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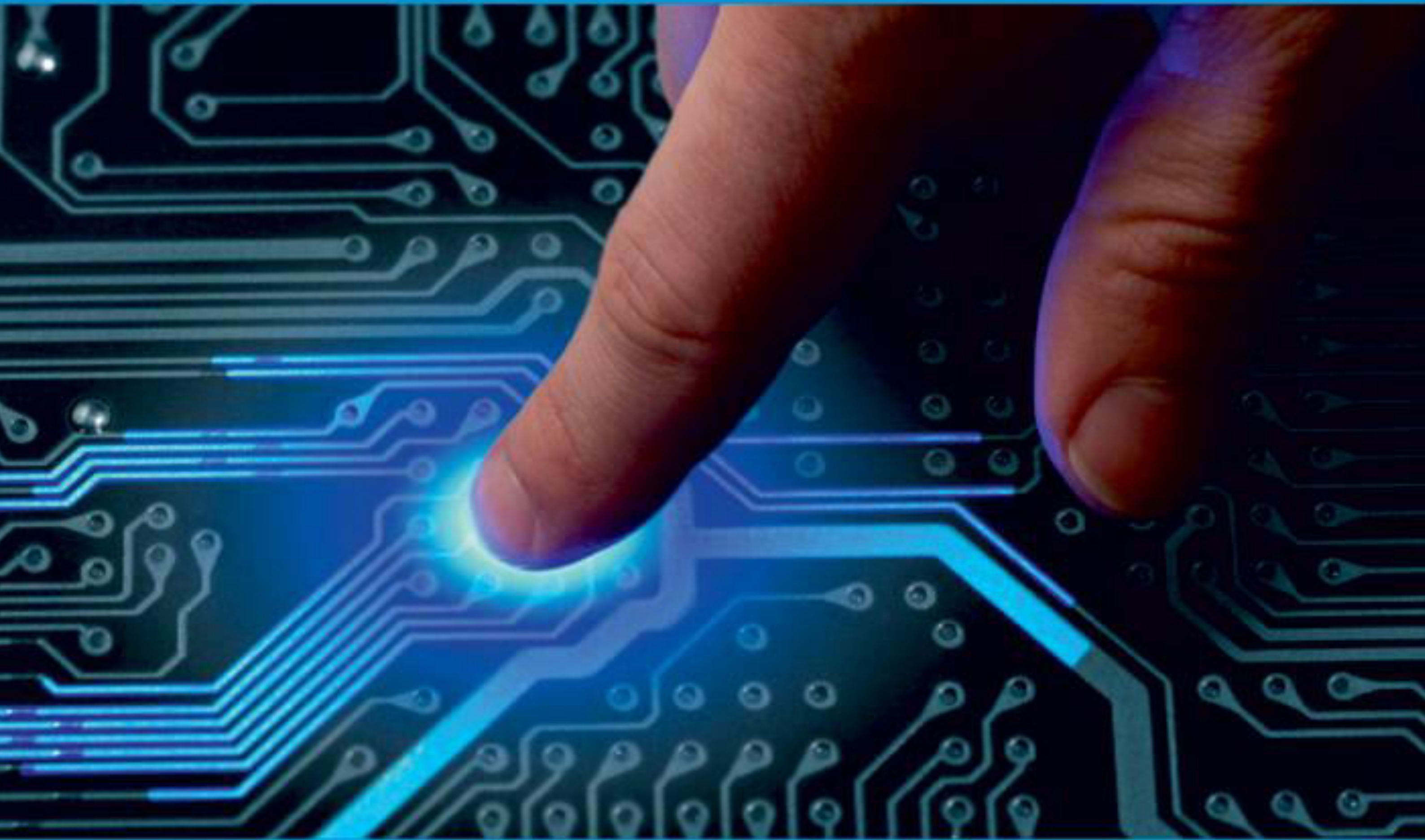

