A various Study of MRI brain Image based on Segmentation

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Abstract—In medical image processing (MIP), brain tumor segmentation (BTS) is an important task; the early diagnosis of brain tumors (BTs) plays an important role in improving therapeutic options and increasing the patient’s survival rate. BTs for cancer diagnosis can be segmented manually from large amount of magnetic resonance imaging (MRI) data, but this is a complex and time-consuming process. An automatic and effective BTS system is therefore required. Nevertheless, tumor detection remains a challenging task for researchers as the tumor has complex appearance and boundary features. This paper seeks to explain BT, its forms and various methods of brain tumor identification and segmentation. The aim of this survey paper is to present different automated brain MRI BTS methods. The current brain tumor detection (BTD) and brain MRI segmentation techniques are explored in this paper.

Keywords—image segmentation; Brain MRI images, FCM, Region growing, Thresholding, Tumor segmentation.

I. INTRODUCTION

Various kinds of digital images (DI) as of dissimilar cameras and sensors with different properties are enhanced by the advancement of sensors and camera technology. For example, we have satellite images (SI) such as panchromatic and multispectral, medical (MI) images such as CT and MRI [1], which are used for dissimilar purposes depending on the application in which they are used.

The brain is the core of the central nervous system in humans. The brain is a complex organ because it has 50-100 billion neurons that form a gigantic network (GN). Brain tumor (BT) is an irregular cell group growth that develops within the brain or around the brain. BT types are benign tumors and MT. BTs are a non-malignant / non-cancerous tumor. A benign tumor is normally located and does not range to extra parts of the body. Many benign tumors are available for therapy. BT is less risky than tumor that is malignant tumor (MT). MT is the growth of cancer. These are often medication resistant and can spread to different pieces of the body. MTs are arranged into essential and auxiliary tumors. The MT spreads quickly entering other brain tissues, slowly aggravating the death-causing disease. Due to the complex brain structure, BT detection is a very difficult problem [2].

Medical image processing is a gift to human beings for preplanning their medical treatments. Brain tumor disease is a dangerous disease for human life-cycle because it emerges as a dominant disease all over the world. The advanced medical diagnosis system detects the brain tumor in patients through MRI scanning, but in some cases, the radiologist can’t detect tumors even though they may be experienced pathologists [3]. The main challenges of brain tumor segmentation are its various sizes, shapes, and appearance at different locations. The deformation of surrounding structures in the brain due to mass effect or edema also complicates the brain tumor segmentation. The artifacts and noise are other obstacles in brain tumor segmentation. For the segmentation pattern recognition technique is widely used. The tumor can be segmented as the outlined of the tissues. The tumor mass effect can change the normal tissues. The segment of gliomas is important for treatment. Images can be tested by using MRI or Computed Tomography (CT) scan. Accurate classification of medical imaging is needed for clinical diagnosis. Many papers are explored on this topic with solutions and many of the researchers do not know about which is the best paper to continue their new research. This paper progressed with a solution to elaborate on the information about the recent state-of-the-art papers which may help young researchers. [3].

Radiologists use (CT scan) and MRI to actually test the patient. The brain structures, tumor size, and area appeared in the MRI pictures. The detail, for example, the area of tumors given radiologists from the MRI pictures was a helpful method to analyze the tumor and prepare the surgical method to remove it [4].

BT segmentation takes into account tumor tissue separation (tumor, edema & necrosis) as of normal brain tissues: gray matter (GM), white matter (WM) & cerebrospinal fluid (CSF)[2 ]. Brain tissue segmentation, especially tumor & edema, is a complicated assignment due to tumor artifacts, complex form, heterogeneous intensity distribution (HID) and tumor location variability [4].

MRI uses radio-frequency (RF) and magnetic area to produce an image of the human body lacking ionized radiation. Imaging plays a key role in the treatment of BT. We either appear hypo (darker than brain tissue) or is tense (same power as brain tissue) on T1-weighted scans or appear hyperactive (brighter than brain tissue) on T2-weighted MRI.

Fig.1. The presence of a brain tumor
MI and soft computing have complete important progress in the segmentation of BT in recent years. This paper shows a study of different brain tumor detection strategies and algorithms using segmentation of the MRI image. Semiautomatic or fully automatic methods are practical for BTs because in this case, errors are lower compared to manual methods of segmentation.

