107-1 MATLAB Midterm Exam

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Please upload all the 4 files, including **mtID_1.m, mtID_2.m, mtID_3.m, and mtID_4.m** to **MATLAB/Midterm** directory at **https://alvin-anat.tw1.quickconnect.to/**. Please do have a copy of all files by yourself.

1. Program Debug (20 points)

Note: Please open the **Debug.m** file within the **MImaterials_midterm** directory, and follow the steps below to debug the program.

Steps:

(1) Please identify the error on Line 1 and correct it. (5 points)

(2) Please identify the error on Line10 and correct it. (5 points)

(3) Please identify the error on Line 14 and correct it. (5 points)

(4) Please save the debugged file as **mtID_1.m**, and remember to change the function name to match with filename. (5 points)

※ Please put the check code on the last line of your code, **%check code**。

2. Fill in Program (20 points)

Note：Please open the **Fillin.m** file within the **MImaterials_midterm** directory, and follow the steps below to finish the program.

(1) Please use **sqrt** to calculate the square root on each element of **A** and **B**. Afterward, please multiply **A** by **B** element-by-element and assign the result to variable **C**. (5 points)

(2) Within the **for-loop**, please calculate the sum of square iteratively from 1 to 1000 and assign the accumulated value to variable **total** in each iteration. (5 points)

(3) Please use **if-else** to stop the **for-loop** once the accumulated value of **total** exceeds 50000. (5 points)

(4) Please use **fprintf** to print out the **i** and **total** on the command window when the condition of (3) is reached. (5 points)

※ Please save the revised script as **mtID_2.m** and remember to put the check code on the last line, **%check code**。

3. DICOM Anonymization (30 points)

Note：Anonymization of DICOM images can protect the patient privacy. In this topic, please follow the steps below to rewrite the specific tags within the DICOM header. Please save the script as **mtID_3.m**.

(1) Please use **for-loop** to get the DICOM header by using **dicominfo**, and read DICOM image by using **dicomread** for all the 23 DICOM files within **MImaterials_midterm\data3** directory. (10 points)

(2) Within the same for-loop as created in (1), please rewrite the DICOM header as follows (10 points),

 ✓ Rewrite the value of **PatientID** as a string of PT001;

 ✓ Rewrite the value of **PatientName.FamilyName** as a string of PT001;

 ✓ Rewrite the value of **PatientBirthDate** as a string of 00000000.

(3) Within the same for-loop as created in (1), please use dicomwrite to create anonymous DICOM files. (10 points)

 HINT: dicomwrite(img, 'FILENAME', info)

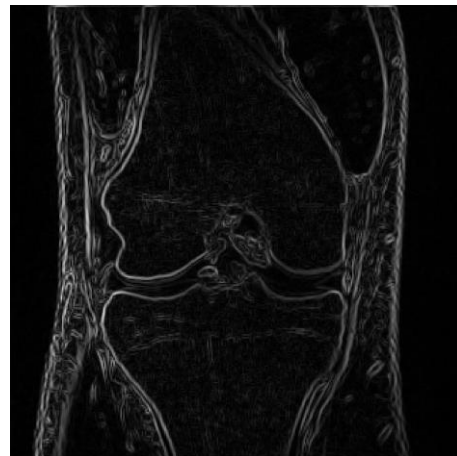※ Please put the check code on the last line of your code, **%check code**。

4. Edge Detection: Image Filtering and Thresholding (30 points)

Note：Edge detection is one of the image processes that can be very helpful for the object recognition. In this topic, please follow the steps below to accomplish the edge detection by using both convolution and thresholding process. Please save the script as **mtID_4.m**.

(1) Please use **dicomread** to read the DICOM file of **MImaterials_midterm\data4\IMG01.dcm** and display the image as Figure 1. (5 points)

(2) Please use **conv2** to perform image filtering on the original image (Figure 1) and display the processed image as Figure 2. (10 points)

(3) Please use **roipoly** to perform manual delineation of femoral head as shown in Figure 3. (5 points)

(4) Please perform thresholding process within the selected region of interest to identify the pixels larger then 600 as shown in Figure 4.（10 points）

※ Please put the check code on the last line of your code, **%check code**。
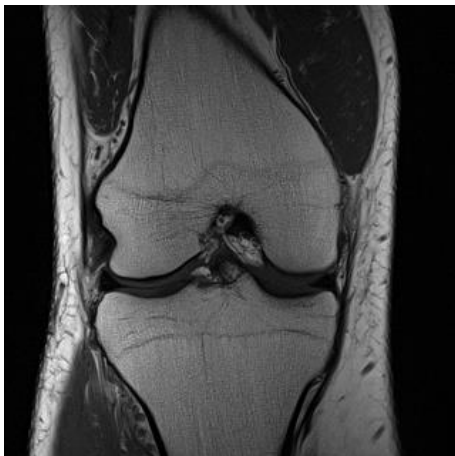
Figure 1

Figure 2

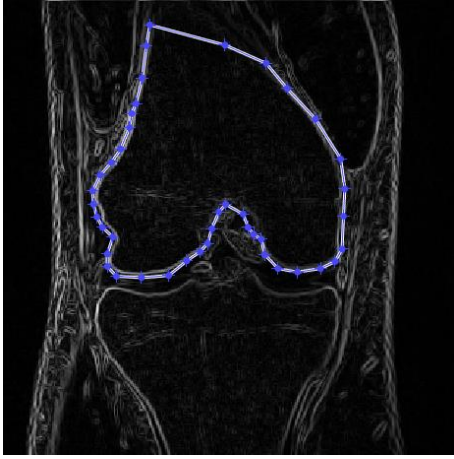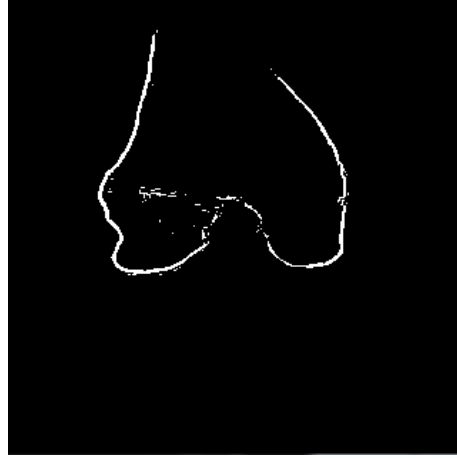**Figure 3**

Figure 4