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A Review on Brain Tumor Detection in Computer Visions

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Abstract

Brain tumors are the mechanisms that control normal cells apparently random and uncontrolled multiplication of cells in which growth is an abnormal mass of tissue. A tumor growth takes place within the skull and interferes with normal brain activity. Therefore, the first step is very important in tumor detection. Various techniques have been developed to detect tumors in the brain. A brain tumor [1], or tumor is an intracranial solid swelling. They cover the brain, cranial nerves, blood vessels, an abnormal and uncontrolled cell division, normally in the brain, but also in lymphatic tissue are made. Brain tumors can spread from cancers primarily located in other organs. A tumor, brain pushes against the skull transfer or by invading and damaging nerves and healthy brain tissue, the brain can cause pressure loss. Area consists of a brain tumor that affects the type of symptoms. Various functions are controlled by different parts of the brain because it is Brain. In present study we are going to present different aspects of brain tumor detection.

INTRODUCTION

In the past decades, we have carried out research into brain cancer diagnosis has seen dynamic growth in the number of tasks. Many university centers [1] because brain cancer is spreading among the population of the world that are focused on issues of fact. In the U. S. for example, approximately 3, 000 children are diagnosed with brain tumors. Almost half the most deadly cancer among children, which die within five years [2]. It will neurological disabilities, retardation and psychological problems and is associated with increased risk of death. Most increases in incidence and death from brain cancer in the general population, despite the world; Africans dying from the disease is more likely than other patients. In Tunisia, for example, the cancer death rate of deaths among the elderly accounted for 14. 8 %. They represent the second leading cause of death after cardiovascular diseases [3]. For its negative effects on people affected by cancer diseases have a high burden on the national economy and society as well as a source of suffering for the family formed [3].

To identify a tumor, the patient will undergo several tests. Most computed tomography (CT) and magnetic resonance imaging (MRI) is used to detect brain tumors. The information obtained will influence treatment a patient will receive. Perhaps the most widely used clinical diagnostic and research technique is MRI. ARM...) is that part of the body of skilled medical imagery equipment, especially the brain. The nuclear magnetic resonance (NMR) is based on the principal. Due to various scenes with high contrast in various tissues[4].

