RV College of Engineering®

(Autonomous Institution Affiliated to VTU, Belgaum)

Department of Electronics and Instrumentation Engineering

V Semester

(2019-20)
ODD Semester

Self-Study Report

Topic: "Brain Tumor Detection from MRI using Image Processing"

Under the guidance of:

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Submitted to

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CERTIFICATE

Certified that the Self Study work titled **'Brain Tumor Detection from MRI using Image Processing'** was carried out by **Aisiri HR, Ruthvik SJ, Srinivas Prabhu B, Vinay Balamurali** who are bonafide Students of R.V. College of Engineering, Bengaluru in partial fulfillment for the award of degree in **Bachelor of Engineering** for **Electronics and Instrumentation Engineering** of the Visvesvaraya Technological University, Belgaum during the year **2019-2020.** It is certified that all corrections/suggestions indicated for the internal assessment have been incorporated in the report deposited in the departmental library. The Self Study report has been approved as it satisfies the academic requirements in respect of Self Study work prescribed by the institution for the said degree.

Marks awarded = (Phase 1 + Phase 2) =

Signature of Faculty In-charge:

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Signature of Head of the Department

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INTRODUCTION:

- Brain Tumor is a fatal disease that cannot be confidently detected without MRI. Brain tumors are basically cancerous (malignant) or non-cancerous (benign) mass or growth of abnormal cells in the brain. Causes of brain tumor include exposure to vinyl chloride, Epstein–Barr virus, ionizing radiation, and inherited syndromes such as neurofibromatosis, tuberous sclerosis, and von Hippel-Lindau Disease
- Medical imaging plays a central role in the diagnosis of brain tumors using either Computed Tomography (CT) or Magnetic Resonance Imaging (MRI).
- An MRI is a type of scan that creates pictures using magnetism and radio waves. MRI scans produce pictures from angles all around the body and show up soft tissues very clearly. MRI can be used to measure the tumor size. A special dye called a contrast medium is given before the scan to create a clearer picture
- MRI's are preferred to CT scans as they produce more detailed images of the soft tissues.
- This project is used to detect brain tumor from an MRI image using MATLAB simulation
- This simulation routine is not completely foolproof. It fails to provide an accurate result when the tumor size is either too small or too hollow

MOTIVATION:

- The motivation for doing this project was primarily an interest in undertaking a challenging project in an interesting area of research. The opportunity to learn about a new area of computing not covered in lectures was appealing.
- Another motivation was to increase the percentage of correctly detecting brain tumors and to use machine learning algorithms in the future by feeding the machine with tens of thousands of MRI images to beat the accuracy gotten by human analyses

LITERATURE SURVEY:

PAPER	METHODOLOGY	ADVANTAGES	DISADVANTAGES
Detection of Brain Tumor from MRI images by using Segmentation & SVM	Enhancement : • Contrast stretching Filtering : • Median filtering • Skull Masking Segmentation - • K means segmentation Classification: • Support Vector Machine (SVM)	SVM is effective in cases where no. of dimensions are greater than no. of samples Easy to implement	SVM does not perform very well when the noise in the data set is more i.e when target classes are overlapping As number of dimensions increases, a distance based similarity measure converges to a constant value between any two given examples
Tumor Detection and Classification of MRI Brain Image using Different Wavelet Transforms and Support Vector Machines	Enhancement : • Haar, Symlet, Morlet, Daubechies methods for deionizing Filtering : • Signal to Noise Ratio • Peak Signal to Noise Ratio • Mean Square error Segmentation : • Otsu's method Classification : • Support Vector Machine (SVM)	Use Otsu's method increases the speed of operation Wavelets offer a simultaneous localization in time and frequency domain It can compress or denoise a signal without appreciable degradation.	Wavelet coefficients oscillate with positive and negative values around the singularities, which complicate their detection and modeling. If input signal is shifted in time or space, wavelet coefficients of the decimated DWT will be changed Aliasing Lack of directionality
Development of Automated Brain Tumor Identification Using MRI Images	Enhancement : • Histogram equalization Filtering : • Median filtering Segmentation : • Otsu's thresholding method	Use Otsu's method increases the speed of operation Easy implementation	Image should have bimodal histogram Assumption of uniform illumination Does not use any object structure of spatial coherence

