SEGMENTATION OF MAGNETİC RESONANCE IMAGE

Taylan SABIR and Ömer AMAÇ

Marmara University, Istanbul, TURKEY

Introduction

❖ Magnetic resonance imaging or MRI scanning uses magnetism, radio waves, and a computer to produce images of body structures.

❖ The MRI scanner is a tube surrounded by a giant circular magnet.

❖ This Project based on 3D modelling of MRI images, by using pixel values(Which can reach to 12 bit values)

Purpose

In the developing world, cooperation is very important. We wanted to provide easier and more detailed information to doctors.

We wanted to improve the quality of work by combining the information of both sides.

Overview

❖ We have MRI images in dicom format.

❖ We are reading dicom image in MATLAB by using «dicomread» command.

❖ We are checking the pixel values and finding the best threshold value to binarizing the image by using histogram.

❖ After we are applying morphological operations on our read image.

❖ We are repeating same process on set of dicom image.

❖ After having set of segmented image, we are starting to create 3D structure.

Image Thresholding
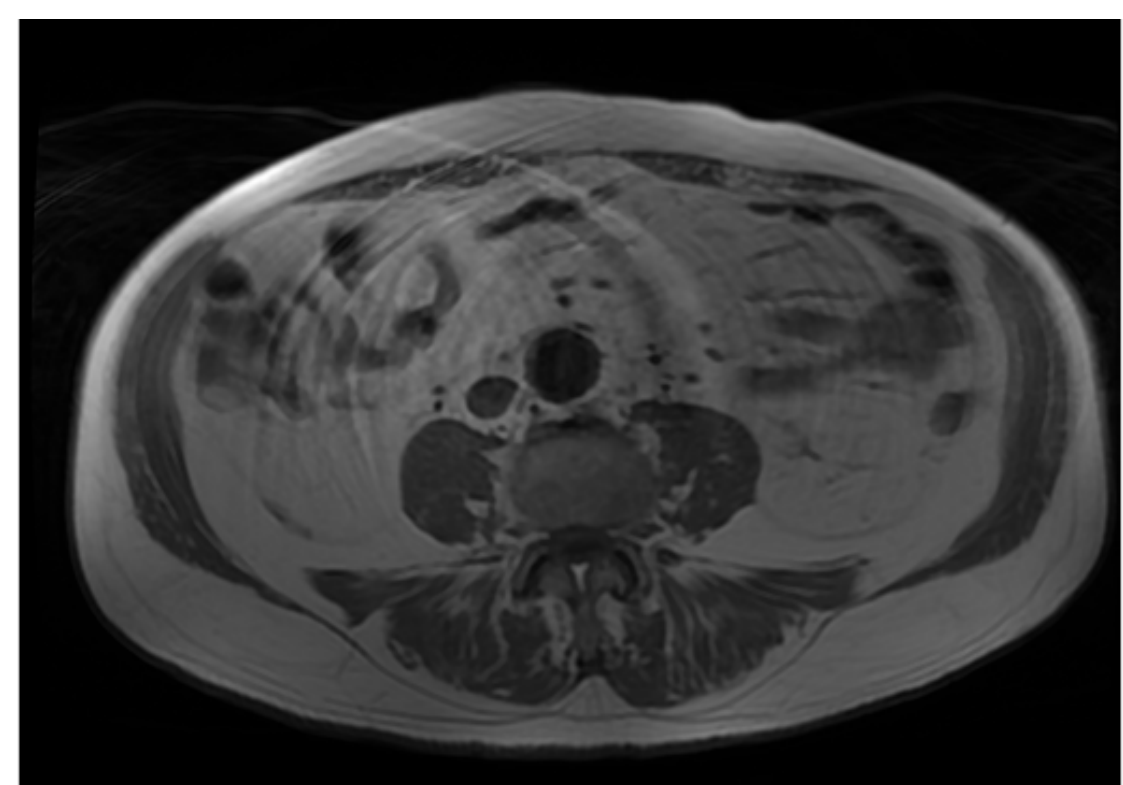
Original DICOM Image (prostate)

❖ The simplest thresholding methods replace each pixel in an image with a black pixel if the image intensity I is less than some fixed constant T.