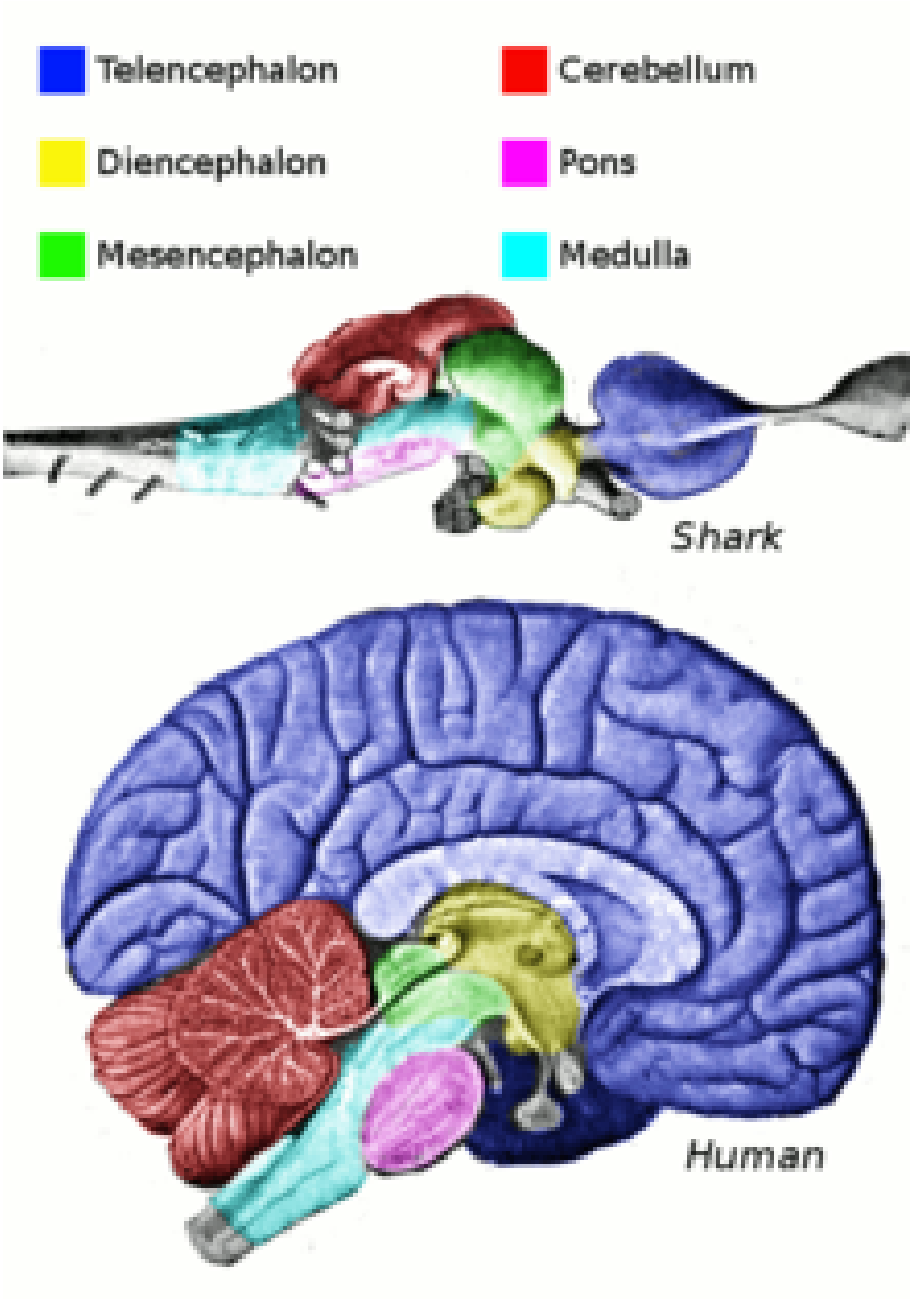

Fig 1. Main anatomical regions of the vertebrate brain

Fig 2. Brain tumours in infants and children

In analyzing image processing, segmentation, a pre- treatment step before the increase. In fact, dealt with low contrast enhancement step, since the majority of the images is needed to improve the quality of the images. Split phase also known as tumor clearance ensures that classification is followed by a post- treatment step. Classification of medical images, such as psychology, biology, medicine is a fundamental step in various applications. Due to the high variability of medical image data classification process, it is important to use the appropriate model.

In the past decade, machine learning -based classification is a major development, which may prove useful for biomedical image analysis, support vector machine these advances, kernel principal component analysis, and independent component analysis, bagging and boosting techniques?

Supervised and unsupervised classification algorithms are classified; each class has its basic principles and properties, though Tumor detection and clearance of both categories that have a common purpose.

DIFFERENT REVIEWS

In computer vision, division multiple segments (sets of pixels) is refers to the process of dividing a digital image. The goal of the division is more meaningful and easier to analyze an image that represents something easy to make and / or change. Medical image segmentation especially magnetic / resonance (MR) images during diagnostic

analysis, in view of human tissues is an inevitable process. Some split into non-overlapping meaningful homogeneous regions or objects is a process of dividing an image space. An image analysis system success depends on the quality of the partition. Computer aided analysis of medical images for diagnosis and treatment, the division is often required as a preliminary step. Medical image segmentation because of the nature of the images is a complex and challenging task.

June Kong, et al. A technique proposed in 2006 [3]. A novel approach for segmenting brain tissue is proposed in this year. The algorithm is composed of four steps. In the first stage of image de-noising based on wavelet filter is used versatile. In the next step, an initial segmentation method as watershed algorithm is applied to brain tissue. The next process is the process of merging fuzzy clustering algorithm is applied to access the partition. Finally, the division process is applied again. Are not completely separated, which is used for certain areas. The minimum covariance determinant estimator is used to detect regions and KNN classifier is used to divide them.

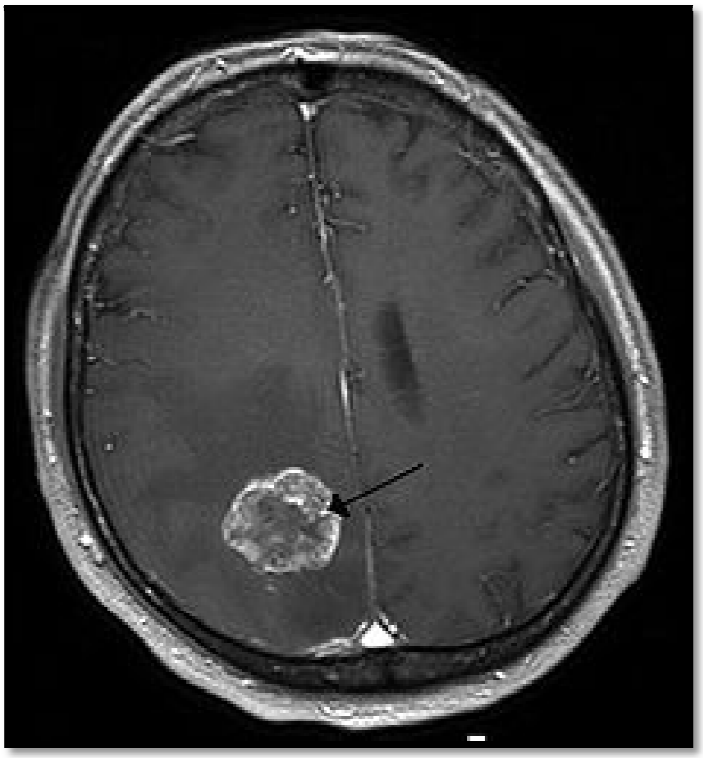

Fig 3. Brain metastasis in the right cerebral hemisphere from lung cancer shown on T1-weighted magnetic resonance imaging with intravenous contrast.