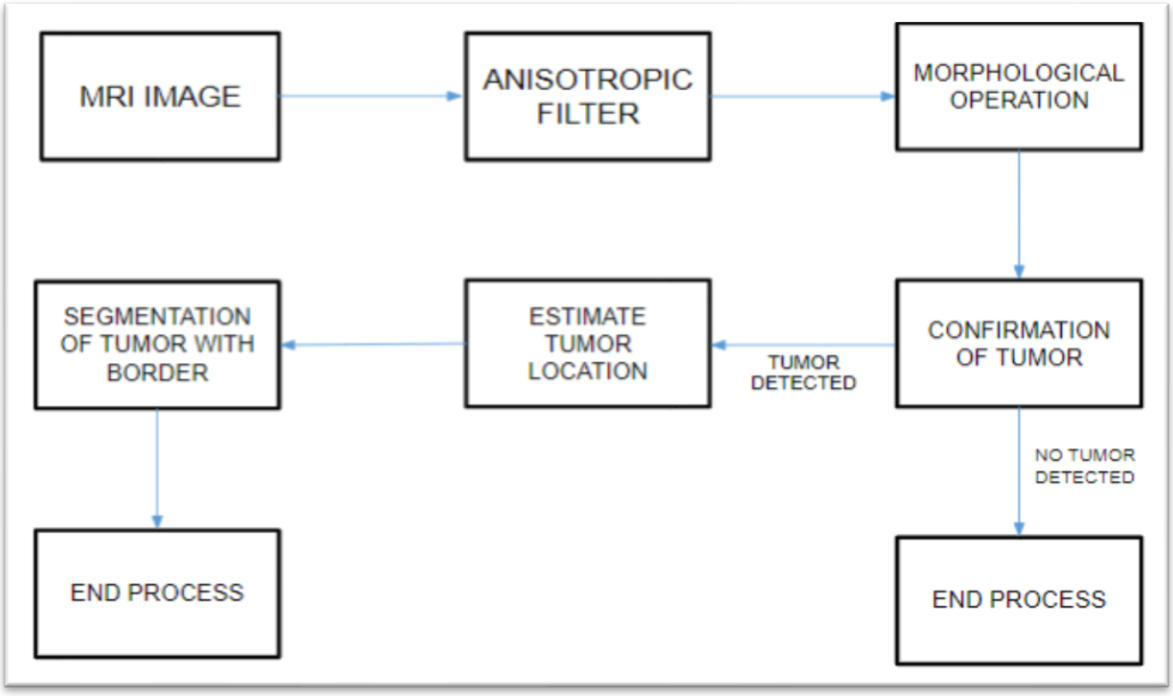
AIM:

1. Prototype development of Brain Tumor
2. Detection from MRI using Image Processing.

OBJECTIVES:

1. To detect if there is a tumor in a given MRI Image.
2. If there is, specify the location of the tumor

BLOCK DIAGRAM:



METHODOLOGY:

1. Anisotropic Diffusion Filter is first applied to reduce the contrast between consecutive pixels while preserving the edges and boundaries.
2. This image is then resized and thresholded for a Black and White image.
3. Morphological operation is then performed on this pre-processed image. This provides us with the tumor location.
4. The obtained tumor is then eroded and then subtracted from the tumor image to get the tumor outline.
5. This tumor outline is then drawn onto the test image for tumor detection if any.