❖ Or a white pixel if the image intensity is greater than that constant.

Regions Colorized

❖ Thresholding is the simplest method for the segmentation.

❖ Also it has different methods in it.

Binary Image

❖ In our example, first the tissues which we want become white and others turn to black.

❖ After from thresholded image we got what we want. Yellow part will be in 3D in next step.

Used Methods and Operations

- imerose
- imdilate
- 'imclose'
- 'imopen'
- 'clean'
- 'fill'
- 'majority'
- 'imclearborder'
- label2rgb
- bwareaopen
- 'imhist'
- 'otsuthresh'

Creating 3D Structure

❖ After had the segmented region we start to 3D modelling.

❖ We have segmented area from every single DICOM image.

❖ We are combining the segmented areas by putting segmented regions in a row with an order.

❖ Depend on pixel's connectivity, we are closing regions.

❖ After that with using isosurface, we are seeing it in 3D.

❖ In that example we are using 10 images(image slices)
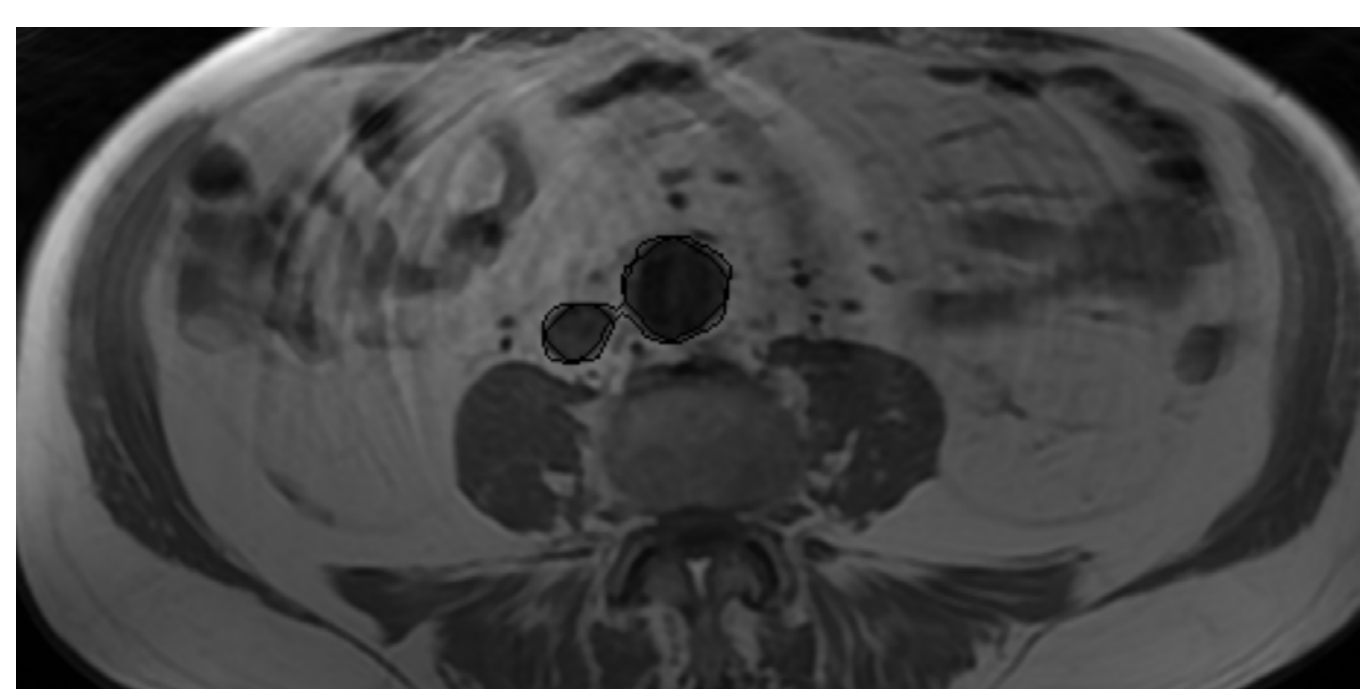
*DICOM with Marked Area(Closed Region)*
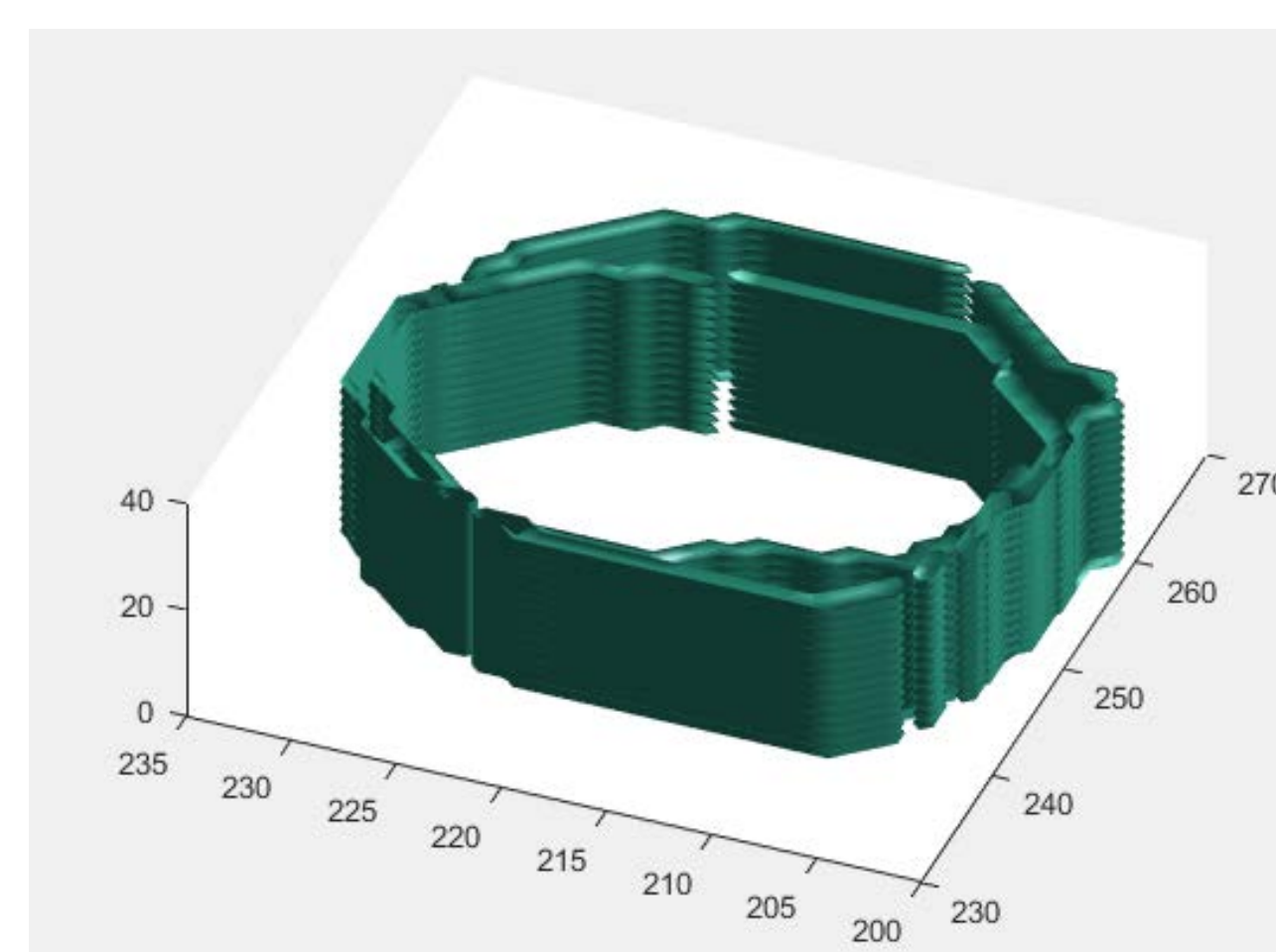
3D Model

