A Comparative Analysis of Wide Band Antenna with Reduced Radar Cross Section

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***Abstract*- An antenna with reduced radar cross section is the most applicable one for military and stealth technology to reduce the radar cross section of sensitive targets, thus makes invisible to the enemy radar. Radar cross section reduction plays a main role in the defense industry. In this paper, the operating frequency and RCS reduction are compared with different wide band antenna. A planar octagonal shaped UWB antenna reduces the radar cross section for the whole operational bandwidth and found best for radar applications with 10dB RCS reduction at the whole operational bandwidth, 25dB RCS reduction especially at low frequencies with good antenna performance.**

Index Terms— Ultra-wideband (UWB) antenna, monopole antenna, reduced radar cross section.

I. INTRODUCTION

As per the federal communication commission (FCC), the operating frequency of ultra wide band has been declared as 3.1 to 10.6 GHz. Mostly UWB antennas are used in target sensing, location finding and tracking applications. The main advantages of ultra wide band antennas are higher bandwidth, low power requirements, minimum fading in multipath, low profile, easy fabrication, low complexity, low cost, high data rate wireless communication. A design of an antenna with low RCS is not easier. Reduction of RCS for a whole operational bandwidth is a challenging one. But designing an antenna with low RCS is mandatory in low observable platforms.

Radar cross section is classified into two types: Monostatic RCS and Bistatic RCS. The Monostatic RCS is obtained, when the transmitter or receiver will be at same location. The Bistatic RCS is obtained, when the transmitter or receiver are not at the same location. Antenna is also a better scatter; scattering is mainly related to feed port. The scattering characteristics are controlled by feed terminations of the antenna. Scattering of an antenna are of structural mode, antenna mode scattering. When the feed port of an antenna is being terminated by matched load, then the scattering would be called as structural mode. If the antenna is terminated with other loads, then the part of the energy would be reflected back, called antenna mode scattering. For reducing the RCS, radar absorbing material also can be used. But it will make the antenna from wide band to narrow band [7].

This paper compares the different wide band antenna for reducing the radar cross section. Mostly, reducing the RCS at low frequency is a challenge. Reduction of Radar cross section depends on geometrical shape or radar absorbing material. Obtaining low RCS at high frequencies has been done.

A novel Printed Circular Disc Monopole Antenna has been designed with circular patch [1], a novel ultra wide band antenna with reduced radar cross section is a system has been proposed with ring antenna [3], a novel low RCS mobius-band monopole antenna has been designed for reducing RCS [2] are compared with planar octagonal shaped ultra wide band antenna, where the reduction of RCS is obtained for the whole operational band [6].
This paper has been organized in the following sections. Section II describes the antenna design and performance of different ultra wide band antenna. Section III gives the analysis of the results of the different antennas. Section IV describes the conclusion of this comparative study.

II. Antenna Design and Performance

2.1 Printed Circular Disc Monopole Antenna (PCDMA)

A circular disc monopole has r as a radius and microstrip feed line as 50Ω are printed on the same side of the FR4substrate whose thickness is 1.5 mm and relative permittivity is 4.7. Length and Width of the dielectric substrate is denoted as L and W respectively. To achieve 50 Ω impedance, the width of the microstrip feed line has fixed at W1= 2.6mm. The length is L1= 20mm covers the section of the microstrip feed line h denotes the height of the feed gap between the ground plane and the feed point shown in Fig. 1

The antenna performances are affected by two design parameters, the dimension of the disc and the width of the ground plane. The return loss will be 10dB from 2.78 to 9.78 GHz.

The distribution of current will be at the edge of the disc. When diameter of the disc increases, the resonant frequency gets decreases. The current distribution of different frequencies has been given in Fig. 2. This figure illustrated in [1].

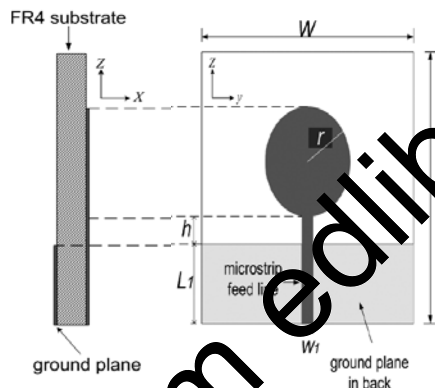
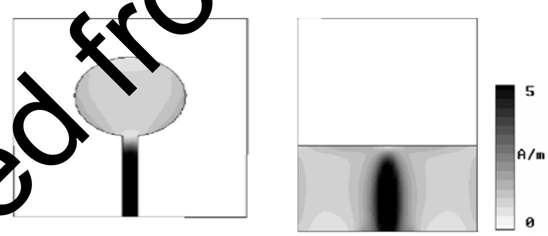
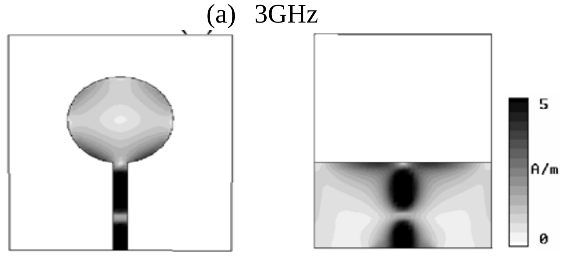


