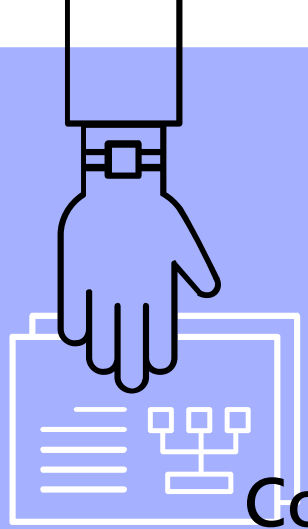
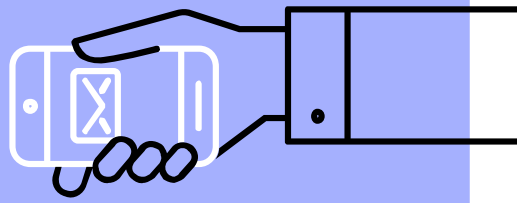
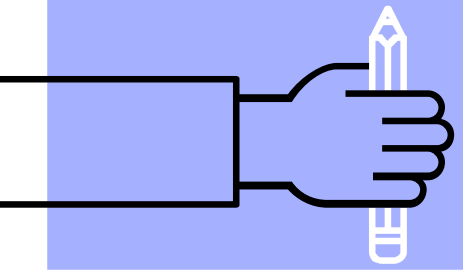


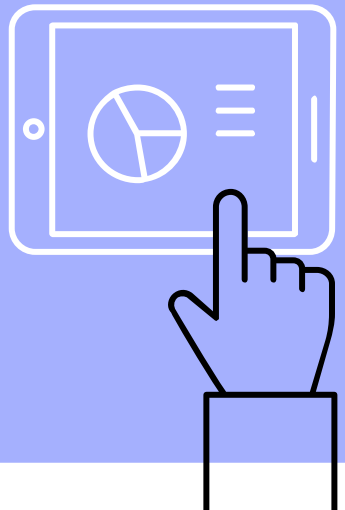


MATLAB Review II

Common Mistakes & Concept Clarification

盧家鋒 Chia-Feng Lu, Ph.D.
Department of Biomedical Imaging and Radiological Sciences, NYCU
alvin4016@nycu.edu.tw

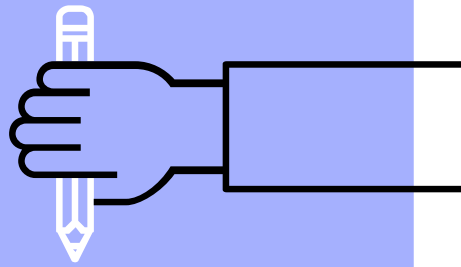


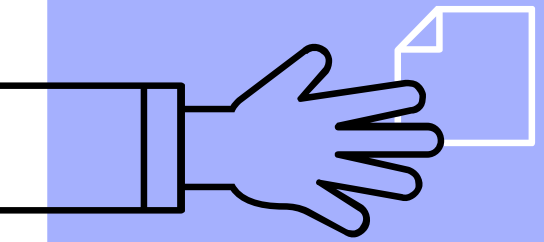


Contents

- Common mistake & concept clarification
- Weekly assignment

Common Mistakes & Concept Clarification





Week 11: Function

- Start with **function**
- Function name = file name
- <Optional> **Input**: right-hand side, within parentheses
- <Optional> **Output**: left-hand side, within brackets

corr.m

```
1  function [coef, pval] = corr(x, varargin)
2  %CORR Linear or rank correlation.
3  %   RHO = CORR(X) returns a P-by-P matrix c
4  %   correlation coefficient between each pair
5  %   matrix X.
```

Function vs. Workspace

- Variables created in functions cannot be called outside the function.

testfun.m

```
1   function [c,d]=testfun(a,b)
2   % This is a test function.
3   %   Lu, Chia-Feng 2014.10.2
4
5   c=a+b;
6   d=a-b;
```

Command Window

```
>> testfun(10,8);
>> c
Unrecognized function or variable 'c'.

>> d
Unrecognized function or variable 'd'.

>> a
Unrecognized function or variable 'a'.

>> b
Unrecognized function or variable 'b'.
```

