

## 111-1 MATLAB Midterm Exam

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Please upload all the 3 m-files, including `mtID_1.m`, `mtID_2.m`, `mtID_3.m`, to the 2022.11.10 Midterm folder in E3 system. Please do have a copy of all files and bring them to classroom next week for the correction.

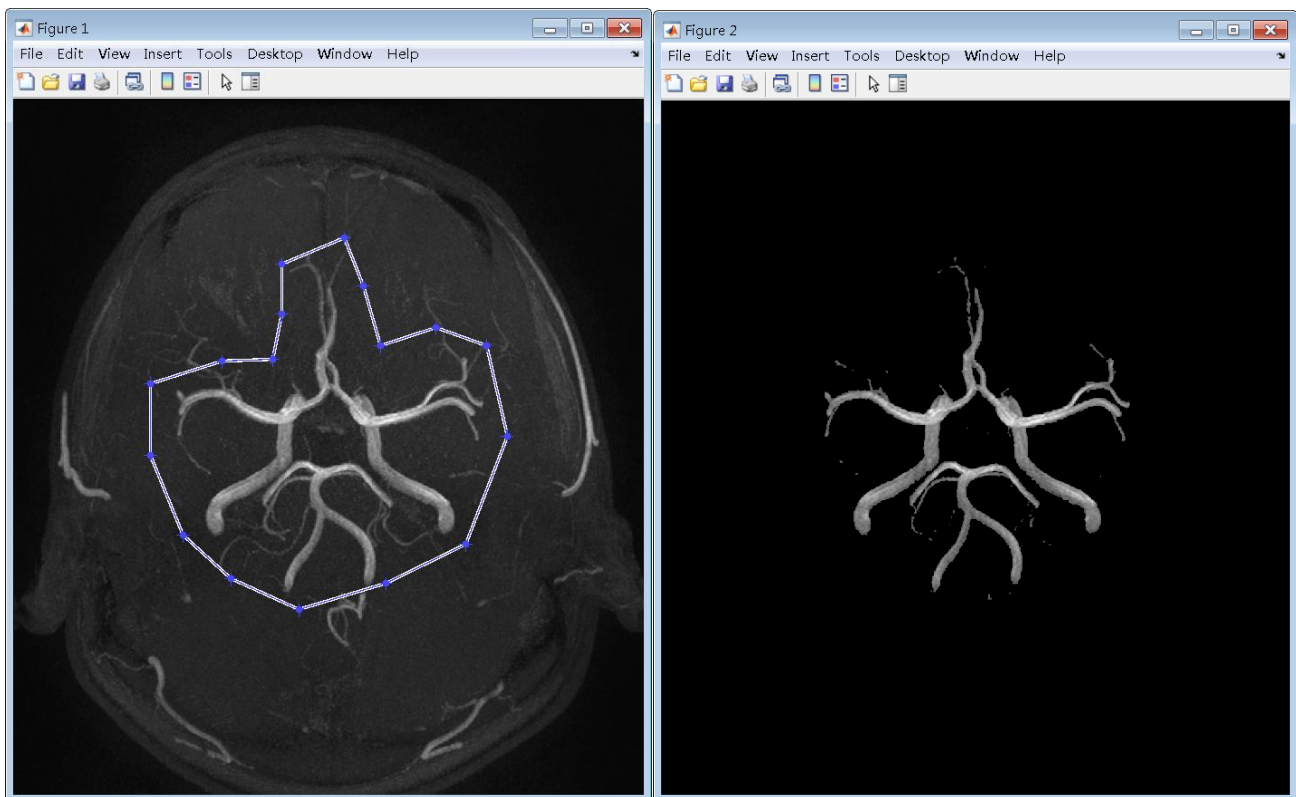
### 1. Program Debug (25 points)

**Note:** Please open the `Debug.m` file in the `MImaterials_midterm` directory and follow the steps below to debug the script. Please save the debugged file as `mtID_1.m`.

#### Steps:

- (1) Please identify one error on Line 5 and correct it. (5 points)
- (2) Please identify two errors on Line 11 and correct them. (6 points)
- (3) Please identify one error on Line 16 and correct it. (5 points)
- (4) Please identify one error on Line 23 and correct it. (5 points)
- (5) Please identify one error on Line 28 and correct it. (4 points)

Once all the errors are corrected, you should be able to create an ROI on the MIP image (left panel) and get the resultant masked image (right panel) as **Figure 1**.