This paper's outline is as follows: Section II segmentation of the image. Section III. Part III of the MRI pictures Brain Mr Pictures. Section V deals with a review of the literature. Section VI provides a study of methods for segmentation of tumors in brain MRI. Part VII. This paper ends.

II. IMAGE SEGMENTATION

Image segmentation is the main technology for processing of the image. A lot of programs either or not on fusion of the object or computer images need specific segmentation. The segmentation partition the image into specific elements of each pixel with comparable features [5]. The adequate image segmentation is more complicated assignment. Image segmentation has interpreted in another way for diverse features. For example, in feature of machine vision, it's far observe as a connection among high and low level vision subsystems, in medical imaging as a tool to outline anatomical configuration and different areas of significance whose realize information is usually existing and statistical analysis, it's far posed as a stochastic evaluation trouble, with hypothetical previous distributions on image form which is broadly utilized in remote sensing. The remote sensing, additionally it is viewed as a useful resource to landscape alternate detection and land use/cover type noted examples specific that image segmentation is found in each form of photo analysis. This constitutes a number of literature on the photo segmentation.

![Image Segmentation Process](image)

**Fig. 3 Block diagram of Image Segmentation process.**

**2.1 Applications**

A portion of the useful uses of Image segmentation are:

- **Machine vision**
- **CBIR**
- **Medical imaging [6]**
  - Find tumors and different pathologies
  - Measure tissue volumes
  - Analysis, investigation of structural structure
  - Surgery arranging
  - Virtual medical procedure recreation
  - Intra-medical procedure route

- **Object recognition [7]**
  - Pedestrian recognition
  - Face recognition
  - Brake light recognition
  - Locate protests in SI (streets, woods, crops, and so on.)

- **Recognition Tasks**
  - Face acknowledgment
  - Fingerprint acknowledgment
  - Iris acknowledgment

- **Traffic control frameworks**
- **Video observation**

III. MAGNETIC RESONANCE IMAGING (MRI)

A few broadly useful calculations and strategies for picture division have been created. To be valuable, these approaches ordinarily should be combined with the particular information of space so as to take care of the division issues of the area successfully.

The cores of an iota's protons and neutrons have rakish energy known as a turn. At the point when the measure of subatomic particles in a core is even, these twists will drop. Cores with an abnormal number will bring about a turn. This structures the establishment for attractive reverberation imaging. MRI scanner usages solid magnets to spellbind & energize cores of hydrogen (single proton) in human tissue, creating a sign that can be recognized and spatially encoded, bringing about body pictures. The RF beat is radiated by the MRI machine, which explicitly associates just to water. The framework sends the beat that requires to be inspected to that specific area of the body. Due to the RF beat, protons assimilate the vitality they have to turn a specific way at the recurrence of the glamour. This recurrence is found relying upon the picture of the particular tissue and the attractive field quality. X-ray utilizes three electromagnetic fields: a static field that is a solid static field and an electromagnetic field for spatial encoding; and a feeble radio recurrence field to control the hydrogen cores to deliver quantifiable sign gathered by radio recurrence antenna [8].

IV. BRAIN MR IMAGES

MRI is a propelled procedure of medicinal imaging that gives rich data about the life structures of human delicate tissue. It has various preferences over other imaging strategies that empower it to furnish high balance between delicate tissues with 3-dimensional information. The amount of data, be that as it may, is to an extreme degree a lot for manual investigation/elucidation, and this has been one of the greatest barriers to efficient MRI use. For this reason, computer-aided image analysis automatic or semi-automatic methods are needed. It is a significant job to segment MR pictures into various tissue groups, particularly GM, WM & CSF. Brain MR Images have the number of highlights, specifically the accompanying: first, they are factually basic; with few classes, MR Images are theoretically piece-wise constant. Second, the contrast between the distinct tissues is comparatively high. The MR image
contrasting relies on how the picture is obtained. By changing the RF and gradient beats and thoroughly selecting relaxation timing, distinct components can be highlighted in the object being pictured and produced.

V. LITERATURE SURVEY

Roopa E et al. (2018) Extraction of satellite image structures with high resolution is a challenging task for remote sensing scientists. MO and perceptual grouping methods are created in the suggested RG Segmentation job and are used to identify structures in high-resolution pictures. Using MATLAB software, the required algorithm is created for implementing region-widening segmentation and its efficiency is checked by inputting several pictures. It is established that rectangular construction footprints are effectively detected by the suggested algorithm. The effectiveness of the constructed algorithm is evaluated successfully by repeating the test several times [9].

