Tumor Detection in Brain MRI Images

PRESENTED BY

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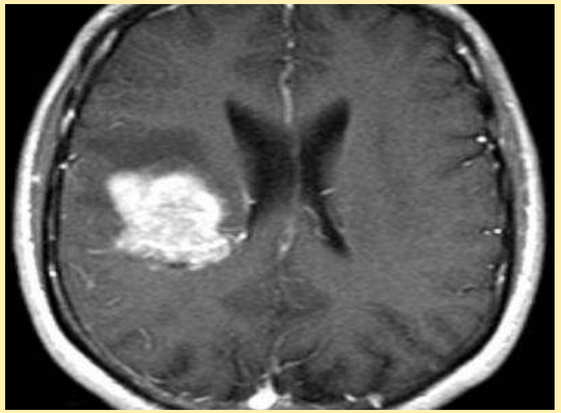
INTRODUCTION

- The goal of this project is to develop a system for automatic tumor detection in brain MRI images. Early detection of brain tumors is critical for timely medical intervention and treatment planning. The proposed system aims to assist medical professionals by automatically identifying potential tumor regions in MRI scans.
- The primary objective of this project is to develop an algorithm that can accurately detect and delineate tumor regions in brain MRI images.

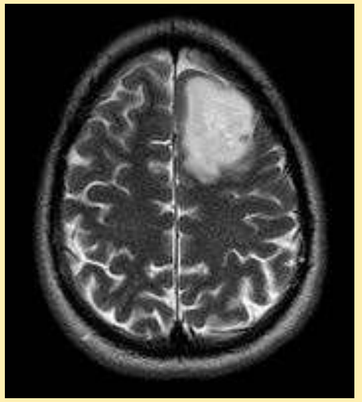


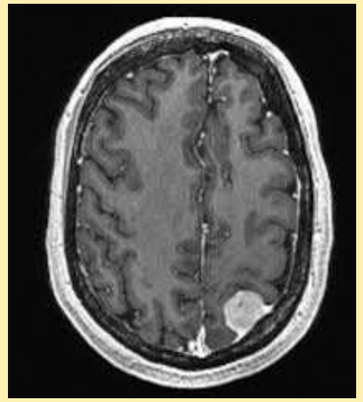
MATLAB CODE

```
close all;

clear all;
clc;
img=imread('brain12Z.jpg');
bw=im2bw(img,0.7);
label=bwlabel(bw);
stats=regionprops(label,'Solidity','Area');
density=[stats.Solidity];
area=[stats.Area];
high_dense_area=density>0.5;
max_area=max(area(high_dense_area));
tumor_label=find(area==max_area);
tumor=ismember(label,tumor_label);
se=strel('square',5);
tumor=imdilate(tumor,se);
figure(2);
subplot(1,3,1);
imshow(img,[]);
title('Brain');
```

```
subplot(1,3,2);
imshow(tumor,[]);
title('Tumor Alone');
[B,L]=bwboundaries(tumor,'noholes');
subplot(1,3,3);
imshow(img,[]);
hold on
for i=1:length(B)
    plot(B{i}(:,2),B{i}(:,1), 'y' ,'linewidth',1.45);



end

title('Detected Tumor');
hold off;
```

METHODOLOGY





1. Image Preprocessing:

• The input MRI image is read using the imread function.

• Conversion to a binary image is performed using a threshold value (im2bw). This step simplifies subsequent processing by converting the grayscale image into a binary representation.

2. Segmentation:

• Connected components in the binary image are labeled using the bwlabel function.

• Region properties such as solidity and area are calculated using the regionprops function. These properties are crucial for identifying potential tumor regions.