Hounsfield Unit

The Hounsfield unit (HU) scale is a linear transformation of the original linear attenuation coefficient measurement into one in which the radiodensity of distilled water at standard pressure and temperature (STP) is defined as zero Hounsfield units (HU), while the radiodensity of air at STP is defined as -1000 HU.
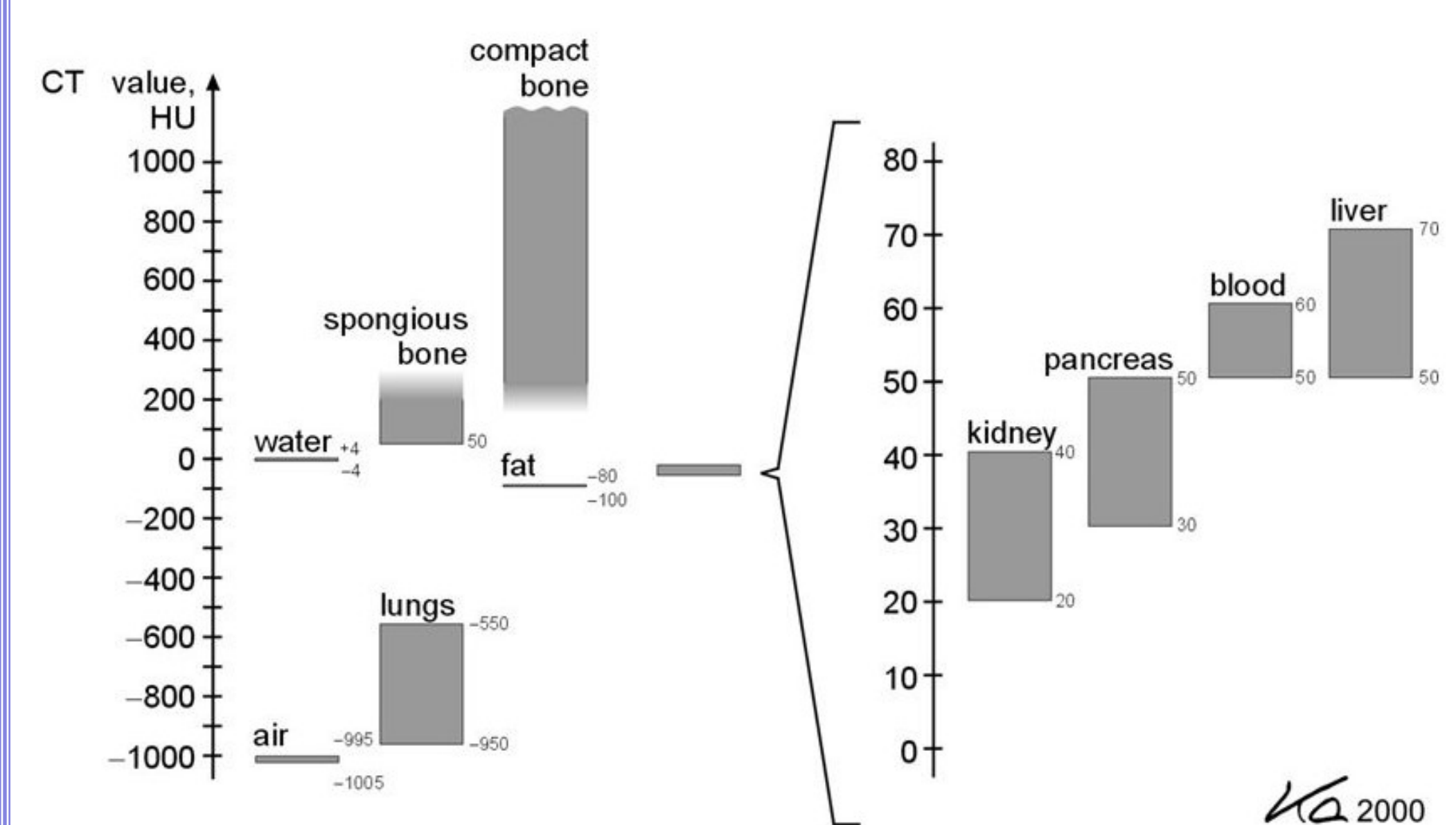
Hounsfield Units of Tissues