Transport Variables

Command Window/Workspace **Function**

Copy Variables

Command Window/Workspace

Function

Function vs. Workspace

- When calling a function, the variable names can be different from the function declaration.
- Inputs, outputs → copy values

testfun.m

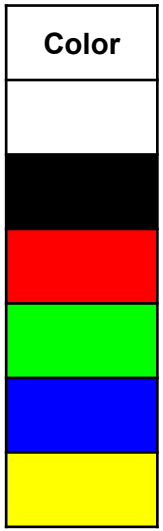
```
1  function [c,d]=testfun(a,b)
2  % This is a test function.
3  %   Lu, Chia-Feng 2014.10.2
4
5  c=a+b;
6  d=a-b;
```

Command Window

```
>> [sum_ab,minus_ab]=testfun(1,2)

sum_ab =

     3


minus_ab =

    -1
```

Week 13: customize colormap

- Each color is composed of 3 numbers as a 1 x 3 vector



⇔

Color	RED	GREEN	BLUE
	1	1	1
	0	0	0
	1	0	0
	0	1	0
	0	0	1
	1	1	0

the value must between 0 and 1!!

- uisetcolor (can help you determine the color vector)

Week 13: customize colormap

- Create a colormap that gradually changes from black to red (with 32 levels)

32nd level

1st level

RED	GREEN	BLUE	
0	0	0	1st level
0	0	0.0323	2nd level
0	0	0.0645	3rd level
0	0	…	
0	0	…	
0	0	0.9677	31st level
0	0	1	32nd level

```
cmap=[linspace(0,1,32)', zeros(32,2)];
colormap(cmap), colorbar
```

Customized colormap

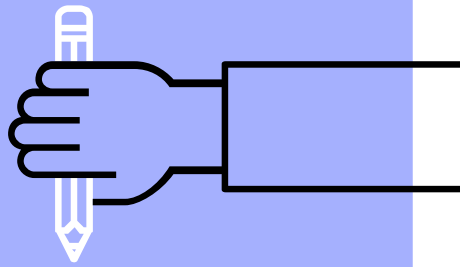
```
6   %% load image
7   load('footimg.mat')
8
9   img=(img-min(img(:)))/(max(img(:))-min(img(:)));
10  img=img*255;
11
12  %% image colormap
13  figure,
14  image(img), axis off
15  colormap(gray(256)), colorbar
16
17  figure,
18  image(img), axis off
19  cmap=[zeros(32,2) linspace(0,1,32)';...                % black -> blue
20        linspace(0,1,64)' zeros(64,1) linspace(1,0,64)';... % blue -> red
21        ones(32,1) linspace(0,1,32)' zeros(32,1);...     % red -> yellow
22        ones(128,2) linspace(0,1,128)'];                 % yellow -> white
23  colormap(cmap), colorbar
```

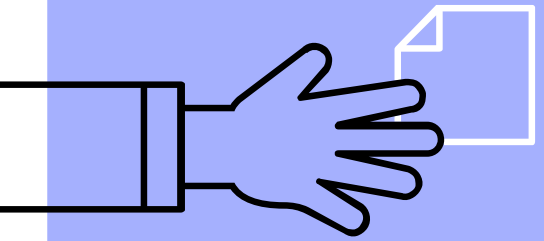
img=img*255+1;