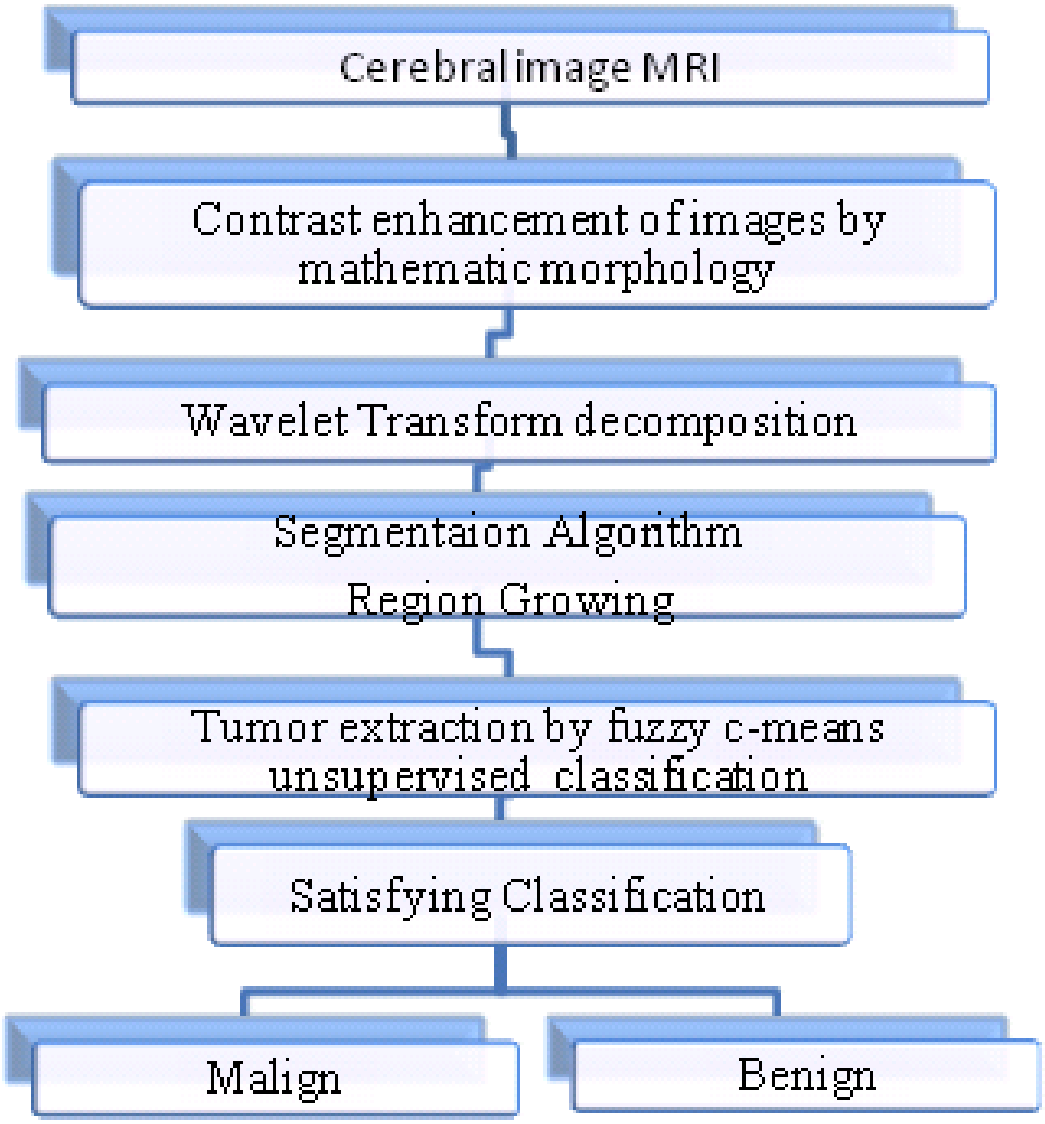

Fig 4. PROPOSED ALGORITHM

Riries Rulaningtyasand Khusnul in 2009[4], analyzed between the three algorithms for the detection of brain tumors by studying the best way to get it. Those three techniques Prewitt, Sobel and Robert study [4]. Three methods for edge detection, the Sobel edge detection method more suitable for brain tumor is found. This method is a little mean and standard deviation value. A pair of 3x3 convolution masks, X- direction (columns) and the Y- direction of the gradient estimate (rows) is used to assess the shield. Manipulating a square of pixels at a time mask is slid over the image. In this way the efficient edge detection is obtained by this method.