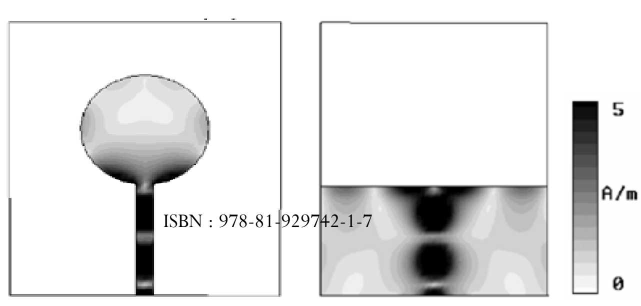
Figure 1. Structure of Printed circular Disc Monopole



(a) 3GHz



(b) 6GHz



(C) 9 GHz

Figure 2: Simulated current distribution at different frequencies

If the diameter of the disc increases it will lead to larger size, radar cross section will also be increased.

2.1 A Novel Ultra Wide Band Antenna with Reduced Radar Cross Section

The novel wide band antenna contains the patch as circular ring, a ground plane, a microstrip feed line, a square shape substrate as a dielectric with thickness of 1.6mm, permittivity of 2.65 has been proposed in [3]. Two circular rings are available, among this two ring one of the rings are fed by 50Ω microstrip line would be printed at the top of the substrate, whereas the bottom of the substrate with the ground plane. To connect the top and bottom of the surfaces with the ground plane metallic via holes are constructed.

The measured return loss is -10dB over the frequency range 1.[illegible]9 to 10.8GHz, the structural mode scattering will not change, when the antenna is terminated with different loads, at the same time antenna mode scattering will change according to the load.

Due to the small shape of dual circular ring radiator, the radar cross section has been reduced largely at high frequencies. But in low frequencies, the reduction of RCS is ineffective, because the geometry of the antenna is similar to the incident wavelength. At that time the structural mode scattering mentioned as the low frequency resonant scattering. Due to this reasons the structure of an antenna becomes inefficient to reduce the RCS.

2.2 A Novel Low RCS Mobius- Band Monopole Antenna

This type of monopole antenna is also constructed in order to reduce the RCS antenna. The structure of the antenna is shown in fig. 3. This topological monopole antenna is a one- sided surface. One- sided surface is made from a rectangle, Keeping one end fixed, rotating the other end by 180º, connecting to the first end. The lower annuluses are presented at inner part. The upper annuluses are presented at upper part. The metallic holes are used to connect the upper and lower annuluses. The antenna is printed on the ground patch. The larger ring is printed on the top of the substrate and fed with 50Ω microstrip line, whereas the smaller ring is printed on the bottom of the substrate. The operating bandwidth of the antenna is 2.8- 11.0GHz.This concept is illustrated in [2].

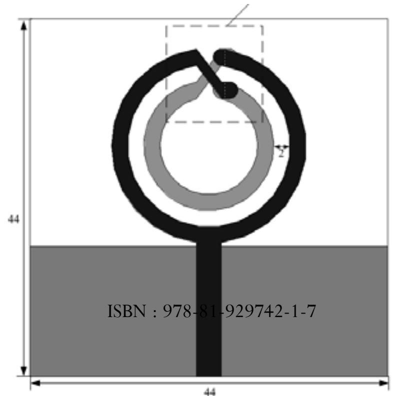


Figure 3. Structure of mobius- band monopole antenna

The RCS reduction is obtained for the whole band. Reduction of RCS is about 7dB has given in [5].

2.3 Planar Octagonal- Shaped UWB antenna with reduced Radar Cross section

The reduction of RCS in the whole operational bandwidth is a challenging one. But it is obtained by a planar octagonal shaped UWB antenna. The operating bandwidth is 2.5- 18GHz. RCS reduction is done by subtracting the metal areas where the current distribution is small. The patches are of different types. They are in elliptical, circular, square shape, but among all of these shapes, octagonal patch antenna gives return loss less than -20dB at 5.5-13.5GHz [4]. The structure of the antenna is shown in fig. 4.

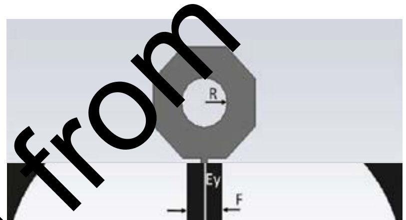


Figure 4 Octagonal shape UWB antenna

The effectiveness of ground plane is very important to control the antenna bandwidth. Feeding plays an important role, which is used to control the scattering characteristics. If the antenna is terminated with the matched, then it would be called as scattering mode, if it is terminated with different load then the scattering would be called as antenna mode scattering. The behavior of radiation is fully depends upon the surface current distribution in the metallic areas. The smaller current distributed metallic areas are subtracted to reduce the RCS.

The antenna is fed with the microstrip feed, according to the distribution of the current; an elliptical geometry will be subtracted from the layer of the ground. In this antenna, the current distribution is small in the middle part of the antenna. That circular part is eliminated from the patch. The RCS of the antenna is reduced about 10dB at 4.5-18GHz, especially at low frequencies the RCS reduction is about 25dB has been proposed in [6].

III. RESULTS AND DISCUSSIONS

3.1 Printed Circular Disc Monopole Antenna (PCDMA)

The results have been discussed for different types of ultra-wide band antenna. The fig. 5 shows the simulation result of the printed circular disc monopole antenna.