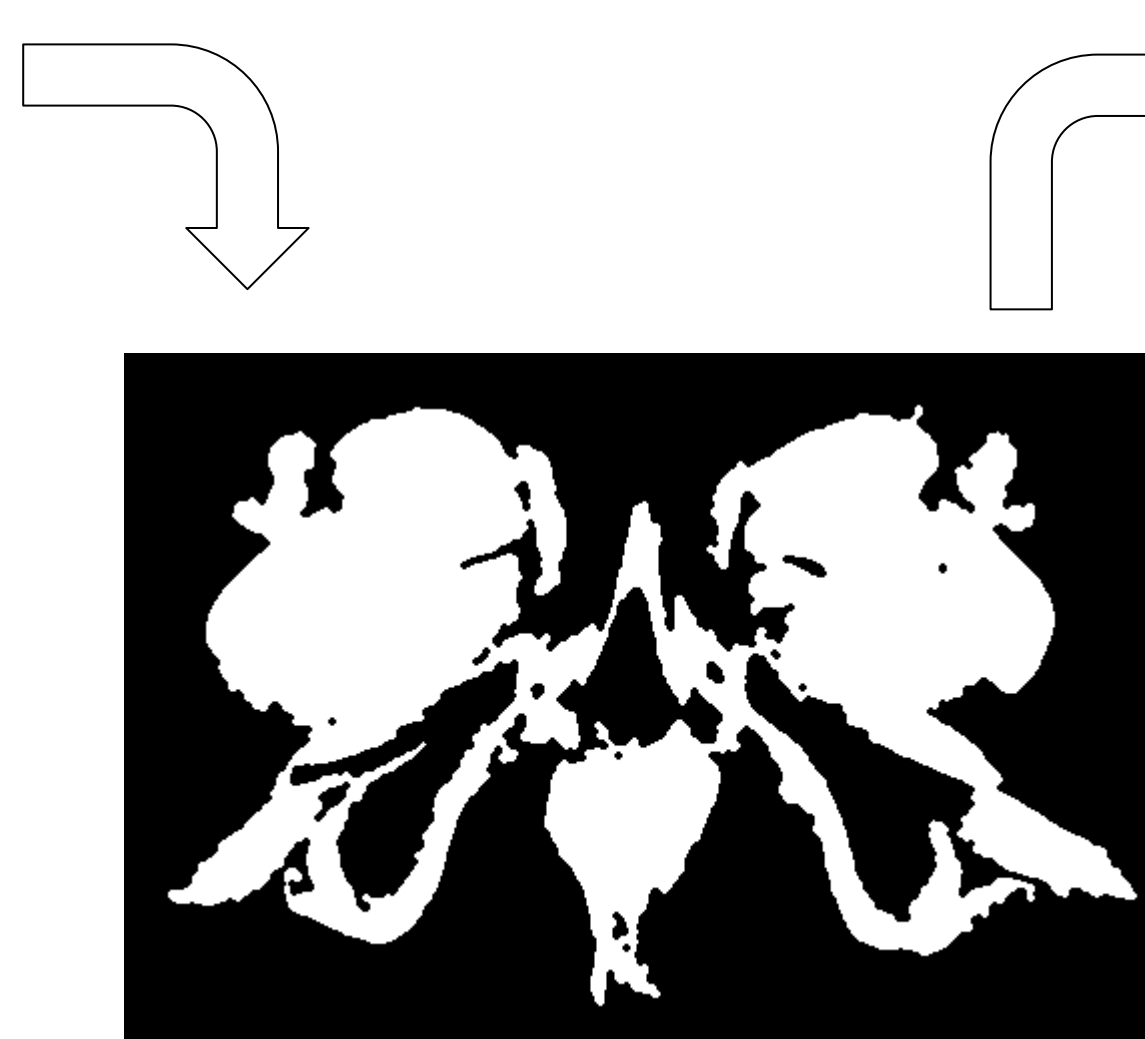## Segmentation Process
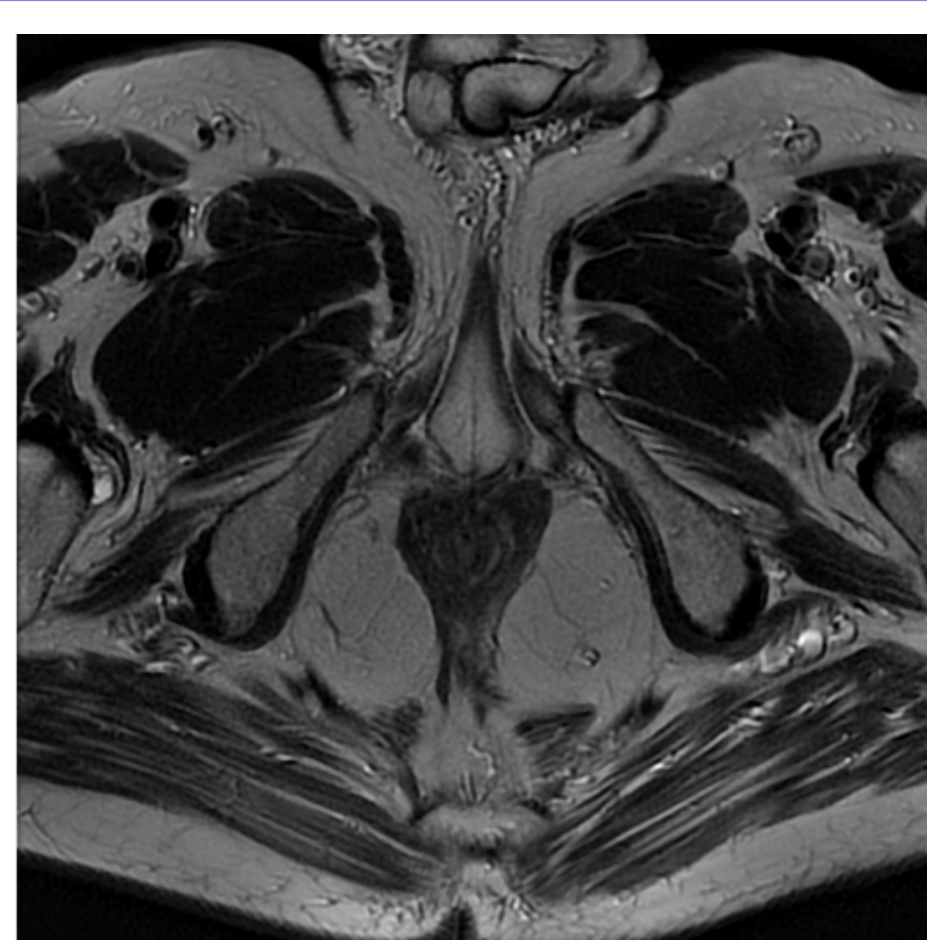
Original DICOM Image

Image After Binarization

Colorized Region

3D Structure

How to Develope More

➢ In our Project we made 3D modelling but it is not enough.

➢ As a future work, we can improve segmentation and 3D modelling and make a intense following. It can give as a 3D model of instense.