**Figure 1**

## **2. Fill in Program - DICOM Anonymization (30 points)**

**Note:** Anonymization of DICOM images can protect the patient privacy. Please open the **Fillin.m** file in the **MImaterials\_midterm** directory, and follow the steps below to rewrite specific tags of the DICOM header. Please save the script as **mtID\_2.m**.

(1) Please declare a function in the first line based on the following rules (6 points):

- ✓ function name: *mtID\_2*
- ✓ two input variables:
  - 1<sup>st</sup> input, DICOM file name: *filename*
  - 2<sup>nd</sup> input, new label for anonymization: *anonymousLabel*
- ✓ No output variables is needed.

(2) Please import the DICOM tag information (metadata) of the specified *filename* using **dicominfo** function and read the DICOM image using **dicomread** function. (4 points)

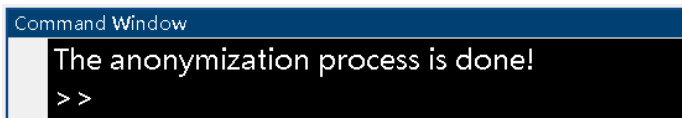
(3) Please rewrite the DICOM information as follows (5 points):

- ✓ Rewrite the field of **PatientName** as the *anonymousLabel*;
- ✓ Rewrite the field of **PatientID** as the *anonymousLabel*;
- ✓ Rewrite the field of **PatientBirthDate** as the *anonymousLabel*.

(4) Please use **dicomwrite** function to create the anonymous DICOM file with a file name of 'anony\_DICOM'. (10 points)

**HINT:** dicomwrite(IMG, FILENAME, INFO)

(5) Please print out the success message in Command Window as follows using **fprintf** function. (5 points)



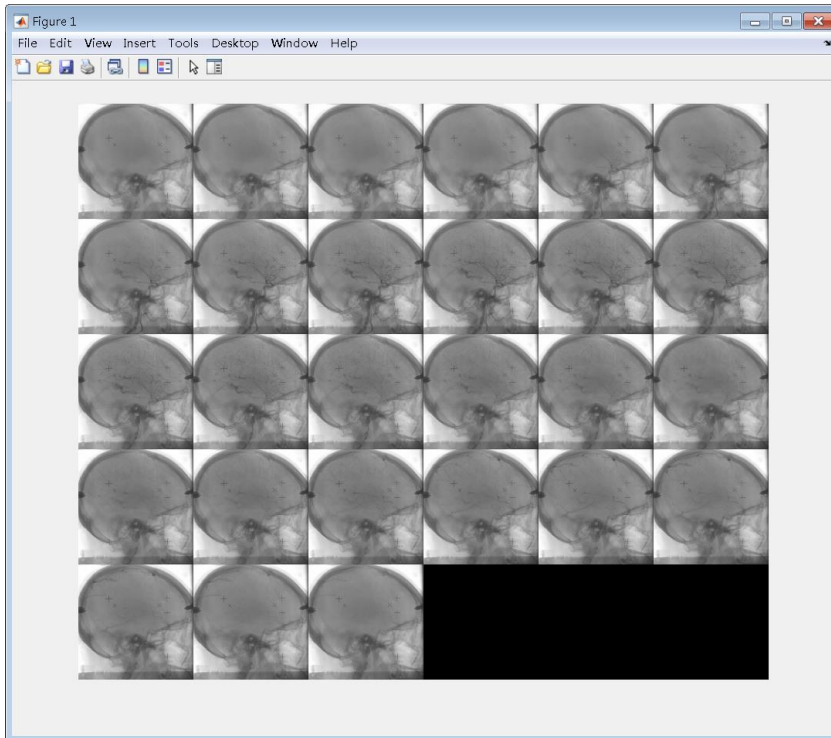
**Figure 2**

## **3. Digital Subtraction Angiography (35 points)**

**Note:** Digital subtraction angiography (DSA) is an interventional radiology technique with contrast injection to visualize blood vessels. In this topic, please follow the steps below to accomplish the process and visualization of DSA. Please save the script as **mtID\_3.m**.

