

LABVIEW BASED BRAIN TUMOR AREA AND LENGTH DETECTION IN CT AND MRI SCAN IMAGES

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ABSTRACT

The Magnetic Resonance Imaging (MRI), and Computed Tomography (CT) scan plays an important role in Brain Tumor detection. The tumor means abnormal cells growth in a human body. In this project we are find out exact position of brain tumor by using NI LABVIEW software. Here, we create a script in NI Vision Assistant. First acquire gray scale image from MRI and CT scan images and then applying thresholding for edge detection, FFT low pass filter technique and finally applying measurement technique to find out exact location area and length of the brain tumor.

Keywords: MRI(Magnetic Resonance Imaging), CT(Computed Tomography), Thresholding, FFT Filter, measurement

INTRODUCTION

The tumor is a growth of abnormal cells in the tissues of the brain. The tumors are divided in to two types Benign tumor (non-cancerous)and Malignant tumor (cancerous) benign tumor grows very slowly, and rarely spreads. Benign cells and located in vital areas can be considered life threatening.classification of benign tumors are Adenomas,Fibromas ,Haemangioma ,Limomas,Myomas ,Nevi ,Neuromas ,Osteochondromas ,Papillomas. And Malignant brain tumor grows firstly and it has irregular boundaries, and attack to nearby brain area. The classification of malignant tumor are Sarcoma, Carcinoma, Leukemia Lymphoma. The CT (computer tomography), PET(positron emission tomography) and ultrasonography is all are recent revolution in medical imaging results from techniques such as the CT and MRI can provide detailed information about disease and identify many pathologic conditions giving an accurate diagnosis. Next the new techniques are available to advance fundamental biomedical research. The medical imaging is an

essential tool for improving the diagnoses to understanding and treatment of a large number of diseases. We give some efforts to develop software that could be easy to modify by other researchers. user to provide interaction capabilities to construct clinical applications. So, many software packages for visualization and analysis of medical data. The Magnetic Resonance Imaging of the brain is a powerful technique for diagnosis used by physician to detect abnormalities of human body. Some years ago, most neurologists only had images of several cross sections of a brain on a light board using their knowledge to make a diagnosis or determine the course of a therapy. With an increasing interest in the field of medical image processing and semi automatic and automatic tools have appeared to assist medical diagnosis centres. For instance brain treatment allows now not only to visualize a volume of functional cortical structures but also to quantify it.

Brain tumors are detected by different techniques

- 1.MRI Scan (Magnetic Resonance Imaging)
- 2.CT Scan (Computed Tomography)
- 3.PET Scan (Positron Emission Tomography)

MRI Scan

In the MRI image, the patient lies on a movable bed. After bed enters a strong magnetic field and then radio waves are applied to body in different direction. And this sudden shift causes the atoms in the patient's body to gives special signals. Scanner detects those special signals. The signals send to a computer and it will create an image of the inner body by using the signal information.

CT scan

Computed Tomography scans take the idea of conventional X-ray imaging. Instead of finding the outline of bones and organs. The Computed Tomography scan machine forms a full three-dimensional computer model of a patient's insides.

Doctors can examine the body one narrow slice at a time to point specific areas.

PET Scan

The positron Emission Tomography technique that produces a three-dimensional image of body. The system detects pairs of gamma rays emitted indirectly by a positron -emitting tracer, which is introduced into the human body on a biologically active molecule. The 3d images of tracer concentration in to the body are then constructed by computer analysis. In modern scanners the 3d imaging is often accomplished with the aid of a ct scan performed on the patient during the same session and also same machine.

MATERIALS AND METHODS

Here, we are acquire an image from MRI scan or CT scan. We have basic concepts to detect tumor in our paper, component of the image hold the tumor generally has extra concentration. Using Lab View software we can guess the area and length of the tumor in the image. In this project we are developed a script using NI Vision Assistant and apply histogram technique, color plane extraction next Thresholding ,applying FFT Filter Measurement technique one by one and finally find out the exact area and length of the tumor.