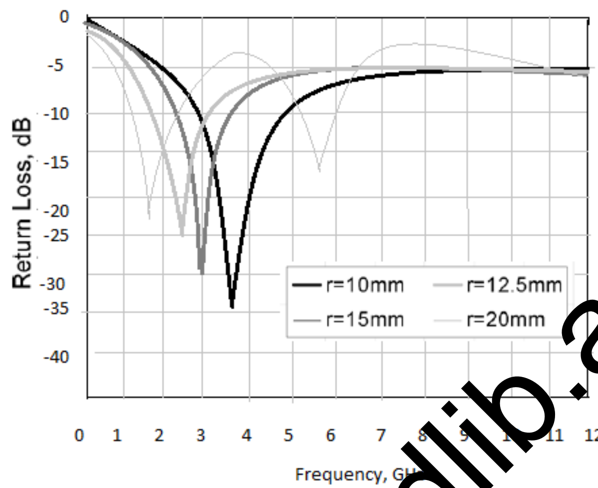


Figure. 5 Simulated return loss curves for different dimensions of the circular disc

The figure indicates the relation between the frequency and return loss. The radius of the disc is increased to reduce the return loss.

3.2.A Novel Ultra Wide Band Antenna with Reduced Radar Cross Section

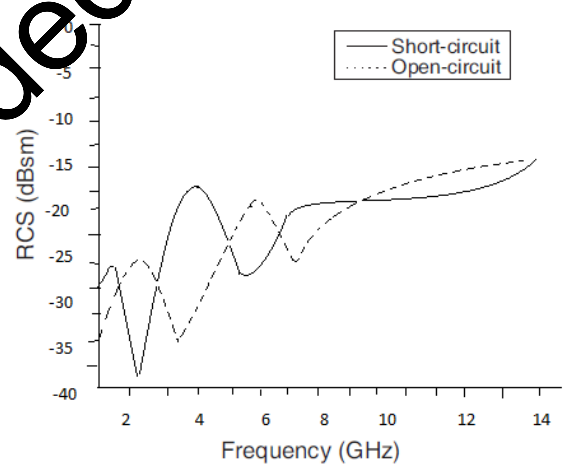


Figure. 6 Simulated curve for frequency versus RCS (dBsm) of different kinds of load

The above figure shows the curve with frequency versus RCS

3.3. A Novel Low RCS Mobius- Band Monopole Antenna

The following figure determines the RCS, of the Mobius- Band monopole antenna.

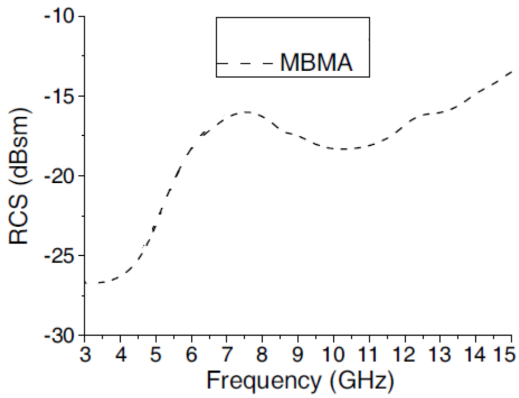


Figure. 7 Simulates RCS antenna

3.4. Planar Octagonal- Shaped UWB antenna with reduced Radar Cross section

The following two diagrams shows the return loss, voltage standing wave ratio of the planar octagonal shaped ultra wide band antenna.