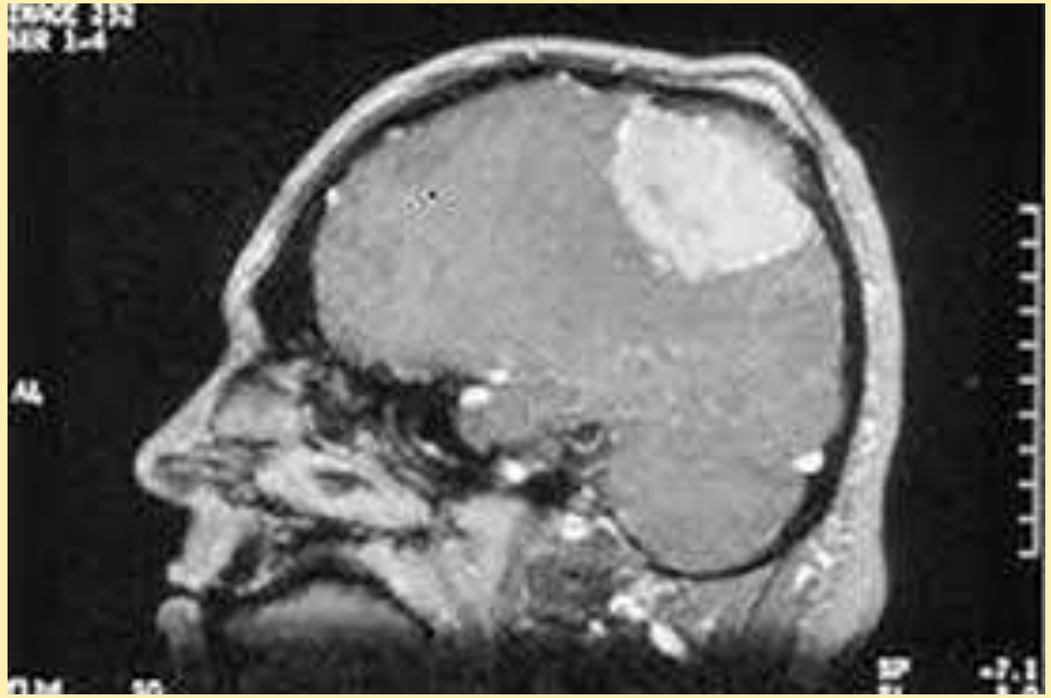
3. Tumor Detection:

• Areas with high density, which may indicate tumor regions, are identified based on the calculated region properties.

• The largest area among the high-density regions is considered as the potential tumor region.

4. VISUALIZATION:

- **A structuring element for dilation (strel) is created.**
- **The binary image is dilated using the imdilate function to enhance the potential tumor region.**
- **The original MRI image, the isolated tumor region, and the detected tumor boundary are displayed using imshow and plot functions.**



5. EDGE DETECTION:

Although the code does not explicitly use traditional edge detection algorithms like Canny or Sobel, it indirectly detects edges by identifying the boundary of the tumor region using the bwboundaries function. This function traces the outer boundary of each connected component in the binary image.

RESULTS

ure 1 ×

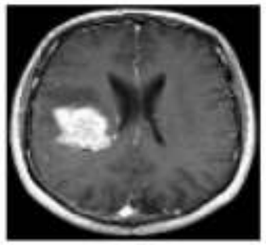
Brain

Tumor Alone

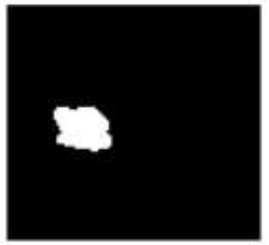
Detected Tumor

gure 2 ×

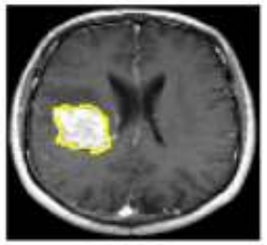
Brain



Tumor Alone



Detected Tumor



RESULT

- The proposed algorithm successfully detects and delineates potential tumor regions in brain MRI images.
- The system provides visual representations of the original MRI image, the isolated tumor region, and the detected tumor boundary, aiding medical professionals in analyzing the results.

CONCLUSION

The developed algorithm demonstrates promising results in automatic tumor detection in brain MRI images. By leveraging image processing techniques and morphological operations, the system efficiently identifies potential tumor regions without the need for manual intervention. Further validation and refinement of the algorithm could enhance its accuracy and applicability in clinical settings.

thank you