on K-means clustering. Dataset consists of Magnetic Resonance Imaging (MRI) size of 181X272. The MRI image dataset that we have utilized in image segmentation technique is taken from the publicly available sources. This image dataset consists of 40 brain MRI images in which 20 brain images with tumor and remaining brain images without tumor. The brain image dataset is divided into two sets. Training dataset and testing dataset. Thus, the pre-processing is done by filtering. Segmentation is done by advanced K-means algorithm and fuzzy c means algorithm. Feature extractions is done by threading and finally, approximate reasoning method to recognize the tumor shape and position in MRI image using edge detection method. This method scans the RGB or grayscale, converts the image into binary image by binarization technique and detects the edge of tumor pixels in the binary image. Also, it calculates the size of the tumor by calculating the number of white pixels (digit 0) in binary image. The stage of the tumor is based on the area of tumor.

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