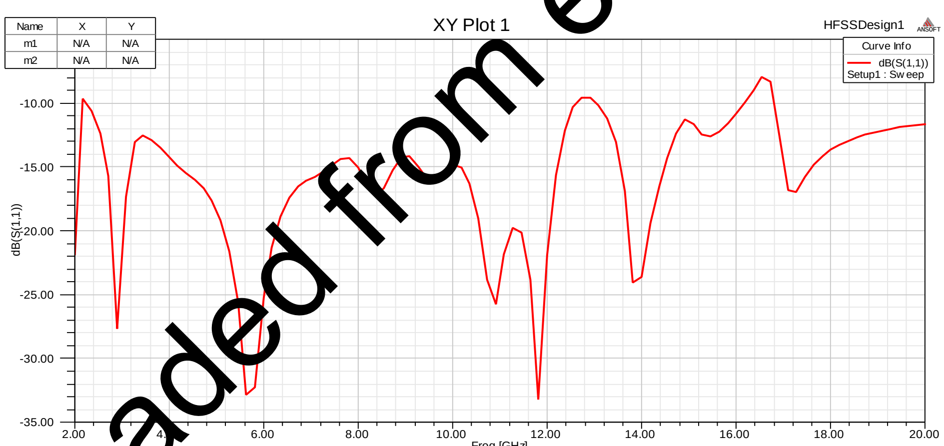


Figure. 8 Simulation of return loss for octagonal shaped antenna

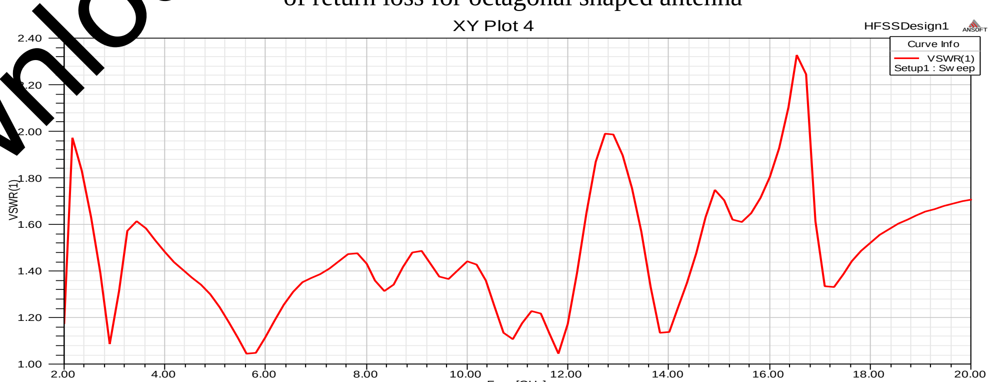


Figure. 9 Simulation of return loss for octagonal shaped antenna

TABLE I
Comparative analysis of different wide band antenna

S. No	Antenna	Operating Frequency	Reduction of RCS
1	Printed Circular disc monopole antenna (PCDMA)	2.69-10.16 GHZ	If the diameter increases reduction of RCS decreased
2	A Novel Ultra Wide Band Antenna with Reduced Radar Cross Section	1.99-10.8GHz	RCS is reduced at high frequencies, not at low frequencies
3	A Novel Low RCS Mobius- Band Monopole Antenna	2.8-11.0 GHz	RCS is reduced about 7dB
4	Planar Octagonal Shaped UWB antenna with reduced radar cross section	2.5- 18GHz	10dB at low frequencies, 25dB at high frequencies

CONCLUSION

In this paper, different types of wide band antenna are compared for reduction of RCS. In printed circular disc monopole antenna, if the diameter of the disc increases the RCS also increases. The diameter is increased to make low resonant frequencies. But the RCS is not reduced. In a novel ultra wide band antenna with reduced radar cross section, RCS is greatly reduced at high frequencies not at low frequencies. In a novel low mobius- band monopole antenna, the RCS is reduced about 7dB. Comparing the entire above antenna, a planar octagonal shaped UWB antenna obtains 10dB RCS reduction at the whole operational bandwidth, 25dB RCS reduction especially at low frequencies with good antenna performance. The metallic area of an antenna has been subtracted, where smaller current is distributed. The radius of 4mm is removed from the patch to obtain the above said RCS reduction.

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BRAIN TUMOR AND BRAIN ABNOMALITY DETECTION USING IMAGE PROCESSING

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Abstract: Brain tumor analysis is done by doctors but its grading gives different conclusions which may vary from one doctor to another. So for the ease of doctors, a research was done which made the use of software with edge detection and segmentation methods, which gave the edge pattern and segment of brain and brain tumor itself. Medical image segmentation had been a vital point of research, as it inherited complex problems for the proper diagnosis of brain disorders. In this research, it provides a foundation of segmentation and edge detection, as the first step towards brain tumor grading and also introduces an inexpensive, user friendly general-purpose image processing tool and visualization program specifically designed in MATLAB to detect much of the brain disorders as early as possible. The application provides clinical and quantitative analysis of medical images. Minute structural difference of brain gradually results in major disorders such as schizophrenia, Epilepsy, inherited speech and language disorder, Alzheimer's dementia etc. Here the main focusing is given to diagnose the disease related to the brain and its psychic nature. Current segmentation approaches are reviewed the use of image segmentation in different imaging modalities is also described along with the difficulties encountered in each modality.

Key words: *Brain tumor, MRI images, image processing, Edge detection, segmentation, cerebral cortex, image registration ,Neuroinformatics.*

I. INTRODUCTION

The human brain is the center of the human nervous system and is the most complex organ in any creature on earth. Any abnormality in brain leads to the total collapse of entire vital functions of the body.Brain tumor, which is one of the most common brain diseases, has affected and devastated many lives. According to International Agency for Research on Cancer (IARC) approximately, more than 126000 people are diagnosed for brain tumor per year around the world, with more than 97000 mortality rate [1].

Despite consistent efforts toovercome the problems of brain tumors, statistics still shows low survival rate of brain tumor patients. To combat this, recently, researchers are using multi-disciplinary approach involving knowledge in medicine, mathematics and computer science to better understand the disease and find more effective treatment methods.

Magnetic resonance (MR) imaging and computer tomography (CT) scanning of the brain are the two most common tests undertaken to confirm the presence of brain tumor and to identify its location for selected specialist treatment options. Currently, there are different treatment options available for brain tumor. These options include surgery, radiation therapy, and chemotherapy. The choice for the treatment options depends on the size, type, and grade of the tumor. It also dependents on whether or not the tumor is putting pressure on vital parts of the brain. Whether the tumor has spread to other parts of the central nervous system (CNS) or body, and possible side effects on the patient concerning treatment preferences and overall health [2] are important considerations when deciding the treatment options.

Accurate detection of the type of brain abnormality is highly essential for treatment planning in order to minimize diagnostic errors. The accuracy can be improved by using computer aided diagnosis (CAD) systems. The basic concept of CAD is to provide a computer output as a second opinion to assist radiologists' image interpretation and to reduce image reading time. This improves the accuracy and consistency of radiological diagnosis. However,segmentation of the image of brain tumors is a very difficult task. In the first place, there are a large class of tumor types which have a variety of shapes and sizes [3]. Appearance of brain tumors at different locations in the brainwith different image intensities [2] is another factor that makes automated brain tumor image detection and segmentation difficult.