32 64 32 128

Black → blue → red → yellow → white

Weekly Assignment





Week 11 Assignment

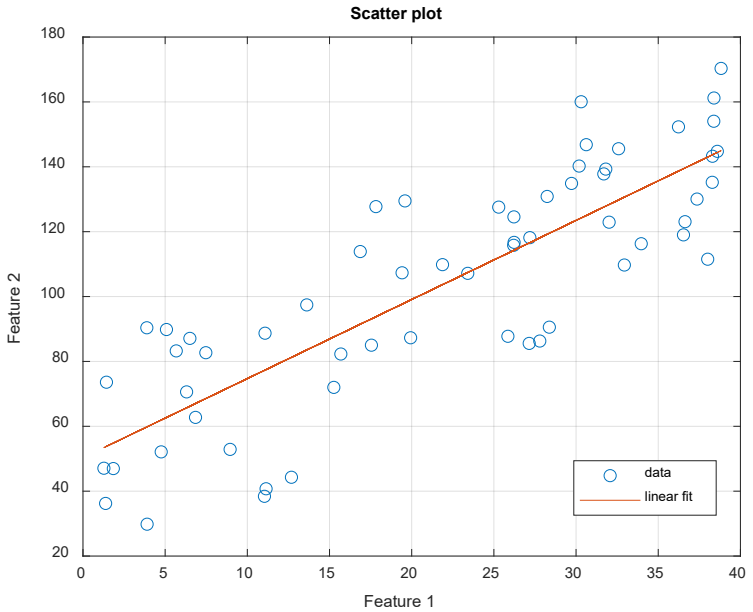
- Create a function that can…
  - extract local image (based on rowrange and colrange),
  - perform interpolation (by a factor of 4),
  - image smoothing (15 pixels),
  - edge detection (3 pixels, L/R & A/P)

- [img_sm,img_edge]=**imgprocess**(img,rowrange,colrange);

  - Modify from **ImageEx04.m**
  - Do not load image within the function (~~dicomread~~)!
  - Do not display any image within the function (~~imshow~~)!

Week 12 Assignment

- load **ScatterData.mat**
- Plot feature1 (x-axis) and feature2 (y-axis).
- Use **polyfit** and **polyval** to find the linear fit.
  - Hint: please set N=1.
- Plot linear fit line.
- Give **xlabel**, **ylabel**, **title**, **grid**, and **legend**.

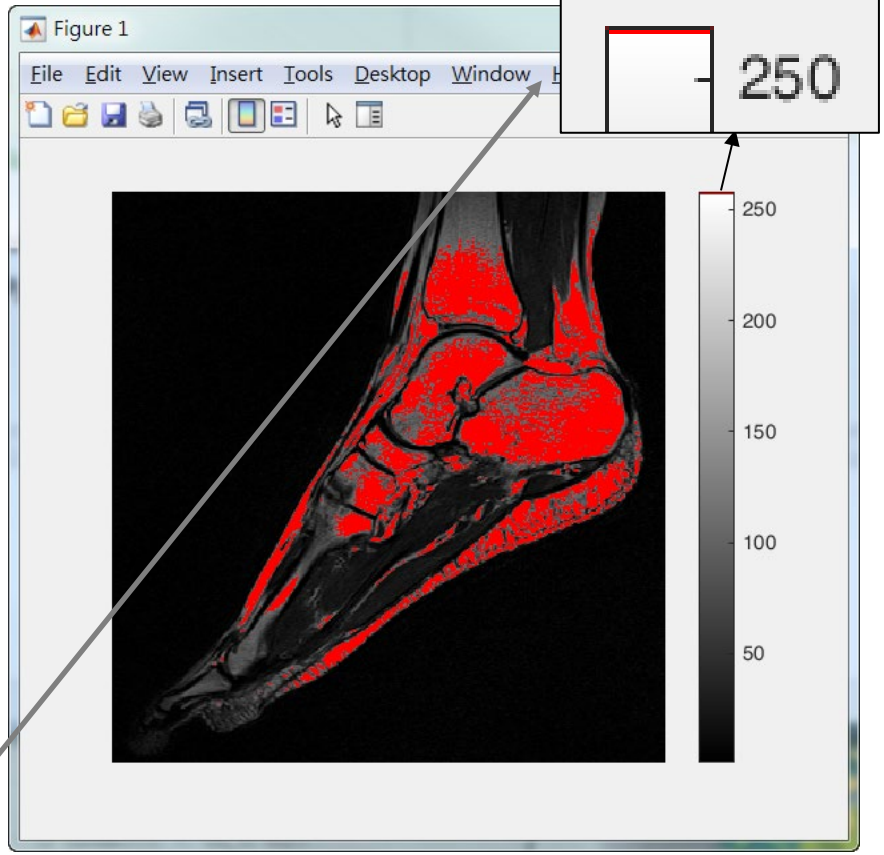


Week 13 Assignment

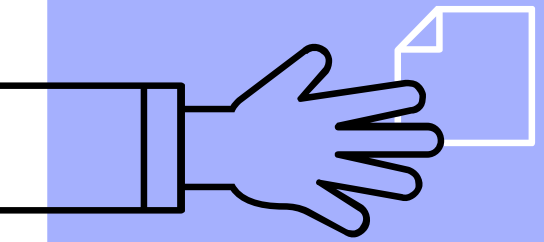
http://cflu.lab.nycu.edu.tw, Chia-Feng Lu

