Detection of Brain Tumor

Using Image Processing

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Table of Contents

Introduction

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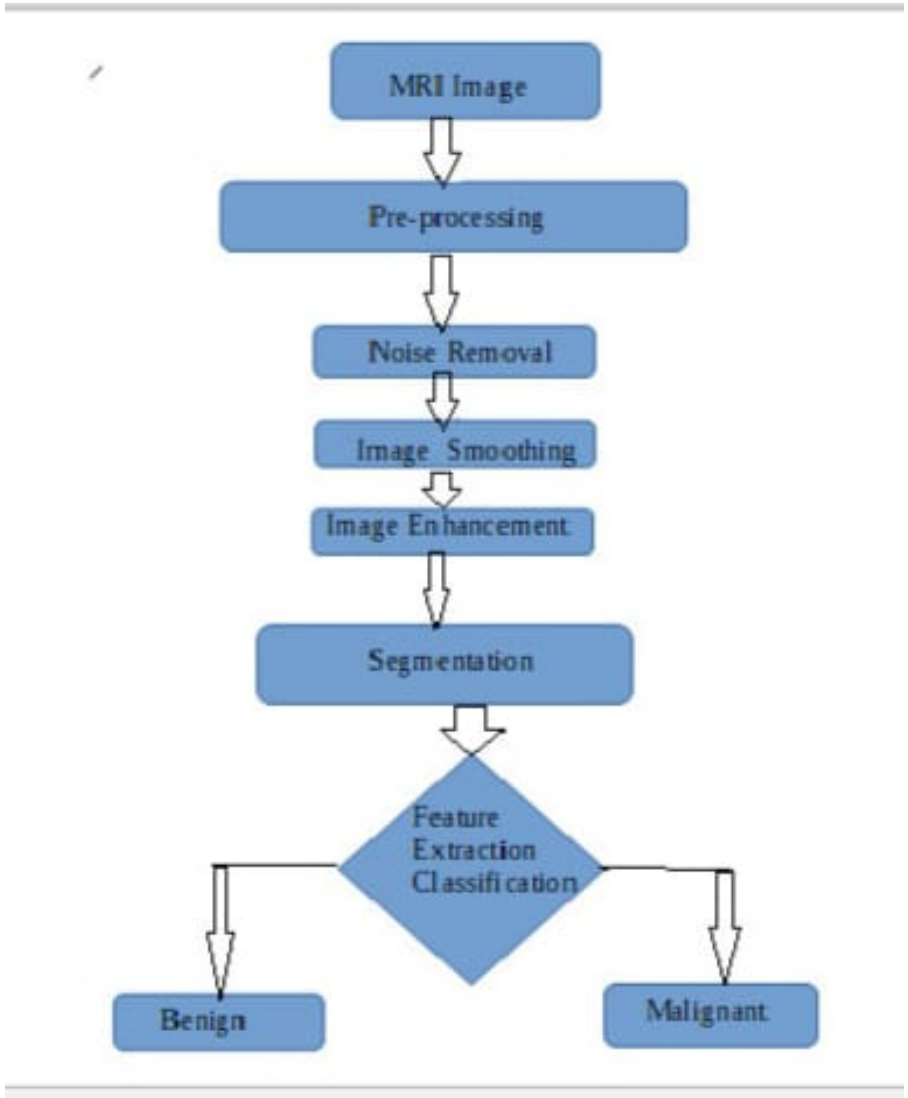
- Brain tumor detection is an important task in medical image processing. Early diagnosis of brain tumors plays an important role in improving treatment possibilities and increases the survival rate of the patients.
- In this project, a method for segmentation of brain tumor has been developed on MRI data which allows the identification of Tumor tissue with high accuracy and repro- ductability compared to manual techniques.
- This method incorporates with some noise removal functions and segmentation which are the basic con- cepts of Image processing.
- The process to detect the brain tumors through MRI images can be categorized into four different sections;
- Pre-processing
- Image Segmentation
- Feature Extraction
- Image Classification