(1) Please use **load** function to import the *img* variable (size: 720x720x27) stored in the **MImaterials\_midterm\data3\Angiography\_LAT.mat** and display the all the 27 slices within one figure using **montage** function (**Figure 3**). (10 points)

**HINT:** Please set up a proper value of 'displayrange' parameter when using **montage**.



**Figure 3**

- (2) Please subtract the first slice from all the slices in *img* and saved as a new variable, *DSAimg* (size: 720x720x27). Please perform a sequential display of each *DSAimg* slice using a for-loop with a 0.05-s pause. (10 points)
- (3) Please perform minimal intensity projection (mIP) across the third dimension of *DSAimg* using min function to get both projected image (assigned as *mIPimg*) and time map (assigned as *timemap*). (5 points)  
**HINT:** `[mIPimg, timemap] = min...`
- (4) Please find the indices of pixels with values larger than -50 in *mIPimg*. Please set these indices in *timemap* to be 0. (5 points)
- (5) Finally, please display the *timemap* using imshow. Please add the following code as the final command line and you should be able to display the time map with colors as **Figure 4**. (5 points)  
`colormap(flipud(jet))`

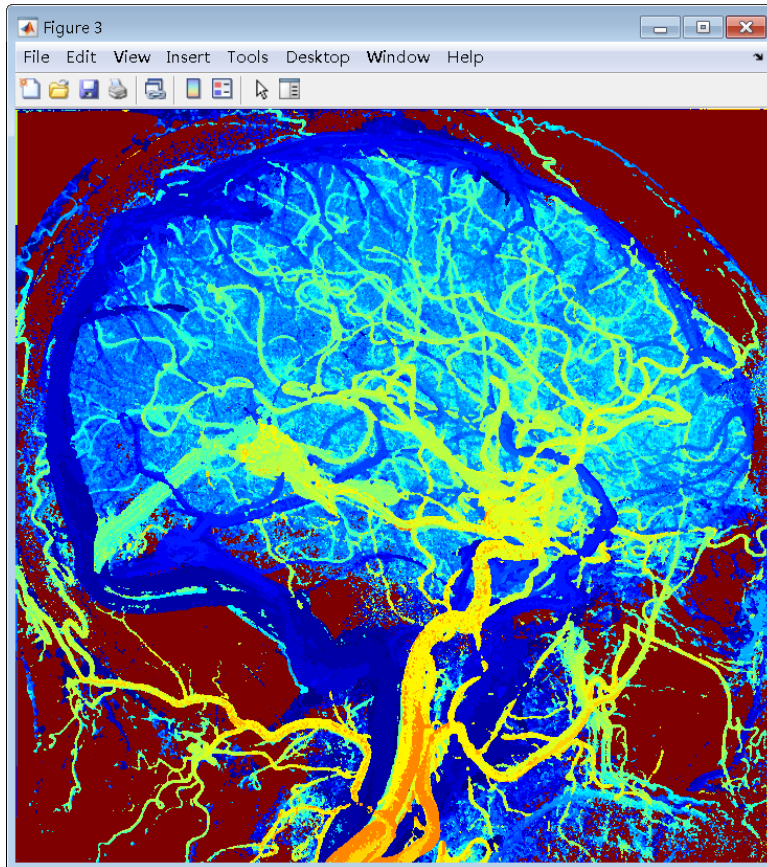


Figure 4

#### 4. Feedback Survey (10 points)

說明：截至期中考，請同學們提供寶貴意見，讓老師可以適時修正課程進行方式與難易度，希望能幫助同學們在期末學習與分組報告更順利。

步驟：請至以下連結填寫表單回饋，有回答便有本題完整分數，請按實際情況真實回覆不用擔心影響成績，感謝同學的意見與參與。

連結網址：

[https://docs.google.com/forms/d/e/1FAIpQLSftyfVnnJR5xbZPehFLlzgS9K4Jxbk9jt4Z3x9G0bE3gaRRFw/viewform?usp=pp\\_url](https://docs.google.com/forms/d/e/1FAIpQLSftyfVnnJR5xbZPehFLlzgS9K4Jxbk9jt4Z3x9G0bE3gaRRFw/viewform?usp=pp_url)



連結 QR code：

為避免佔用前三大題答題時間，本題線上回答截止時間為 11/11 (五) 24:00，不需要在考試交卷前完成。