Laxmi Gupta1, et al. (2018) In this document, we suggest and examine an independent stains segmentation structure that extends to arbitrary stains the characteristic of an available segmentation habitual residential for a particular stain. The idea is to perform the following slides into spatial alignment between unique stains so that one can remove the place statistics got by segmenting the picture to the consecutively recorded pictures adorned with further stains by an exacting stain. For a situation study with complete renal slide pictures, we do look into and analyze the consequences of the proposed technique with basic (division of the stain, the strategy was created for) and furthermore survey the effect of the rest of the strategy arrangement error.[10]

Zhen Song Wang et al. (2018), The commitments of this work are just to address as pursues: 1) another component for the distinguishing proof of significant vertices is planned to group apexes by particular appearances and great consistency crosswise over various subjects; 2) another procedure for progressive vertex relapse is additionally used to gradually find additional vertices by the assistance of recently recognized vertices; & 3) a progressive methodology for various leveled vertex relapse. In particular, by creating three novel approaches, for example, progressive basic model vertex acknowledgment, shape and appearance learning, and various leveled vertex relapse, our methodology can adequately defeat the affectability drawback of forming instatement in conventional deformable models. This demonstrates this method can be far superior to condition of - the-craftsmanship draws near. In this investigation, a technique for division concentrated on progressive vertex relapse to fragment OARs from H&N CT pictures for arranging radiotherapy [11].

Wei Yang et al. (2018), Present a novel approach using trained local nonlinear descriptors and matching features to predict T1w and T2w MRI pseudo-CT images. In this process, pseudo-CT images are produced with an MSE of 75.25 18.05 Hounsfield units, a PSNR of 30.87 1.15 dB, a comparative MSE of 1.56 0.50 percent in PET constriction rectification, and a portion relative volume contrast of 0.055 0.107 percent in D contrasted by genuine CT. The nonlinear nearby descriptors are gotten by anticipating the direct nonlinear space utilizing express component guide and low-position estimation with administered numerous regularizations. In this examination, a capacity coordinating strategy for foreseeing CT from MR picture information with learned local descriptors. Using an explicit function map, the primary MR object descriptors are first projected to an HDS to obtain the nonlinear descriptors.[12]

Zisha Zhong et al. [2018] For traditional cancer diagnosis and treatment, positron emission tomography and computer tomography (PET-CT) double methodology imaging give significant demonstrative data. In PC helped tumor perusing and examination dependent on PET-CT, mechanized precise tumor outline is significant. In this article, we suggest a novel way to deal with lung tumor division that joins the amazing Fully Convolutional Networks (FCN)- founded semantic division framework (3D-Unet) with the co-division model dependent on diagram cutting. Initial, 2 discrete profound UNets are prepared independently on PET & CT to adapt significant level discriminative attributes to create tumor/non-tumor covers and maps of PET and CT pictures. Rather, in a chart cut-based co-division model, the two likelihood maps on PET and CT are likewise utilized at the same time to generate the final results of tumor segmentation. Comparative studies on 32 lung cancer patients with PET-CT scans show our model's effectiveness. [13]

Yubing Li, et al. [2018] Grab Cut algorithm is single of image segmentation's greatest popular methods. This uses object texture data and boundary information, and by a minor quantity of user interactions this achieves strong segmentation efficiency. But this algorithm has two significant drawbacks. First, the segmentation will not be very good on the off chance that the foundation is perplexing or the foundation and the article is fundamentally the same as. Then again, its usage is seriously restricted by the generally moderate speed and complex iterative strategy for the calculation. In this paper, we proposed a changed snatch cut calculation to establish these aspects. This algorithm incorporates catch cut and object segmentation based on graphs. The improved algorithm is applied after the experiment to more complex situations.

Ionut Schiopu, et al. [2017] The paper proposes a picture division technique for lossless pressure of plenoptic pictures. Each light-field picture caught by the plenoptic camera is handled to get a pile of sub-opening pictures. Each sub-gap picture is encoded by utilizing a slope base indicator that groups the picture edges and structures refined settings for an improved expectation and division. The paper's principle commitment is another division strategy that creates a primer division, either by scaling the power contrasts or by utilizing a quantum cut based calculation and consolidations it with an edge positioning based division. The outcomes appear around 2% improved execution contrasted with the cutting edge for a dataset of 118 plenoptic images.[15]

Haigang Sui, et al. [2017] A new constant shape feature-founded picture registration technique has been suggested in this article by combining the stable area by a set of rotations, scale-invariant characteristics, and multi-scale image segmentation (MSIS) to achieve similar regions. This algo originally shifts MSIS and convex form constraint pictures into objects. Then, instead of points or lines, these consistent and constant picture areas are used as similar units. The experiment shows that the depiction of the algo in this document is not perceptive to distortion of rotation and resolve, which is robotically full picture index [16].