This paper presents a review of the methods and techniques used during brain tumor detection through MRI image segmentation. The paper introduces a concept of simple user friendly GUI application to process an image of brain and analyze its morphological abnormalities

II BRAIN TUMOR AND BRAIN ABNORMALITY

Brain tumor is an abnormal growth of cells inside the skull. Normally the tumor will grow from the cells of the brain,blood vessels, nerves that emerge from the brain. There are two types of tumor which are- benign(non-cancerous) and malignant (cancerous) tumors. The former is described as slow growing tumors that will exert potentially damaging pressure but it will not spread into surrounding brain tissue. However, the latter is described as rapid growing tumor and it is able to spread into surrounding brain.

Tumors can damage the normal brain cells by producing inflammation, exerting pressure on parts of brain and increasing pressure within the skull.

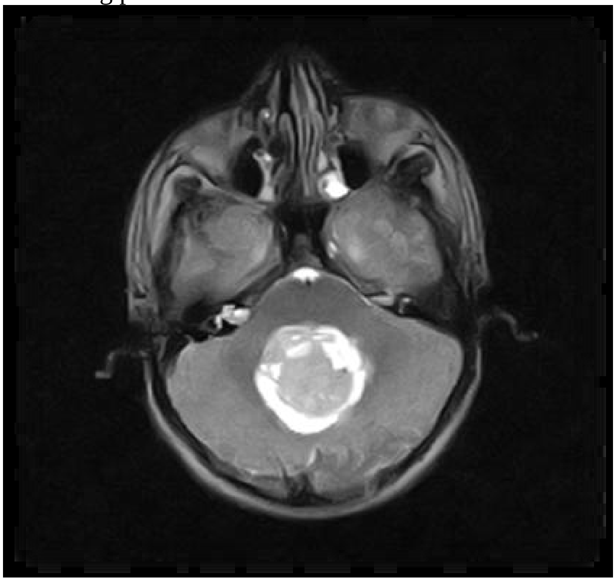


Figure 1 shows the presence of tumor in the brain.

Typical abnormality of brain is the shrinking of its cerebral cortex (as shown in Figure 2). The spaces in the folds of the brain (the sulci) are grossly enlarged. This type of abnormality leads to Alzheimer's disease.

Radiologists examine the patient physically by using Computed Tomography (CT scan) and Magnetic Resonance Imaging (MRI). MRI images showed the brain structures, tumor's size and location of shrinking of brain abnormalities. From the MRI images the information such as tumors location and shrinking of brain provided radiologists, an easy way to diagnose the tumor, abnormality and plan the surgical approach for its removal.

Figure:2 abnormality of brain

III. MRI BRAIN IMAGING AND CHARACTERISTICS OF BRAIN TUMORS

MRI's use radiofrequency and magnetic field to result image's human body without ionised radiations. Imaging plays a central role in the technique for automatic detection of some types of brain abnormalities, along with techniques for tumor segmentation in MRI sequences. They presented an automated and clinically-tested method for detection of brain abnormalities and tumor-edema segmentation using MRI sequences.. On MRI, they appear either hypo (darker than brain tissue) or iso tense (same intensity as brain tissue) on T1-weighted scans, or hyper intense (brighter than brain tissue) on T2-weighted MRI. They presented an automated and clinically-tested method for detection of brain abnormalities and tumor-edema segmentation using MRI sequences. Their method follows a Radiologist's approach to the brain diagnosis using multiple MRI sequences instead of any prior models or training phases. Their procedure consists of the following steps:

i. Pre-processing of the MRI sequences, T2, T1, and T1 post-contrast (enhanced) for size standardization, contrast equalization and division into active cells.

ii. Identification of the T2 MRI sequence as normal or abnormal by exploiting the vertical symmetry of the brain.

iii. Determination of the region of abnormality using its hyper-intense nature.

iv. Separation of tumor from edema using the T1 and its post-contrast (enhanced) sequences.

v. Estimation of the volume of tumor found and generation of an anatomical differential of the possible disorders.

In medical, doctors don't have method that can be used for brain tumor detection standardization which leads to varying conclusions between one doctor to another .
Edge-based method is by far the most common method of detecting boundaries, discontinuities in an image and segmentation. The parts on which immediate changes in
grey tones occur in the images are called edges. Edge
detection techniques transform images to edge images benefiting from the changes of grey tones in the images. As a result of this transformation, edge based brain segmentation image is obtained without encountering any changes in physical qualities of the main image .
This image processing consist of image enhancement using histogram equalization, edge detection and segmentation process to take patterns of brain tumors, so the process of making computer aided diagnosis for brain tumor grading will be easier.

IV LITERATURE REVIEW

The image segmentation is entailed with the division or separation of the image into regions of similar features. In this paper, we will discuss an illustrate a number of approaches and show improvements in segmentation performance that can be achieved by combining methods from distinct categories such as techniques in which edge detection s combined with thresholding. The definitive aim in image processing applications is to extract important attributes from the image data, from which a descriptive, interpretative, or understandable prospect can be obtained by the machine. Time consumption during the segmentation of brain tumor from magnetic resonance imaging is a crucial drawback. Thus, we have studied the foundations of brain segmentation and edge detection, by various techniques employed by researchers.