Flow Chart

Way of Approach

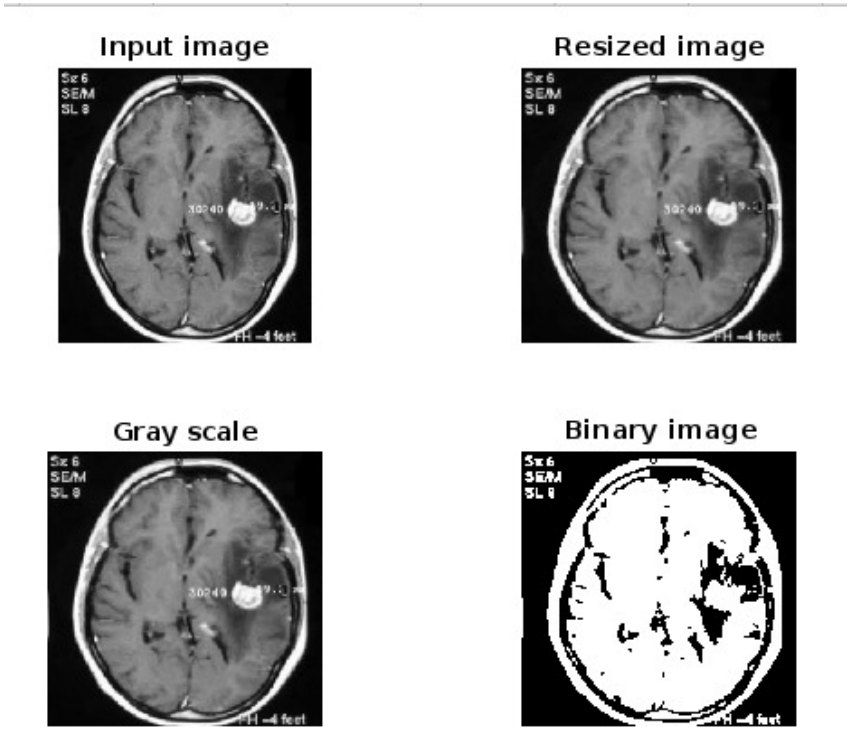


Methods

Pre-processing

The aim of pre-processing is to improve the quality of the image so that we can analyse it in a better way. By preprocessing we can suppress undesired distortions and enhance some features which are necessary for the particu- lar application we are working for

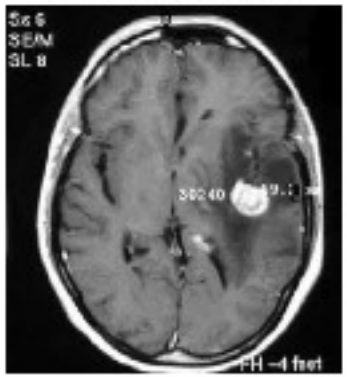
1. Resize
2. Grayscale
3. Binary image.



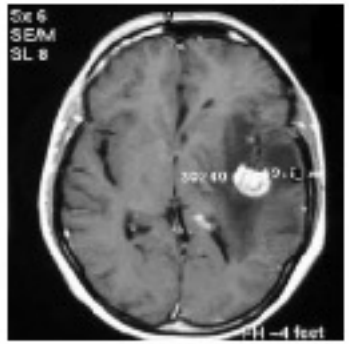
Enhancement

The main aim of this filter is to reduce noise without removing signifi- cant parts of given image, sharp edges and significant lines with anisotropic diffusion.

Input image



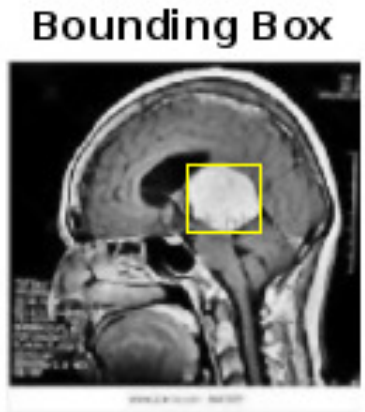
Filtered image



Segmentation

Image segmentation is a method in which a digital image is broken down into various subgroups called Image segments which helps in reducing the complexity of the image to make further processing or analysis of the image simpler. Segmentation in easy words is assigning labels to pixels

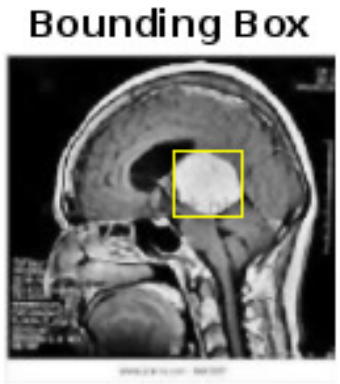
1. Thresholding
2. Bounding Box

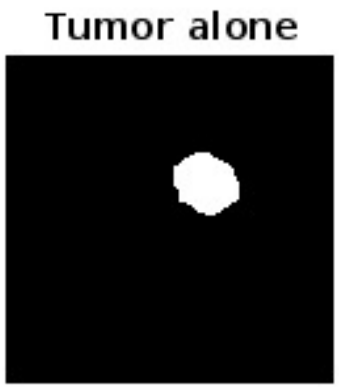


Feature Extraction

Feature Extraction can be achieved through Morpological Opertion.Morphological operation is a non-linear operation which is related to shapes or morphological features of an image. This operation depends on the ordering of the pixels in the image and not their numerical value.The operation deals with structuring element producing output image of the same size.The morphological operation has two common processes which is, Dilation and Erosion