Dingsheng Hu, et. Al. (2016) This reflects one of PoIsAR's most sophisticated unsupervised statistical segmentation set of guidelines and utilizes the PoIsAR data doubly flexible, two-parameter-distribution version. The opportunity density feature's complexity, however, finishes in elevated time consumption. The documents in the distribution representation show the important object-ordered deviation & determine a new parameter region, i.e. PDFs are easy. Then a 1-D look-up table with nodes of broad variation determined by the respective Fourier spectrum is prepared in this region and is adopted to prevent re-evaluating the arithmetic essential in PDF in order to estimate the posterior class opportunity for each illustration. The proposed methodology is coordinated in the ordinary division calculation. A model check has been finished to approve the effectiveness of the proposed method[17].
Marek Wdowiak, et.al. (2016) This document allows modification in microscopic pictures of stained desmoglein-3 of the traditional watershed algorithm (WA) for cell segmentation. The PROPOSED methods combine color deconvolution for the partition of the symbols and GVF for the segmentation of watersheds. Watershed is usually tremendously susceptible to noise that generates picture in microscopy. The recommended solution considerably reduces more segmentation problems (appropriately segmented eighty-eight percent cells) and also enables image analysis [18].

Maithili Lawankar, et.al. (2016) This paper presented the Watershed Transform segmentation algorithm is employed as it generates total separation of images in split section still condition dissimilarity is reduced. Therefore this method could be achieved 92.1% accuracy.[19]

Yiping Duan, et.al (2016) Convolutional neural network (CNN) is better on studying characteristics from unprocessed data without manual intervention, especially the structural characteristics. CWNN gives the result of segmentation with two types of approach i.e., a superpixel method & an MRF methodology to generate the last separation plan. The superpixel strategy is cast-off to carry out soft nature in the limited arena. Contrary, to maintain the edges and descriptions of the SAR picture, the MRF strategy is cast-off. Two segmentation maps are created by actualizing the superpixel and MRF conspire. The principal division guide is cultivated by gathering the CWNN division map and the superpixel progress, while the subsequent division guide is acquired by applying the genuine SAR picture to the MRF strategy. CWNN is efficient for segmentation assignments because several texture image tests demonstrate the efficacy of CWNN. The speculation on the real SAR pictures shows that the strategy achieves the region along with the consistency of labeling while at the same time maintaining the corners and details.[20]

Ravi Boda, et.al. [2016] precise segmentation of pictures is very significant in the processing of images. Image segmentation's primary aim is to divide the initial picture into standardized areas. Image segmentation can be introduced to other image processing methods as the pre-processing phase. Several MR image segmentation methods exist in IP. Bio-medical segmentation of image has become an important method for carrying out substantial quantitative searches to control human organs, defective tissues, etc. In this document, we suggested the Gray Threshold Mechanism (GTM), Sobel Gradient Method (SGM), Active Contour Method (ACM), and Watershed Transform (WST) picture segmentation methods. These 4 techniques of division are applied to pictures of Knee joints, mind, ultrasound and cardiovascular therapeutic MRI. These division methods are applied to 128X128, 256X256, 512X512, and 1024X1024 size MRI pictures above. Later, parameters such as MSE, PSNR, and Entropy and time execution estimation are determined and thought about for all image measurements. The below methods for division are made and execution parameters are determined to utilize a product from MATLAB 2014[21].

VI. EXISTING MRI BRAIN IMAGE SEGMENTATION TECHNIQUES
Existing brain tumor segmentation strategies from MRI images can be broadly classified into four groups, i.e. Segmentation based on thresholds, segmentation based on margins, segmentation based on regions and segmentation based on clusters. In threshold-based segmentation techniques, the objects from the image are extracted on the basis of a particular threshold. In edge-based segmentation techniques, the abrupt change in intensity values is taken into consideration for object extraction. In region-based segmentation (RBS) methods, the picture is divided into regions having different properties. In the case of clustering-based segmentation (CBS) techniques and picture is divided into a number of clusters based on the importance of membership functions allotted to each pixel in the image. Fig. 4 signifies the classification of these segmentation techniques.