IMAGE PROCESSING

In this project step by step image processing doing. First acquire an image from MRI scan or CT scan. Developed a script in NI Vision Assistant. Apply Roberts filter for edge detection. Color plane extraction remove red plane. Apply Histogram for detecting each pixel values. For Threshold technique apply local threshold background correction for clarity of tumor boundaries. Next apply low pass FFT Filter. Finally apply measurement technique for detecting exact position and location of tumor using measurement technique we find out area, length and angle of the tumor

TUMOR DETECTION

Different techniques for tumor detection in NI Lab view software. Tumor is abnormal growth of cells in human body. The tumor divide in to two types benign tumor and malignant tumor. The benign tumor consist regular boundaries and malignant tumor consist irregular boundaries. Using vision assistant techniques

ORIGINAL IMAGE:Original images acquire from MRI Scan or CT scan. These images are gray scale images.

COLOR PLAN EXTRACTION

In vision assistant software we using color plane extraction for MRI images or CT scan images. Remove Red plane extraction.

HISTOGRAM

Histogram is a graphical representation of the distribution of data. A graphical representation similar to a bar chart in structure, organizes a group of data points into user-specified ranges. Histogram condenses a data series into an easily interpreted visual by collecting many data points and grouping them into logical ranges or bins. Histogram is a representation of tabulated frequencies, shown as adjacent rectangles, over discrete intervals, with an area equal to the frequency of the observations in the interval

BLOCK DAIGRAM

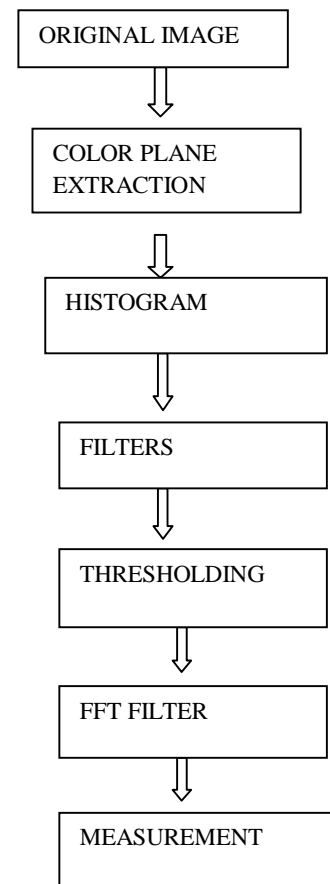


Fig 1 :Flow Chart

MATHEMATICAL DEFINITION

A more general mathematical sense, histogram is a function m_i that counts the number of observations that fall into each of the disjoint categories (as *bins*), the graph of a histogram is merely one way to represent a histogram. If we let n be the total number of observations and k be the total number of bins, histogram m_i meets the following conditions:

$$n = \sum_{i=1}^k m_i$$

Cumulative histogram

The cumulative histogram is a mapping that counts the cumulative number of observations in all of the bins up to the specified bin. The cumulative histogram M_i of a histogram m_j is defined as:

$$m_i = \sum_{j=1}^k m_j$$

Number of bins and width

The "best" number of bins, different bin sizes can reveal different features of the data. The grouping data is as least as old as Graunt's work but no systematic guidelines were given until Sturges work in 1926

$$K = \lceil \frac{\ln(\max x - \min x)}{\ln 2} \rceil$$

THRESHOLDING

The thresholding is important as well as necessary to separate the region in which we are much more interested from the background. And the thresholding provides an easy and the most it is the convenient way to carry out this activity by separating the foreground and background certain thresholding value and the pixels which are having intensity value more than the thresholding are set as white as output and rest are assigned as black. So basically it provides binarisation for an image and this is also one of the steps of image segmentation the thresholding takes filtered image as their input.

FFT FILTER

A fast Fourier transform (FFT) is an algorithm to compute the discrete Fourier transform (DFT) and its inverse. The Fourier converts time (or space) to frequency and vice versa; the FFT rapidly computes such transformations and result, fast Fourier transforms are widely used for many applications in engineering and science, and also mathematics. Basic ideas were popularized in 1965. Fast Fourier

transforms have been described as "the most important numerical algorithm of our lifetime"

MEASUREMENT

The measurement is most commonly made in the SI system, and which contains seven fundamental units, kilogram, meter, candela, second, ampere, Kelvin and mole. The definition of one remaining unit. By using this measurement technique find out tumor length and area.