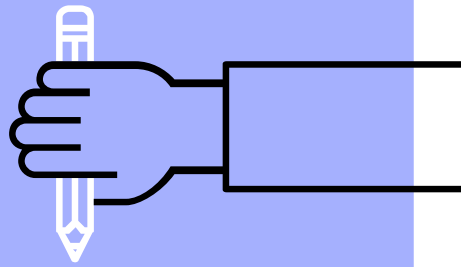
- Please display the foot image with the red-labeled region for the high-intensity area (intensity > 600).
- 1. **Find** the indices of pixels with intensity > 600.
- 2. **Rescale** img intensity to 1~255.

  (overall 255 gray levels)
- 3. **Assign** the intensity of indices (found in step 1) to 256.
- 4. Adjust the colormap



Final Competition





Create Questions for Competition

- **For each study group, ….**
  - Generate one question (**20 points**) that can be solved by other teams within **10 minutes**;
  - Formats include **debug**, **fill-in**, and **application**;
  - The anticipated average score for other teams should be between **12 and 17 points** (**reasonable difficulty**);
  - The quality of question will be evaluated and graded (**20 points**);
  - The poor-quality question will be excluded.

Question Assignment

Debug (D), fill-in (F), and application (A)

Question Categories	Groups
1. For-loop flow	12(D)、13(F)、17(A)、18(A)
2. If-else flow	2(D)、3(F)、5(A)、23(A)
3. Function	6(D)、14(F)、21(A)、25(A)
4. Data display	1(D)、11(F)、16(A)
5. Color image display	8(D)、9(F)、19(A)

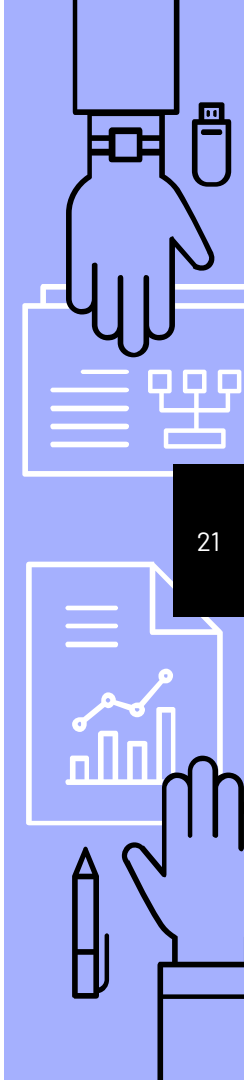
Question Assignment

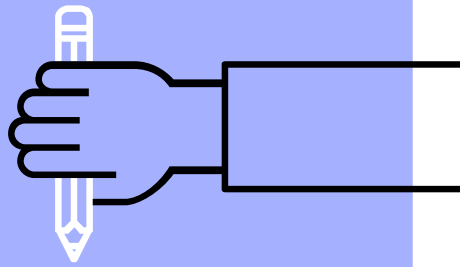
Debug (D), **fill-in (F)**, and **application (A)**

Question Categories	Groups
6. Image contrast adjustment	4(F)、26(A)
7. Image processing (smoothing, edge detection, thresholding)	10(F)、15(A)
8. Image region of interest & thresholding	7(F)、24(A)
9. Surface rendering	20(F)、22(A)

Create Questions for Competition

- **For each study group, ….**
  - Provide question description (in English), test materials, and score arrangement (a **Word file**).
  - Provide the reference answer (an **m-file**).
  - Please discuss with your group members and upload these files to E3 System **before 12/14 23:59**.
  - **[Hard regulation] Do not let other groups know the question/answer before the competition.**





THE END

alvin4016@nycu.edu.tw