The segmentation & edge detection approaches were studied under 5 categories. These are as follows- 1) Thresholding approaches, 2) Region growing approaches, 3) Genetic Algorithm approaches,4) Clustering approaches ,5) Neural network approaches. Several authors suggested various algorithms for segmentation**.**

Thresholding based methods:
In thresholding approach; image segmentation is based on gray level intensity value of pixels. A thresholding procedure attempts to determine an intensity value called the threshold, which separates the desired classes. The segmentation is then achieved by grouping all pixels with intensity greater than the threshold into one class, and all other pixels into another class.

Region growing:
Region growing connects neighboring points to make bigger region. The process of region growing is dictated by certain condition associated with the selection of a threshold value [16, 17, 18]. Seeded region growing starts with one or more seed points and then grows within the region to form a larger region satisfying some homogeneity constraint. The homogeneity of a region can be dependent upon any characteristic of the region in the image: texture, color or average intensity.

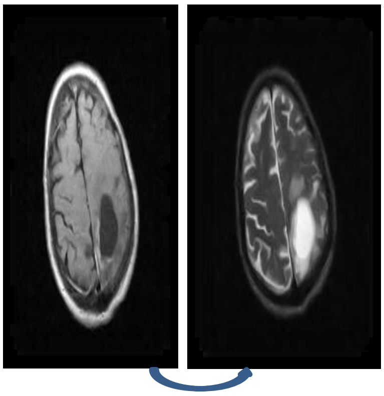
Genetic Algorithm approaches:
The split method begins with the entire image, and repeatedly splits each segment into quarters if the homogeneity criterion is not satisfied. These splits can sometimes divide portions of one object. The merge method joins adjacent segments of the same object.

Spatial clustering:
Image segmentation and image clustering are different. In image segmentation, the grouping of the image is carried out in spatial domain. In image clustering, grouping is performed in the measurement space. Overlapping regions can be the result of clustering. It is not possible to produce overlapping regions from segmentation. Clustering and spatial segmentation can be combined to form spatial clustering, which combine histogram techniques with spatial linkage techniques for better results.

Neural networks based method:
Neural network based segmentation methods use artificial neural network computational models consisting of processing elements (called neurons) and weighed connections between them. The weights (coefficients) are multipliers at the connections. Training is required to obtain the values of the coefficients. Several types of neural networks have been designed and TESTED RESULTS USING MATLAB Multilayer perceptron, back-propagation learning algorithm (MLP), Hopfield neural networks (HNN) and selforganizing maps (SOM) neural

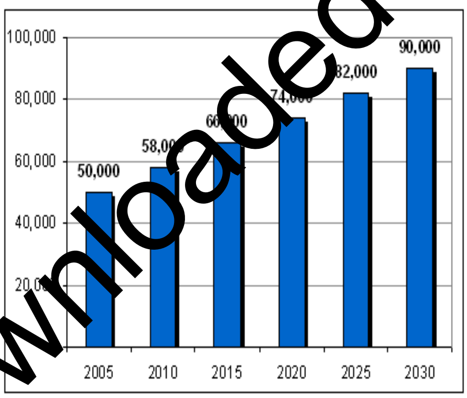
network are some of the algorithms used in segmentation process. A thorough treatment of neural networks can be found. The property of neural networks with respect to their ability to learn segmentation procedure through some form of learning process have attracted more researchers in image segmentation than other image processing techniques.

Zhang presented the analysis and comparison of these evaluation methods are performed according to the classification and assessment criteria for methods and performance metrics proposed in that survey. The results reveal the advantages and limitation of these new methods, and provide additional understanding about the evaluation procedure. This review presents also some novel procedures for image generation under different conditions. **Dzung L. Pham, Chenyang Xu, Jerry L. Prince** proposed the basics that thresholding approaches segment scalar images by creating a binary partitioning of the image intensities. It attempts to determine an intensity value, called the threshold, which separates the desired classes. Segmentation is achieved by grouping all pixels with intensity greater than the threshold into one class, & all other pixels into another class. Determination of more than one threshold value is a process called multi thresholding.



V PROJECT GOALS

A.Alzheimer- The Brain Disorder: Just like the rest of our bodies, our brains change as we age.Most of us notice some slowed thinking and occasional problems remembering certain things.However, serious memory loss, confusion and other major changes in the way our minds workare not a normal part of aging [6]. These may be the signs of brain cells failure [7].The brain has 100 billion nerve cells (neurons). Each nerve cell communicates with many others to form network. Nerve cell networks have special jobs. Some are involved in thinking, learning and remembering. Others help us see, hear and smell. Still others tell our muscles when to move.In Alzheimer's disease, as in other types of dementia, increasing numbers of brain cells deteriorate and die [6].



*5.1. Brain imaging methods***:** Functional imaging of electric brain activity requires specific models to transform the signals recorded at the surface of the human head into an image [8]. Two categories of model are available: 1) single-time-point and 2) spatio-temporal methods. Theinstantaneous methods rely only on few voltage differences measured at one sampling point. To create a spatial image from this limited information, they require strict assumptions that rarely conform to the underlying physiology. Spatio-temporal models create two kinds of images: first, a spatial image of discrete equivalent multiple dipoles or regional sources, and second, an image of source current waveforms that reflect the temporal dynamics of the brain activity in circumscribed areas. The accuracy of the spatial image is model dependent and limited, but it can be validated from the spatio-temporal data by the "regional source imaging" technique, introduced here. The source waveforms are linear combinations of the scalp waveforms, and thus, specific derivations which image local brain activities at a macroscopic level.