![Image 307x571 to 542x739](...)
6.2 Edge Based Segmentation (EBS)

EBS methods of segmentation split a picture founded on abrupt alterations in pixel power near the edges. The effect is a binary picture that senses the edges of the objects. There are two simple EBS approaches, viz., based on the theory. Black histograms (BH) and methods focused on gradients.

(A) Gray Histogram Technique (GHT)
The output of the gray histogram technique depends primarily on threshold (T) selection. The picture is transformed into a gray-scale image (GSI) & added to the histogram of that image after that gray-level thresholding (GLT).

(B) Gradient-Based Method (GBM)
The disparity between adjacent pixel intensity values is taken into account in the GBM. So when in a region of an image there is an abrupt change in brightness and there is much less image noise then GBM works well. These methods require gradient operators to be applied to the image. Specific edge detection operators used in this process are Sobel operator (SO), Canny operator (CO), Laplace operator (LO), Laplacian Gaussian operator (LOG) operator, etc., from which SO and CO provide better results Edge detection methods display a balance between accuracy and noise immunity. If the detection level of accurate edges is too high, then noise can produce fake edges, and if the degree of noise immunity is too high, some parts of the image that contain important information may go undetected.

6.3 Region-Based Segmentation (RBM)

Region founded methods divide an object into dissimilar regions founded on a set of specific criteria. The current strategies for area segmentation consist mainly of the next approaches:

(A) Region growing (RG)
The region-growing approach is one of the most widely used segmentation approaches. This approach begins with a seed pixel and grows the region based on some threshold value by adding the neighboring pixels. When all pixels belong to certain areas, the RG ceases. In general, RG segmentation is used for small and simple structures such as tumors, lesions, etc.

(B) Region splitting and merging
The picture is alienated into a number of dissimilar regions based on a criterion and is combined after splitting. The whole image is initially considered to be a single region, and then the internal similarity of the image is determined using the standard deviation. If the variance is very large, the picture is divided into regions using a certain threshold value. This process is repeated until no further division of the area is feasible. The quadtree is a common structure of data used for splitting.

(C) Watershed segmentation (WS)
Watershed segmentation algorithm (WSA) can be used if the picture has a uniform differentiation appropriation and recognizes the recurrence of the frontal area and foundation. Likewise utilized is the Watershed calculation to find the weak edges in the images.

6.4 Clustering

Clustering is the method most widely used in the MRI Segmentation, where it separates pixels into groups, without prior information or preparation. This classifies the pixels that are most likely to be in the same class. In the clustering method, the practice is conducted using the pixel characteristics of each group of identified pixels.

(A) K-means (KM)
K-means clustering (KMC) calculation is the least complex of current clustering algorithms (CA) that can group pixels into various locales dependent on pixel properties. This technique is called hard grouping since bunches must be adequately removed from one another and every pixel is appointed a participation work so that it has a place with just a single specific district. [22]

(B) Fuzzy c-means (FCM)
FCM grouping is an aided strategy for dissecting a given information picture. The FCM CA allows enrollment capacities to every pixel in a picture relating to each group focus dependent on the separation of the bunch focus from that particular pixel. The pixels shut the bunch focus have lower participation include (MF) towards the group focus.

(C) Hierarchical clustering (HC)
The hierarchical method of clustering works by grouping in the image data object into a cluster tree. HC does not need to define in advance the number of clusters.

6.5 Contourlet Transform (CT)

CT defeats the inconveniences of ordinarily utilized convenient augmentations of one-dimensional variations, for sample, Wavelet & Fourier change, when processing the geometry of the picture edges. This change has been made by Minh Do et. Al., where it assessed a "genuine" 2D change that could catch the major geometrical structure that is the fundamental point in visual information. They made a circumspect change that stretches an uncommon expansion to conventional pictures with a relentless layout. By utilizing consonant investigation and vision, two key qualities of the new picture model are watched, which outflanks the separable 2D WT, characterized as directionality and anisotropy. In view of this test, they additionally made another channel bank configuration, called a contourlet channel bank, which can make the picture's multiscale and directional disintegration versatile.
Sub-band pictures created by multi-scale disintegration are then handled by a directional channel bank to uncover directional unobtrusive components at each extraordinary scale level [23]. The contourlet coefficients are the data obtained from the directional filter register.