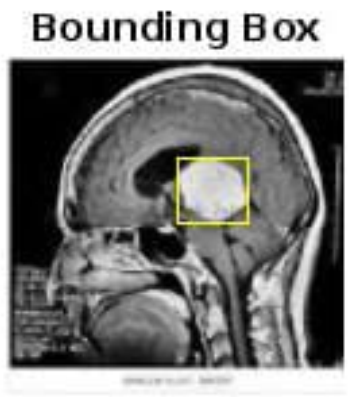
1. Dilation
2. Erosion

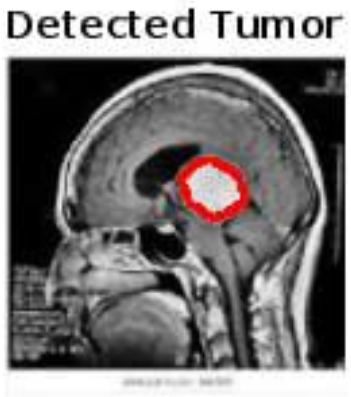




Highlighting Tumor Region

The final phase not only indicates the tumor normally it also border the tumor region in different color for spontaneous observation.Because the image is already given in the grey scale, so it is useless to show the tumor region in black or white. The other option is to represent it in red or green orblue. Here the tumor region will be indicated in red color as shown in the figure.After highlighting,brain tumors itself can be divided into two ,namely benign and maglignant brain tumors A tumor can be malignant (cancerous) or benign (not cancerous).





Results

Malignant Tumor

Input image

Filtered image

Bounding Box

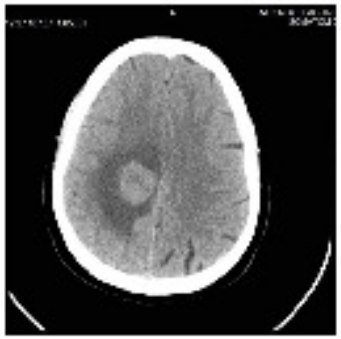
tumor alone

Tumor Outline

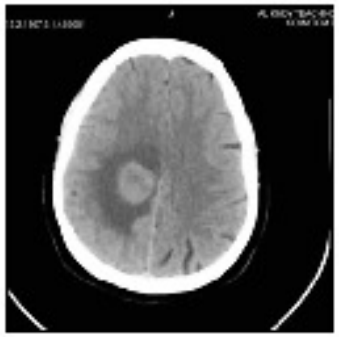
Detected Tumor

Benign Tumor

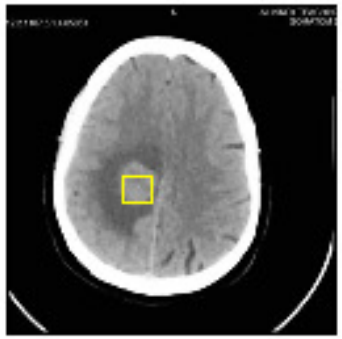
Input image



Filtered image



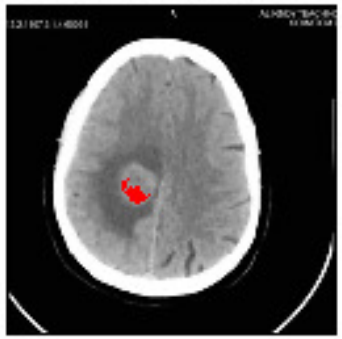
Bounding Box



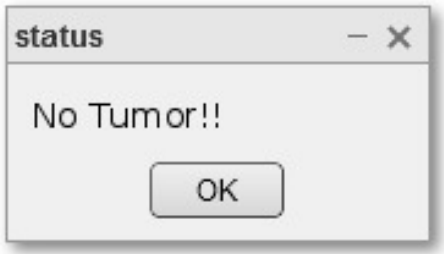
tumor alone

Tumor Outline

Detected Tumor



No Tumor



Conclusion

Conclusion

- We have detected Brain Tumor using image processing using morphological operations such as dilation and erosion for abdominal computed tomography scans.
- A limitation of this research is that the performance was designed for only single mass of tumors
- In future, we will collect clinical and computed tomography image data to ensure accuracy of evaluation and perfect val- idation for multiple tumors in the brain.

Thank you!