5.2 Functional MRI: Functional MRI or functional Magnetic Resonance Imaging (fMRI) is a type of specialized MRI scan. It measures the haemodynamic response related to neural activity in the brain or spinal cord of humans or other animals. It is one of the most recently developed forms of neuroimaging. Since the early 1990s, fMRI has come to dominate the brain mapping field due to its low invasiveness, lack of radiation exposure, and relatively wide availability.

5.3Positron Emission Tomography (PET): Positron emission tomography (PET) is a nuclear medicine imaging technique which produces a three-dimensional image or picture of functional processes in the body. The system detects pairs of gamma rays emitted indirectly by a positronemitting radionuclide (tracer), which is introduced into the body on a biologically active molecule. Images of tracer concentration in 3-dimensional space within the body are then reconstructed by computer analysis. In modern scanners, this reconstruction is often accomplished with the aid of a CT X-ray scan performed on the patient during the same session, in the same machine. If the biologically active molecule chosen for PET is FDG, an analogue of glucose, the concentrations of tracer imaged then give tissue metabolic activity, in terms of regional glucose uptake. Although use of this tracer results in the most common type of PET scan, other tracer Nmolecules are used in PET to image the tissue concentration of many other types of molecules of interest.

5.4 Image Registration: In this project, sets of data acquired by sampling the same scene or object at different times, or from different perspectives, will be in different coordinate systems. Image registration is the process of transforming the different sets of data into one coordinate system. Registration is necessary in order to be able to compare or integrate the data obtained from different measurements.

Medical image registration (for data of the same patient taken at different points in time) often additionally involves elastic (also known as nonrigid) registration to cope with deformation of the subject (due to breathing, anatomical changes, and so forth). Nonrigid registration of medical images can also be used to register a patient's data to an anatomical atlas, such as the Talairach atlas for neuroimaging.
Image registration is the process of overlaying two or more images of the same scene taken at different times, from different viewpoints, and/or by different sensors. It geometrically aligns two images—the reference and sensed images. The present differences between images are introduced due to different imaging conditions.

5.5. Image registration methodology:
Image registration, as it was mentioned above, is widely used in remote sensing, medical imaging, computer vision etc. In general, its applications can be divided into four main groups according to the manner of the image acquisition:
1. Different viewpoints (multi-view analysis). Images of the same scene are acquired from different viewpoints. The aim is to gain larger a 2D view or a 3D representation of the scanned scene. Examples of applications: Remote sensing—mosaicing of images of the surveyed area.
Computer vision—shape recovery (shape from stereo).
2. Different times (multitemporal analysis). Images of the same scene are acquired at different times, often on regular basis, and possibly under different conditions. The aim is to find and evaluate changes in the scene which appeared between the consecutive image acquisitions.Examples of applications: Remote sensing—monitoring of global land usage, landscape planning.
Computer vision— automatic change detection for security monitoring, motion tracking. Medical imaging—monitoring of the healing therapy, monitoring of the tumor evolution.
3. Images of the same scene are acquired by different sensors. The aim is to integrate the information obtained from different source streams to gain more complex and detailed scene representation. Examples of applications: Remote sensing—fusion of information from sensors with different characteristics like panchromatic images, offering better spatial resolution, color/multispectral images with better spectral resolution, or radar images independent of cloud cover and solar illumination. Medical imaging—combination of sensors recording the anatomical body structure like magnetic resonance image (MRI), ultrasound or CT with sensors monitoring functional and metabolic body activities like positron emission tomography (PET), single photon emission computed tomography (SPECT) or magnetic resonance spectroscopy (MRS). Results can be applied, for instance, in radiotherapy and nuclear medicine.
4. Scene to model registration. Images of a scene and a model of the scene are registered. The model can be a computer representation of the scene, for instance maps or digital elevation models (DEM) in GIS, another scene with similar content (another patient), 'average' specimen, etc. The aim is to localize the acquired image in the scene/model and/or to compare them. Examples of applications: Remote sensing—registration of aerial or

satellite data into maps or other GIS layers. Computer vision—target template matching with real-time images, automatic quality inspection. Medical imaging— comparison of the patient's image with digital anatomical atlases specimen classification.

E.Defining Project Goals: Fundamental problems in the analysis of functional and structural imaging data include data transport, boundary identification (including manual tracing, edge detection, and tissue segmentation), volume estimation, three-dimensional reconstruction and display, surface and volume rendering, shape analysis, and image overlay. These problems require that research investigators have access to suitable methods of image analysis, implemented on a set of software programs, in order to conduct neuroimaging research.
The registration algorithm described is a robust and flexible tool that can be used to address a variety of image registration problems. Registration strategies can be tailored to meet different needs by optimizing trade-offs between speed and accuracy. The main emphasis is given to the color combination of some brain tissues. The spaces in the folds of the brain (the sulci) can be easily detected by their color combination. Color intensity of that area will be measured;
based on that measurement results, hypothesis will be generated. Cavity in cerebral cortex region stained in PET image is shown in figure 4**.**

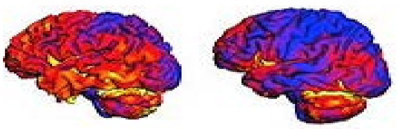


FIGURE 4: Cerebral Cortex with Color Stain (PET Image).