A novel brain tumor segmentation scheme [9], the image is obtained by thresholding segmentation technique where Rajasvaran Logeswaran, Chikkannan

Eswaran is addressed. In this paper, 2D MRCP images a plan for early detection of tumors was proposed. Ages of different implementations of the scheme were presented. In tests carried out, the schemes correctly classify tumors and normal MRCP images were found to achieve high success rates. Planning ahead can be improved and some recommendations are presented here. During the division of the existing scheme uses Gaussian filtering. The Euclidean shortening flow (ESF) as Anisotropic filtering algorithm may be better to try to maintain Image structure. Threshold values in different parts of the algorithm used to recover a large number of test images can be tuned through better statistical analysis. Dynamic thresholding algorithms can be used.

PROBLEM FORMULATION

1. ENHANCEMENT: Enhancement aims at improving the quality of a given image. It can be accomplished by removing noise, enhancing contrast, emphasizing edges and modifying shapes.
2. SEGEMENTATION: After pre-processing phase, a segmentation algorithm is adopted. The basic aim of segmentation is the partitioning of an image into homogeneous regions (spatially connected groups of pixels called classes, or subsets) with respect to one or more characteristics or features; such that the union of any two neighs boring regions yields a heterogeneous.

Medical image segmentation is a promising field and imposes constraints related to the concept of time, the great number of implied data and the richness of image concerning the complexity of the organ's anatomy, the patient's position of catching image. All these medical images characteristics add more difficulties to the problem of image segmentation and make the construction of a general model more complex. This explains the variety of segmentation methods appeared in the last years. In literature there exist two major classes of segmentation techniques: edge based segmentation approach and region based segmentation approach.

3. TUMOR DETECTION: In recent years a great effort of the research in field of medical imaging was focused on brain tumors segmentation. The automatic segmentation has great potential in clinical medicine by freeing physicians from the burden of manual labeling; whereas only a quantitative measurement allows to track and modeling precisely the disease. MR is generally more sensitive in detecting brain abnormalities during the early stages of disease, and is excellent in early detection of cases of cerebral infarction, brain tumors, or infections. MR is particularly useful in detecting white matter disease, such as multiple sclerosis, progressive multifocal leukoencephalopathy, leukodystrophy, and post-infectious encephalitis. After scanning of brain, detection of the Brain tumor from the brain scanned images (MRI Scan) is performed. This detection helps to obtain the location and size of the tumor. Segmentation is the most important method to obtain the useful information from the MRI image of the scanned brain.

CLUSTERING METHOD:

The K-means algorithm:

K-means algorithm [6] is an iterative technique that is used to partition an image into K clusters. The basic algorithm is:

- Pick *K* cluster centers, either randomly or based on some heuristic.
- Assign each pixel in the image to the cluster that minimizes the distance between the pixel and the cluster center.
- Re-compute the cluster centers by averaging all of the pixels in the cluster.
- Repeat steps 2 and 3 until convergence is attained (e. g. no pixels change clusters).

In this case, distance is the squared or absolute difference between a pixel and a cluster center. The difference is typically based on pixel color, intensity, texture, and location, or a weighted combination of these factors. *K* can be selected manually, randomly, or by a heuristic.

Fuzzy Clustering:

Traditional clustering approaches generate partitions; in a partition, each instance belongs to one and only one cluster. Hence, the clusters in a hard clustering are is jointed. In this case, each pattern is associated with every cluster using some sort of membership function, namely, each cluster is a fuzzy set of all the patterns.

Larger membership values indicate higher confidence in the assignment of the pattern to the cluster. A hard clustering can be obtained from a fuzzy partition by using a threshold of the membership value.

The most popular fuzzy clustering algorithm is the fuzzy *c*-means (FCM) algorithm. Even though it is better than the hard *K*-means algorithm at avoiding local minima, FCM can still converge to local minima of the squared error criterion. The design of membership functions is the most important problem in fuzzy clustering; different choices include those based on similarity decomposition and centroids of clusters. A generalization of the FCM algorithm has been proposed through a family of objective functions. A fuzzy *c*-shell algorithm and an adaptive variant for detecting circular and elliptical boundaries have been presented.

CONCLUSION AND FUTURE WORK

Research in the field of medical imaging in recent years a great effort has been focused on segmentation of brain tumors. Automatic segmentation by freeing physicians from the burden of manual labeling has great potential in clinical medicine; only a quantitative measurement of disease modeling allows tracking and recovering while. MR usually during the early stages of the disease is more sensitive in detecting abnormalities of the brain, and cerebral infarction, brain tumor, or infection in the early detection of cases is excellent. In future we will present a fuzzy based method to detect the brain tumor.

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