OUT PUT RESULT CASE 1

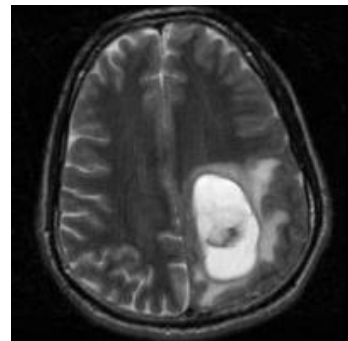


Fig 2 : ORIGINALIMAGE

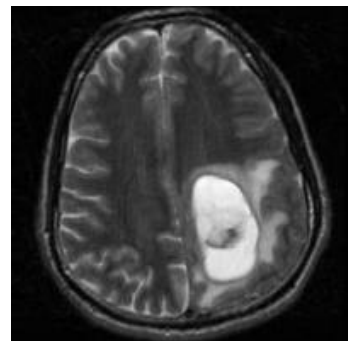


Fig 3 :HISTOGRAM

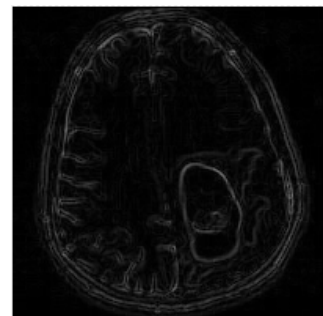


Fig 4 : FILTER



Fig 5 : THRESHOLDING

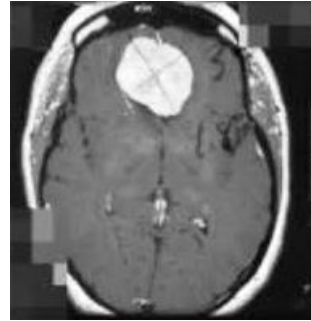


Fig 9: HISTOGRAMIMAGE



Fig 6: FFT FILTER

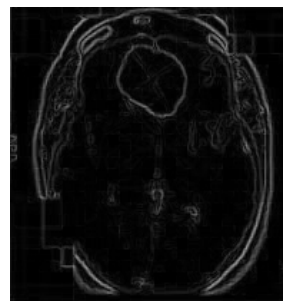


Fig 10 : FILTER

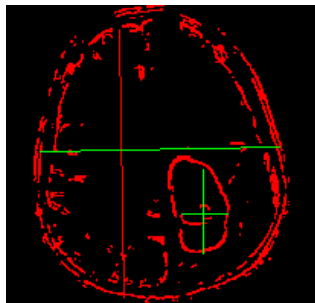


Fig 7: MEASUREMENT



Fig 11: THRESHOLDING

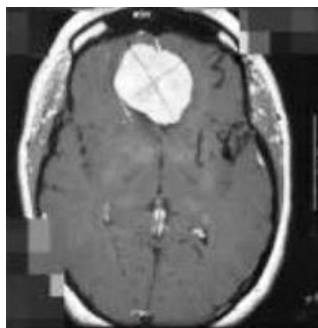


Fig 8: ORIGINAL IMAGE



Fig 12: FFT FILTER

OUT PUT RESULT CASE 2

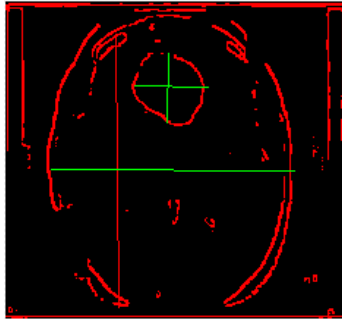


Fig 13:MEASUREMET

EXPERIMENTAL RESULT

Table 1: Histogram Result

	CASE 1	CASE 2
Minimum value	0.00	0.00
Maximum value	255.00	255.00
Mean value	42.40	100.22
Standard deviation	50.19	66.09
Number of pixels	50235	50328

Table 2: Measurement Result

	CASE 1	CASE 2
Brain vertical length	179.002	186.00
Brain horizontal length	152.00	165.00
Tumor vertical length	64.03124	40.00
Tumor horizontal length	34.92	49.00
Area of tumor	2173.00	2115.00
Area of total brain	24966.00	31717.00
Pixel ratio% of tumor	4.32	4.202
Pixel ratio% of Total tumor	49.6984	63.02

CONCLUSION

In this paper we proposed two different parameters Length, Area, of the tumor on MRI scan images and CT scan images. This is a better technique for measuring exact position of tumor.

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