TESTED RESULTS USING MATLAB:

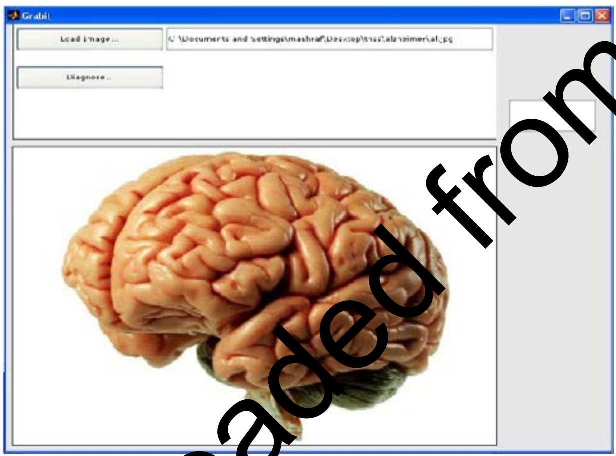


Figure 5: Simulated Image First Load

FIGURE 6: Image in Zoom

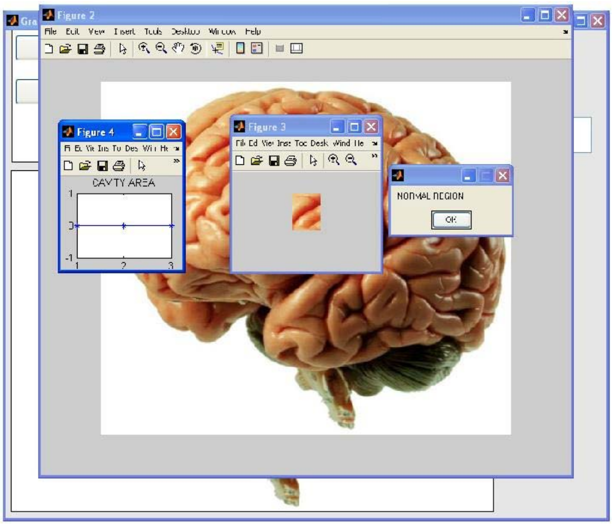


FIGURE 7: Normal Area.

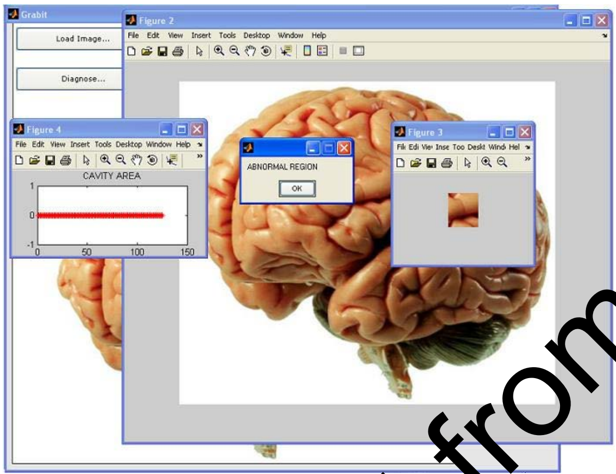


FIGURE 8: Abnormal Area.

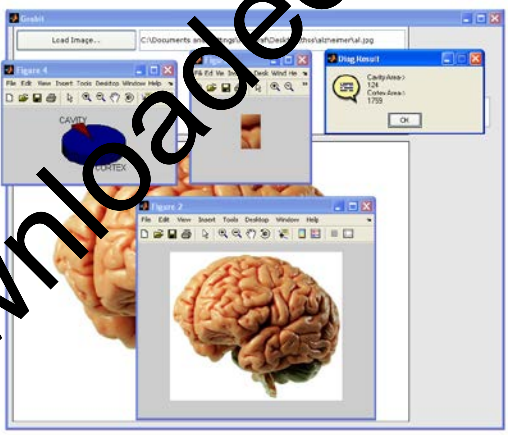


FIGURE 9: Measure of Abnormality.

CONCLUSION

Relevance of these approaches is the direct medical application for segmentation and edge detection. We have reviewed the techniques of the MRI image enhancement in terms of tumor pixels detected. We have studied several digital image processing methods and discussed its requirements and properties in brain tumor detection.Due to high cost and requirement of professionalism much of medical imaging softwares are far from common man. Here the attempt was develop simple software in MATLAB to detect the structural abnormality of brain. The task almost fulfilled but it requires much perfection. The highlight of this software is simplicity, user friendliness and keen observation of the image at minute level This paper gives enhanced information about brain tumor detection and segmentation. The marked area is segmented and the assessment of this tool from the radiologist, whom the project is concerned with, is positive and this tool helps them in diagnosis, the treatment procedure and state of the tumor monitoring.

FUTURE SCOPE

Future research in the segmentation of medical images will lead towards improving the accuracy, exactness, and computational speed of segmentation approaches, as well as minimising the amount of manual interaction. These can be improved by incorporating discrete and continuous-based segmentation methods. Computational effectiveness will be crucial in real-time processing applications. Segmentation methods have proved their utility in research are as and are now emphasizing increased use for automated diagnosis and radiotherapy. These will be particularly important in applications such as computer integrated surgery where envision of the anatomy is a significant component.

In this research the measurement of cavity area is totally based on the color coding system. This measurement should be converted into some metric form. After that the abnormality can be categorized as mild, moderate and severe.

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