

A Comprehensive Review of Image Morphology Base Brain Tumor Detection

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Abstract: Brain tumor is one of the major diseases which severely affect the brain. It is one of the main causes for raise in mortality among adults and children. A tumor is considered as the mass of tissue which goes out of control which regulates growth. In the current situation of health care society, brain tumor considered as the common fatality. Therefore precise detection of the type of brain irregularity is extremely necessary for cure planning. In this paper, brain tumor and its various cause are discussed.

Keyword: MRI, Tumor, Morphology, image processing

I. INTRODUCTION

Brain is most complex and biggest organ in the human body. The brain is a flexible, soft mass of tissue and consists of several million nerves which communicate in synapses. The brain is surrounded by a layer of tissue called the meninges and protected by the thin layers of tissue, skull bone and ventricles within the brain. A brain tumor occurs when abnormal cells forms inside the brain. Tumor is a rapid differentiation growth of abnormal cells in human brain and it is also referred as intracranial neoplasm. Brain tumors are often challenging for doctors to diagnose and then give treatment. They can be also formed due to spread of cancers in other organs. Brain tumor may be classified as two types: primary brain tumor and secondary brain tumor. Those which originate in the brain itself are called primary while those that spread to the brain from somewhere else in the body are termed as secondary. Tumor is threatening disease and it is an uncontrolled growth of tissues. Tumor has many types and having distinct characteristics and treatments, but brain tumor is inherently severe and life-threatening disease. Brain tumors are classified based on the type of tissue involved, the location of the tumor, whether it is benign or malignant, and other considerations. Primary brain tumors are originated in the brain and having name after the cell types from where it is created/originated. It may be benign or non cancerous tumor which do not spread and attack surrounding tissues. They can also be malignant and invasive (spreading to neighboring areas). Secondary or metastasis brain tumors take their origin from tumor cells which spread to the brain from another location in the body.

Identification of tumor in MR Image is one of the significant topic in these days in which segmentation filtering, Image Enhancement are simple and most interesting area among all the digital image processing technique. there are many techniques to detect brain tumor. magnetic resonance imaging is the one of the popular and common way to study brain tumor. MRI is the widely used method for analysis of brain tumor and it provides better quality images of the brain. MRI is a reliable method for segmenting tumor. MRI scan can be used as an accurate method for detecting tumor from human brain. It provides two dimensional images of brain from various planes. These two dimensional images can be combined together to create a three-dimensional image of the tumor. MRI detects signals emitted from normal and abnormal tissue, providing clear images of most tumors. MRI is a method used by radiologists to imagine the internal structure of human body. Nowadays, MRI is the mostly used methods due to its high resolution images ability.

Brain is the essential part of the human body and also the structure of the brain is very intricate. It is the complex organ and it is a part of the Central Nervous System (CNS). The brain is covered by a protective skull and consists of Gray Matter (GM), White Matter (WM) and Cerebro Spinal fluid (CSF). The skull hides the brain from direct view and provides protection from injuries. The skull hinders the study of its function both in healthy and diseased conditions. The gray matter consists of neuron cell bodies. The white matter consists of myelinated axons and CSF which supplies the brain with nutrients and hormones.

Brain tumor is the cause of anomalous growth of the cells in the brain or the central spinal canal. It is considered as mass of tissue in which cells grown and multiply uncontrollably. Every primary brain tumor is the robust portion of the tumor. It may have other related parts such as edema and necrosis. Edema is the most vital element leading to mortality related with brain tumors. Brain tumors can be primary or metastatic. Primary brain tumors originate in the brain. Metastatic brain tumors are from cancerous cells that have migrated from their original location and have entered into the central nervous system via the blood-brain barrier. According to the National Cancer Institute (Institute NC), there are two types of brain tumor namely Benign and Malignant brain tumors. Benign brain tumor consists of abnormal cells which grows slowly with well defined boundaries and do not spread. Malignant brain tumor consists of cells that have no distinct separation from healthy cells. This grows quickly and can spread to surrounding tissues. Malignant almost refers to cancer. Most brain tumors are named after the cells from which they arise

II. RELATED WORK

Solomon, D. et al. [1] A proposed a series of many cases which are using morphological brain variation and other genetic variation. Tumor occurs when abnormal cells forms inside the brain. Tumor is a rapid differentiation growth of abnormal cells in human brain. Brain tumors are often challenging for doctors to diagnose and then give treatment. The result analysis has been indicated that proposed technique is accurate, effective as compared to other techniques.

Shenbagarajan et al. [2] in this paper, brain tumor has been diagnose by using ACM segmentation and ANN-LM classification approach. A Detection of tumor in MR Image is one of the important topic in recent days in which Image Enhancement, segmentation filtering are simple and most appealing area among all the digital image processing technique. The primary aim of this work is to develop more accurate, efficient for detection of brain tumor by using image algorithm. The results indicate that the proposed MRI brain image tumour diagnosis process is accurate, fast and robust.

Baraiya, Neha et al. [3] the main goal of this work is study several segmentation approaches by using matlab and it compare its precision with each. Sometimes in the body, new cells are formed without any requirement and the old cell does not die as they should die according to normal process. Due to which some extra cells are buildup in the brain which create a group or mass of tissue called as tumor.

Havaei, Mohammad et al [4] proposed a brain tumor segmentation approach depending on deep Neural Network (NN). The result analysis has been indicated that proposed neural network technique is accurate, effective and sensitive as compared to other traditional approach. The analysis has been calculated by mean of QR with abnormal and normal MRI images. Also the performance of proposed approach is compared with KNN and Bayesian classification approach.

Aastha Sehgal et al. [5] a fully automatic method has been proposed to detect brain tumors. Tumor extraction is carried out by using Area and Circularity as a measure. The results are finally verified by comparing them with the manually segmented Ground Truth. Dice coefficient is also calculated and the average dice coefficient value attained was 0.729.

Chandra, G. Rajesh et al. [6] proposed detection of tumor in MRI brain image by using Genetic algorithm. In this paper, a new method is used to detect and extract tumor from the whole images. This paper proposes a scheme for extracting tumor from MRI based on GA (Genetic Algorithm) based morphological operation. Computer simulations of our algorithm present a considerable improvement over other existing techniques. The result indicates that the presented approach is very effective and accurate.

Vaishali Londhe et al. [8] proposed a system which is used to detect the brain tumor blocks and categorized the kind of tumor by utilizing ANN algorithm for MRI images of patients. Medical Image techniques are used for Medical diagnosis. Brain tumor is a serious life threatening disease. Image processing and neural network techniques are used to improve the performance of detecting and classifying brain tumor in MRI images.

Priya v viswa et al. [9] proposed a segmentation strategy for detection of brain tumor. This proposed method will increase the efficiency of the detection and will used for further disease classification. The performance result indicates that the proposed technique performs better in detecting the Brain Tumor from MRI images

Thirumurugan, P et al [10] proposed a method for diagnose and detection by using ANFIS technique. Brain tumor is considered as the severe disease that can affect brain. It is one of the main causes for raise in death among people. A tumor is considered as the mass of tissue which goes out of control which regulates growth. Finally, result, demonstrate that proposed method is very precise and efficient and provide accurate results.

III. CONCLUSION

The implementation of the morphology based tumor detection helps in improving the accuracy of the system by increasing the detection capability without any database to be stored and thereby enhancing detection capabilities with less resources needed. Superiority of imaging, complexity of brain structures, and the necessity of accurate segmentation make it difficult to qualifying the performance of the segmentation algorithms of brain. There still exists a scope improvement in terms of accuracy and computation time.

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