UNIVERSITAT DE GIRONA

MEDICAL IMAGE ANALYSIS

LABORATORY REPORT

Image Modalities Ultrasound, MRI and X-ray

Author
Mohit VAISHNAV

Supervisor
Dr. Robert MARTI

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1 Introduction

Medical Image Analysis is a interdisciplinary field involving fields of computer science, mathematics, vision related technology, medicine for sure and many others. This field is developed to solve the medical imaging problems faced usually in biomedical research and clinical care.

In this lab we were given task to understand more about the $DICOM$ standard and its particularities. Various modalities used in this lab are $X-Ray$, $Ultrasound$, MRI in $MATLab$ environment.

2 Learning's

We have learned in this lab about the $DICOM$ image standard widely used as a format of medical images. Here, we tried opening the image, reading its content, visualizing its content, histogram and finally to transform a raw image to a more realistic ones.

3 Results

Dimensionality of data for each modalities:

MRI

$$Modality = MR$$

$$Numberof Pixels = Rows \times Columns = 512 \times 512$$

$$PixelSpacing = [0.3125, 0.3125]$$

$Ultrasound$

$$Modality = US$$

$$Numberof Pixels = Rows \times Columns = 452 \times 564$$

$X-Ray$

$$Modality = MG$$

$$Numberof Pixels = Rows \times Columns = 4096 \times 3328$$

$$PixelSpacing = [0.07, 0.07]$$

On checking the information about the patient we found that the annonymization has been done in terms of parameters like $PatientName$, $Patient-ID$ whereas information like DOB, Sex, $Year$ etc have been made public in

the given *DICOM* image dataset provided. Things not included in the *DICOM* information: *Referring physician Name*, *Performing Physician Name*, *Patient ID*.

Third part of the task requires us to compute the histogram of MRI volume:

Next we have to see the three axial views from the data-set of MRI image which is as shown below.

In the visualization related to the raw image and processed image there is subtle difference. Raw image is not very much clear and understandable like we see after processing it. So to make the information more visible, various techniques have been proposed to obtain the more clearer view which has also been implemented in coming section.

4 Output

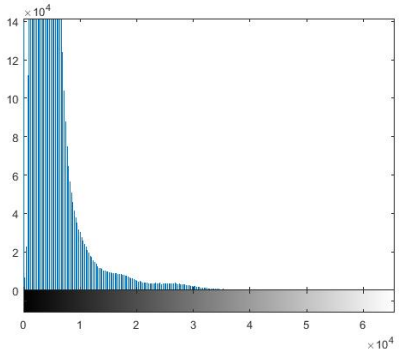


Figure 1: Histogram Output of all the slices of MRI data set

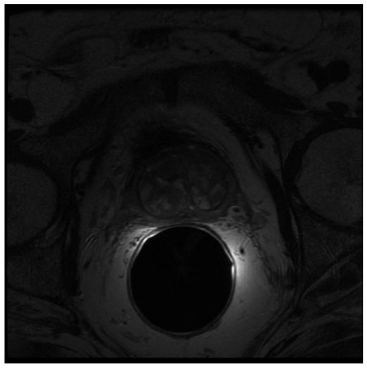


Figure 2: Coronal View of MRI slice

Figure 3: Axial View of MRI slices

Figure 4: Sagital View of MRI slices

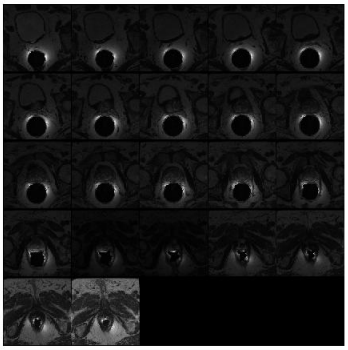
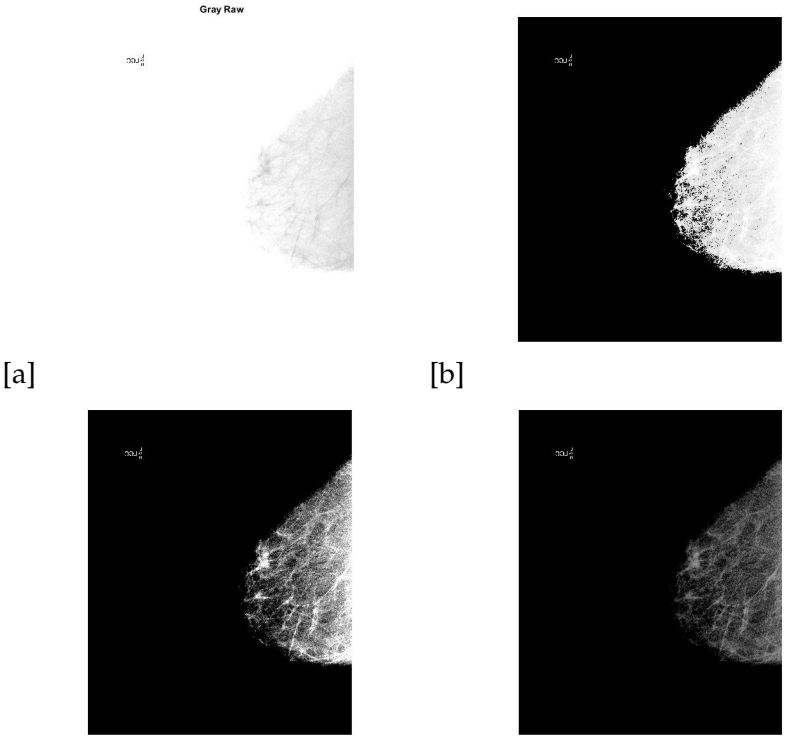


Figure 5: Joined View of MRI slices



[a] [b]

[c] [d]

Figure 6: A set of four subfigures: **??** Gray Raw Image; **??** After applying Histogram Equalization; **??** After applying Imadjust; and, **??** After applying adaptive histogram equalization.