6.6 Canny Edge Detection (CED)
In the wake of applying CT and improvement highlight to an institutionalized picture, we applied CED to the proposed incorporated strategy in this stage. The CED strategy works in five stages. From the outset, the Gaussian channel is utilized to expel clamor, and after that the inclination of the picture is determined to distinguish sharp edges. From that point onward, the calculation manages thick edges to make them flimsy by utilizing non-most extreme concealment. As a subsequent stage, this method sets 2 edges esteems as per the edge an incentive for the edge region. In the last phase, this methodology endeavors to expel false edges that are not associated with an exceptionally solid edge utilizing the hysteresis procedure.

1.1 DIFFERENT METHODS OF BRAIN TUMOR SEGMENTATION [24]

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<tr>
<th>S no.</th>
<th>Segmentation Algorithm</th>
<th>How &amp; Why</th>
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<tr>
<td>8.</td>
<td>Fuzzy Clustering</td>
<td>The limit of tumor tissue is exceptionally sporadic and non-crystalline. Deformable models and area-based methodologies are usually utilized for clinical picture division to recognize the limit of the tumor. Besides, fluffy grouping, which might be founded on single or multi-criteria, may accomplish better outcomes as far as precision at some computational cost. A few scientists additionally utilized it as a blend with different techniques, for example, K-Means/C-Means.</td>
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<td>9.</td>
<td>Entropy-Based Segmentation</td>
<td>It is an outstanding observational reality that the tumor part normally has more vitality or entropy contrasted with different segments and in the event that we can discover sharp edges with this strategy, this can give the distinction in slope, therefore assisting with simple tumor segmentation.</td>
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<td>10.</td>
<td>Neural Network-based</td>
<td>This machine calculation has been utilized in the two different ways as far as directed and in solo manner to discover the tumor part, the exactness anyway in the two strategies relies upon right sort of highlight choice and right mix of info, covered up and yield layers.</td>
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<td>11.</td>
<td>Closely Linked Associated Pixel</td>
<td>This is only another method for gathering the pixels which can speak to an intently connect properties of the tumor and non – tumor part as far as either pixels force or other surface features.</td>
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<td>12.</td>
<td>Multi-Fractal Texture</td>
<td>There is constantly a need to fabricate an extraordinary mix of highlight column set in such a way, that it can assist us with identifying the tumor &amp; non-tumor part discriminately to give precise ground truth approval, consequently multi real surface technique is one approach to do. This strategy gives multi-criteria surface component blend to limit tumor part.</td>
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<td>13.</td>
<td>Geometric Transformation Invariant</td>
<td>The GT invariant strategy helps in recognizing the tumor in different scales, positions, and directions. The technique consolidates three highlights (shape, position, and surface) to frame an element vector, which is utilized for identifying the tainted parts in the picture. In this way getting precise tumor parts.</td>
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<td>14.</td>
<td>Bounding Box and Level Set method</td>
<td>This technique permits the division of tumor tissue by exactness and constancy in correlation by manual division. Additionally, it likewise diminishes the ideal opportunity for investigation.</td>
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<td>15.</td>
<td>Support Vector Machine</td>
<td>There has been an extensive discussion which is making due to date on whether the ANN is better or SVM is better, however, it very well may be securely said that it relies upon the dataset and application, colossal exactness has likewise been found by specialists for distinguishing cerebrum tumor.</td>
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A variety of current brain tumor identification and segmentation techniques have been explored in this paper for brain MRI images. The various existing segmentation methods like thresholding-based, region-based, edge-based & clustering-based segmentation procedures have been described for the extraction of brain tumors from MRI pictures. Brightness-based thresholding approaches deliver good performance but do not work for objects with large differences in brightness. Regional segmentation is good for high-contrast images, but it does not provide effective results for low-contrast pictures. Edge-based segmentation delivers better performance but fails for noisy objects as it creates false edges for them. Clustering-based segmentation is very basic, fast and delivers good results, but with noisy images it produces incorrect results. This paper offers additional data on the identification and segmentation of brain tumors. The identified region is segmented and the radiologist involved in the project's evaluation of this tool is positive and this tool assists them in the status of diagnosis, treatment protocol, and tumor monitoring.

**Conclusion**