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Brain Tumor Detection Using Image Processing

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Abstract
Segmentation is one of the crucial steps for detection of brain tumor and diagnosis. Segmentation of MRI images helps in detection of abnormal tissue growth in a timely manner. However, its effectiveness is greatly dependent on the image features that are extracted. It is important to minimise errors in this process. Through the years, various methods are being tested to achieve this. But there is still scope for betterment. The following study throws light on some observations and analysis and provides an overview of possible future strategies.
KeyWords: *Brain tumor, MRI images, Extraction, Image processing, Segmentation.*

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I. INTRODUCTION

As brain is the most important and complex part of the human body, it requires proper attention and care.

1.1 Brain Tumor:

Brain tumor is a type of tumor that starts in the brain due to abnormal or uncontrolled growth of the tissues. Through broad classification, brain tumors are divided into two categoriesprimary brain tumor and secondary brain tumor. Primary brain tumor is the one which originates in the brain whereas secondary brain tumor originates in other body parts and reaches the brain throughblood stream.

Primary tumors are again categorised as benign and malignant. Malignant tumors are cancerous. Secondary tumors are called metastatic and they are also cancerous.

1.2 Magnetic Resonance Imaging:

MRI images will be accustomed provide detailed data on the inner matter of respective images in medical imaging techniques. Imaging segmentation play vital role in tumor detection technology, multiple imaging techniques are want to identify tumors from the processing of resonance images of the brain. Segmentation types include manual segmentation and automatic segmentation (e.g. threshold-based, edge-based, geographic or clustering segmentation).

Segmentation and classification of brain tumor from MRI image involves various steps such as preprocessing feature extraction, segmentation and classification.

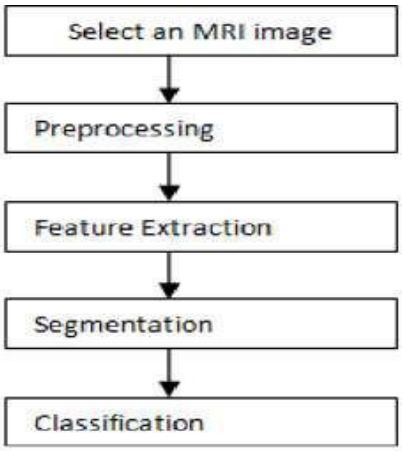

Fig 1 : Stages in Brain Tumor Detection

The basic steps in the treatment of brain tumors:

1. Pre-processing

A clearer picture of either a raw MRI image is made in the preprocessing step. These tasks in pre-processing include de-noise, skull scraping, image enhancement.

2. Feature Extraction

This is the basic task for the segmentation of braintumors specifically.

3. Segmentation

Many tumor detection segmentation methods are available, including intensity-based techniques, regional methods, asymmetry based techniques and machine-learning techniques.

Image Segmentation Techniques:

1. Threshold-based image segmentation

The global threshold separates target and background pixels by employing a binary partition for dividing the image by comparing them to the threshold value defined. Regional thresholding strategies also are remarked as adaptive thresholds. The key threshold techniques suggested byvarious researchers are the mean technique, Ptile technology, histogram-based method, edge maximization technique, or visual technique.

2. Region-Based Image Segmentation

Pixels that correspond with the identical object are sorted for segmentation by this method. The area to be studied should be locked for optimization. Segmentation of areas based mainly on similarities is additionally called segmentation. The borders for segmentation are specified because of edge pixels and no differences are made during this explicitly based optimization region. After the shift is distinguished within color and texture, stem flowis regenerated into a vector.

3. Edge Based Image Segmentation

It separates an image and its importance into an entity. Edge detection identifies the image by measuring the amplitude or pixel difference in the frame. Two main techniques for identifying blade for color distinction are gray histogram & gradient. Laplacian (LoG), light edge sensors etc. classical boundary detectors, zero crossings, gaussian Laplace.

4. Fuzzy Theory-Based Image Segmentation

Fuzzy set theory is used to produce reliable data from every image for the aim of interpreting images. Fuzzification can even be used to minimize image noise. A gray picture can easily be turned into a fluid image with a fuzzing feature.

5. ANN Based Image Segmentation

Fuzzy set theory is used to supply precise data from each image so as to interpret images. The fluxing approach may also used to scale back image noise.

6. PDE Based Image Segmentation

For image analysis or image optimization, PDE (Partial Differential Equations) formulas or models are widely used. The matter of optimization is converted into PDE by the successful contour system or snakes. The Snakes, Level-Set & Mumford shah system are several common PDE methods accustomed optimize photos.

7. Post-Processing

These involve post-processing techniques such as spatial control, limits on the form and contextual limitations for improved results. Brain scanning is often administrated differently through different techniques, such as MRI and CT scans,at a distinct level.

II. CONCLUSION

Detection of brain tumors are done through MRI because of the complex structure of the brain. Images produced through MRI can be used to separate and analyse brain tumors. Pre- processing, image fragments, extraction and classification are the methods for detecting them. As a future strategy for more effective diagnosis and detection, a combination of preprocessing and deep learning can be used. This may increase computation, but the scope of patient survival canalso increase in the proposed case.

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