Edge detection and segmentation of lesion in MR images

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*Abstract*—

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# Introduction

The following work proposes an approach for analyzing and segmenting a volumetric MRI image in order to perform lesion detection. To perform this task the process begins with volume visualization to approximately assess the slices of interest and the extension of the tumor.

Single slice segmentation is carried out by means of an algorithm that employs filtering, thresholding and density analysis.

To evaluate the robustness of the segmentation approach , sensitivity analysis to two noise types is implemented. The type of noises considered are "salt & pepper" and Gaussian noise.

To assess the accuracy of the segmentation, a comparative analysis between Otsu thresholding and the proposed approach is conducted, using the Dice index to compare similarities.

# Material & Methods

## Image Segmentation

The image is cropped to a rectangle to identify a ROI of the image. A median filter is preventively applied to reduce eventual salt & pepper noise degradation. An Empirical Thresholding is applied to the standardized image, with range between 0.5 & 0.85. The resulting continous regions are labelled using the matlab function *bwlabel*, and subsequently statistical properties of those regions are computed, such as solidity and area. To find the area corresponding to the tumor, it is assumed that such area is the one with the densest region in the image based on an empirical density value. The image is corrected with the *imfill* function.

## Noise Sensitivity

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