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Brain Tumor Detection Using Deep Learning: A Review

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ABSTRACT: Currently, the different algorithms for detecting tumor range and shape in brain MR images are being implemented and it is now possible to find out the degree of tumor with regard to the given tumor area. The information was gathered via research of various statistical analysis methods which are all based on those individuals who have been diagnosed with brain tumors, and then risk factors and symptoms that appear for all individuals diagnosed with brain tumors were discovered. The advancement of research in medicine day and night aims to provide modern therapeutic approaches. The surgeon physically examines this image in order to identify and diagnose brain tumors. However, this procedure accurately measures the stage and scale of the tumor and accurately distinguishes the stage of the tumor based on the location of the tumor. This dissertation employs k-means and fuzzy c-means algorithms to segment brain tumors and classify tumor cells using CNN (convolution neural network). This approach enables the accurate and reproducible segmentation of tumor tissue equal to manual segmentation. Additionally, it decreases research time and accurately determines the stage of tumor from a given region of tumor.

KEYWORDS: CNN, clustering, Segmentation, thresholding, Magnetic Resonance imaging, brain-tipped tumor**.**

I. INTRODUCTION

MRI or CT scans are usually used to image the brain's anatomy. The entire procedure is recorded in this paper using an MRI scan. For diagnosis, an MRI scan is more convenient than a CT scan. It has no adverse effect on the human body. It works by the use of magnetic fields and radio waves. Numerous algorithms have been created for the diagnosis of brain tumors. However, they may have some disadvantages in terms of identification and extraction.

Two algorithms are used in this work to perform segmentation. Algorithms for clustering K-means and Fuzzy C-means. As a result, it produces a correct tumor segmentation result. Tumors are caused by excessive tissue growth in every portion of the body. Main or secondary tumors are likely. If it is a source, it is referred to as primary. If a portion of the tumor spreads to another location and grows independently, this is referred to as secondary. Normally, a brain tumor has an effect on the CSF (Cerebral Spinal Fluid). It contributes to strokes. The surgeon treats the strokes rather than the tumor. Thus, early identification of tumors is crucial for successful treatment. When a brain tumor is diagnosed at an early stage, the patient's life expectancy may be extended. This will add about one or two years to the lifespan. Typically, tumor cells are classified into two groups. They are classified as Mass and Malignant. It is somewhat difficult to detect a malignant tumor in a bulk tumor. In this post, we will explore how to diagnose brain tumors using brain MRI images and how to assess the stage of the tumor depending on the given region of tumor. Treatment for a brain tumor is determined by the tumor's form and level, its size and location, as well as the general health and medical records. In the majority of cases, the aim of therapy is to totally eliminate or kill the tumor. The majority of brain tumors are curable if detected and treated early.

An individual who has been diagnosed with some kind of brain tumor is at an elevated risk of having another form of brain tumor. An individual who has two or more close relatives (mother, father, sister, brother, or child) who have developed brain tumors has an increased chance of developing his or her own brain tumor. Occasionally, family members will inherit a mutation that makes the brain more vulnerable and raises the chance of developing a brain tumor. Around 5% of brain tumors are thought to be caused by inherited (genetic) causes or disorders. The aim of this work is to develop a method that can inform people about their estimated risk of developing a brain tumor, whether they are at risk or not, and by how much. Java is used to build the detection platform. Finally, we have systems that detect the tumor and its form, as well as the stage of the tumor, from a given region of the tumor.

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II. LITERATURE REVIEW

For magnetic resonance imaging, the method of image registration and data fusion theory presented here has been modified for the segmentation of the magnetic resonance images. This research aims to propose an image registration and data fusion method that is optimal for segmentation of magnetic resonance images.This method enables the accurate and rapid detection of brain tumors. This device utilises the K-means algorithm to provide an effective and rapid tool for diagnosing brain tumors [1].

