

Chapter 2

The Brain Tumor Segmentation Using Fuzzy C–Means Technique: A Study

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ABSTRACT

Image segmentation is a technique which divides an image into its constituent regions or objects. Segmentation continues till we reach our area of interest or the specified object of target. This field offers vast future scope and challenges for the researchers. This proposal uses the fuzzy c mean technique to segment the different MRI brain tumor images. This proposal also shows the comparative results of Thresholding, K-means clustering and Fuzzy c- means clustering. Dice coefficient and Jaccards measure is used for accuracy of the segmentation in this proposal. Experimental results demonstrate the performance of the designed method.

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INTRODUCTION

Thermal Imaging is one of the most important part of infrared imaging science and technology. These techniques are usually applied in the fields of radiation detection, thermal mapping, chemical imaging, medical fields and various other fields. Imaging techniques involve various step by step processes such as restoration of images, enhancement of Image quality, color image processing as well as segmentation and clustering of images. Image segmentation is highly used in the fields of detection and segmentation of the diagnosed part of the affected organ thereby providing a great help in the field of medical imaging. Clustering techniques are widely used in detection and segmentation of brain tumor distinctly and with much better precision. Thresholding, K mean clustering and Fuzzy C mean are some of the important clustering techniques used in the Brain tumor segmentation process. Brain is the most vital organ contained in the skull of each and every type of vertebrates. It also acts as the most critical organ in most invertebrates. It is the coordinating center which coordinates the sensations, intellectual and all the nervous activities of an organ system. Brain is the centermost part of a nervous system. It is regarded as a complex and composite organ in a vertebrate's body which is located in the head. As the recreation of cells take place in an unchecked manner, an unusual growth of tissue starts taking place. It results in creation of tumor. If this unusual recreation of cells takes place inside a brain, then this unusual recreation of brain cells is regarded as brain tumor. Development of unusual recreation of brain cells is also called as intracranial neoplasm.

Tumors are of two types, malignant (cancerous tumors) and benign tumors. Cancerous tumors are again sub-divided into two further types. They are primary and secondary tumors. The root of primary tumors is inside the brain. Secondary tumors usually originate and expand from somewhere else. It is also known as brain metastasis tumors. Elemental indications of development of a brain tumor differ depending on the section of the brain convoluted. The basic signs and symptoms of a brain tumor affected patient include problems with eyesight, intense headache, vomiting and drastic cerebral changes. The headache is serious in the morning and gradually goes off after vomiting within a short span of time. Brain tumor may cause difficulty in walking, problems in speaking, intellectuals and sensations along with many more specific problems. As the diseases advances, mental incapability may occur with time. Apart from disclosure to vinyl chloride or ionizing radiation, there are no exactly known coincidental factors which are linked with the inducing causes of brain tumors. Variations and removal of tumor suppressor genes are also the causing factor for the creation of some of the types of brain tumors.

The human brain and other vertebrates are made up of a very delicate tissue which is a gelatin-like surface. A living brain tissue has a pink hue in color regarded as

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