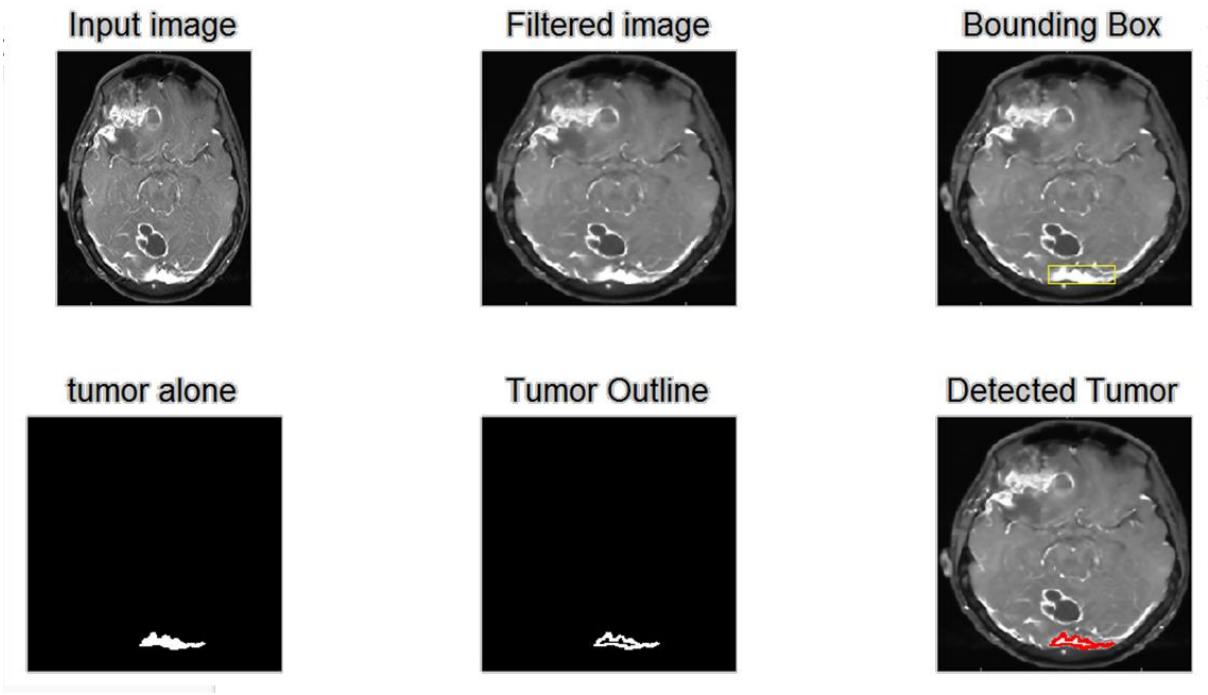
SOFTWARE REQUIREMENTS:

1. MATLAB Software
2. Image Processing Tool Box

APPLICATIONS:

1. MRI imaging is less harmful than an X-ray. It is less attenuated by bones.
2. MRI provides high spatial resolution and excellent soft tissue diagnosis.
3. This project can make MRI image processing and tumor detection process faster and cheaper.
4. Early and accurate detection followed by treatment can save a life.
5. Telemedicine applications.
6. Manual identification is neither fast nor accurate nor efficient, this application is designed to overcome this problem.
7. Accurate detection of secondary tumors,

RESULTS AND CONCLUSION:



- May give false positive if the section of bones is too thick.
- May give false negative if the tumor image is hollow, i.e. density of tumor is low.

COURSE MAPPING:

COURSE	RELEVANCE
DSP	● Digital Image Processing is one of the most important applications of Digital Signal Processing. ● Understanding and application of filter concepts
BIOMEDICAL INSTRUMENTATION	● Medical image processing continues to enable biomedical instrumentation revolution that we are experiencing today ● NMR imaging technique as superior to other imaging techniques in Biomedical was studied and incorporated in the project.

COURSE OUTCOME:

COURSE	CO1	CO2	CO3	CO4
DSP				
BIOMEDICAL INSTRUMETATION				

REFERENCES:

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