Meena and Raja demonstrated how to use the Spatial Fuzzy C Means (PET-SFCM) is used for PET scan image datasets to cluster data in 3D. To better assist the clustering process, a proposed algorithm incorporates spatial neighbourhood information into the FCM, and modifies the objective function of each cluster simultaneously.This algorithm has been applied and validated on a large data set of patients with neurodegenerative disorders of the brain, such as Alzheimer's disease. It has been shown to be efficient in real-world patient data sets [2].

In this case, the presented framework features three image segmentation algorithms, namely K-Means clustering, Expectation Maximization, and Normalized Cuts. The main objective of this project is to find a solution to the issue of cutting up a picture into separate regions. When we compare the two unsupervised learning algorithms, K-means and EM, to a graph-based algorithm, the Normalized Cut, we equate them to each other. Clustering algorithms that divide a data set into clusters based on a given distance measure, such as K-means and EM, are two common methods for clustering [3].

Funmilola et al. introduced the Combining the properties of Fuzzy C-means and K-means, the fuzzy K-C-means form can be used. While most of this work has focused on clustering algorithms like k-means and fuzzy c-means, this portion has done much of the work on both approaches. The k-c-means clustering algorithm was constructed by utilising these separate algorithms. This allowed the algorithm to provide a more effective result in terms of computational time. the algorithms have been put to the test and proven correct by comparing them to human brain MRI images Results have been thoroughly investigated and reported [4].

Wilson and Dhas, respectively, The SWI technique was used to detect iron in the brain by first using K-means and then using Fuzzy C-means. accurate assessment of iron stores is needed in a number of neurodegenerative diseases because of the relationship between iron accumulation and the aetiology of these diseases a susceptibility the weighted imaging SWI (SWI weighted for sensitivity) assists in getting an accurate depiction of a tissue's properties which are different from the structures under which it is located [5].

The overview of various brain tumor diagnostic techniques provided here contains a full examination of their various types. The main purpose of this article is to provide a comprehensive Type-II fuzzy expert method for diagnosing human brain tumors (Astrocytoma tumors) with T1-weighted Magnetic Resonance Imaging (MRI) with contrast. four distinct modules make up the proposed Type-II fuzzy image processing method: pre-processing, segmentation, feature extraction, and approximate reasoning [6].

Human intuition plays a key role in pattern recognition, and mainstream mathematics cannot accurately accommodate this complicated and ambiguously defined system. This, coupled with the inadequacy of fuzzy mathematics to fully embrace these ideas, has led to the implementation of various fuzzy approaches [7].

This paper presents a technique that offers an efficient and synergistic algorithm for brain tumour diagnosis, utilising median filtering, K Means segmentation, FCM segmentation, and a final threshold segmentation. in this method, we aim to improve the accuracy of tumor images obtained via MRI and to use that increased accuracy to guide estimations on the size of the tumors [8].

The author of the presented work is conducting an examination of various algorithms that can be used to color images, text, and gray scale images. When image segmentation is done, the resultant collection of segments or contours will take up the whole image, or a collection of segments and contours will be derived from the image. A pixel in a particular region can be identical in some way, such as color, strength, or texture [9].

This thesis showed how to isolate features from brain images and detect tumors using k-means and C-mean clustering techniques [10].

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III. Open Issues

Lot of work has been done in this field because of its extensive usage and applications. In this section, some of the approaches which have been implemented to achieve the same purpose are mentioned. These works are majorly differentiated by the techniques for Brain tumor detection systems.

IV. Conclusions

Segmentation of brain tumors is done in this presented work. To start, the image is pre-processed using the median filter technique. If noise is detected in the MR image, it is extracted prior to the K-means phase. The noise-free image is fed into the k-means algorithm, which extracts the tumor from the MRI image. Eventually, estimated logic is used to calculate tumor area and location, and finally, the resulting area of the tumor is used to identify the stage of the tumor, which is simpler, less expensive, and faster.

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