

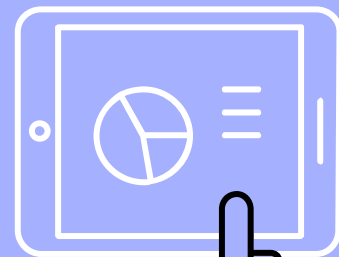


MATLAB Flow Control II

Region of Interest and Thresholding



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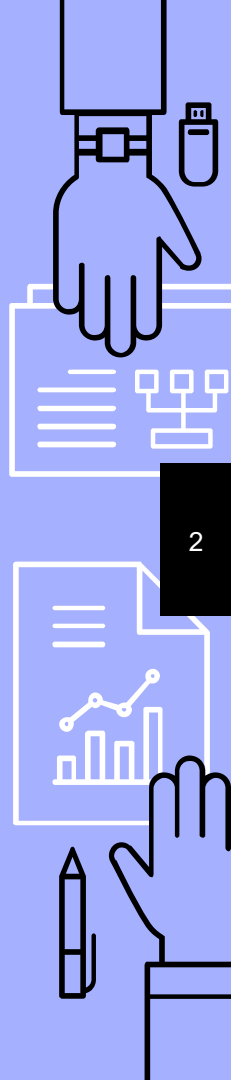


Contents

- ▶ Flow control: if-else and switch-case
- ▶ Region of interest and thresholding

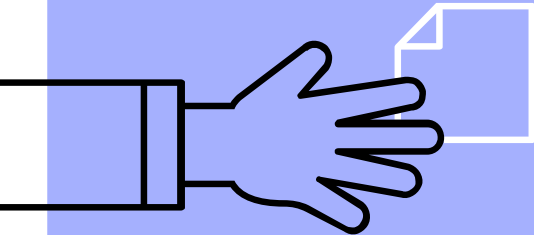
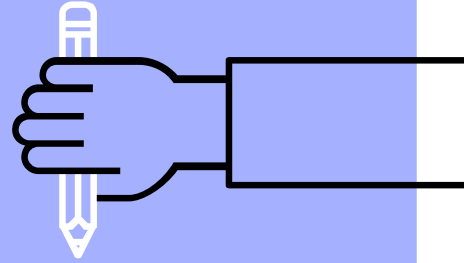
Please download the handout and materials from

http://cflu.lab.nycu.edu.tw/CFLu_course_matlabimage.html



Conditional Statements

if-else and switch-case



If-else structure

```
if condition1
    statement1
else
    statement2
end
```

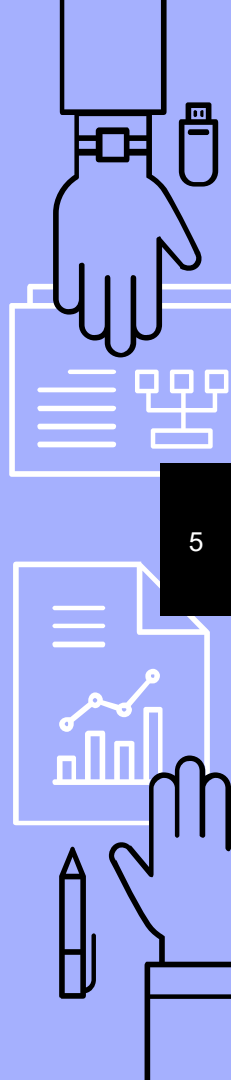
Equal	==
Not equal	~=
Less than	<
Greater than	>
Less than or equal	<=
Greater than or equal	>=

```
1 a=99;
2 b=81;
3
4 if a>=b
5     winnerScore=a;
6 else
7     winnerScore=b;
8 end
```

If-else structure

```
if condition
  statement 1
  .....
else
  statement 2
  .....
end
```

```
if condition1
  statement 1
  .....
elseif condition2
  statement 2
  .....
end
```

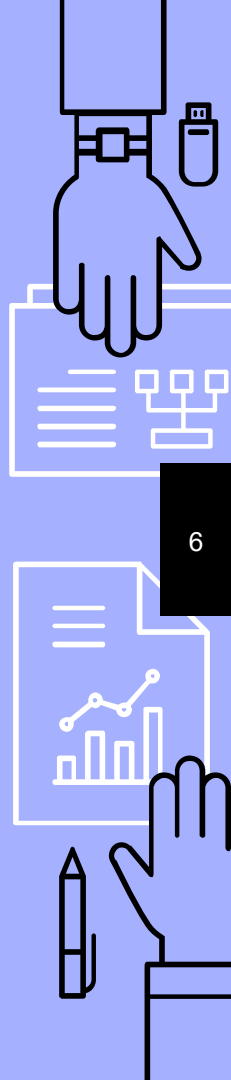


Processing flow

```
A=[5 9];  
if A(1)>A(2)  
    maxvalue=A(1)  
    step=1  
elseif A(2)>A(1)  
    maxvalue=A(2)  
    step=2  
else  
    maxvalue='equal'  
    step=3  
end
```



Processing flow



Load & Check Dataset

- ▶ Load data from **NC.mat**
- ▶ Check data integrity and remove subjects with missing data.
- ▶ Save data as **NCcheck.mat**

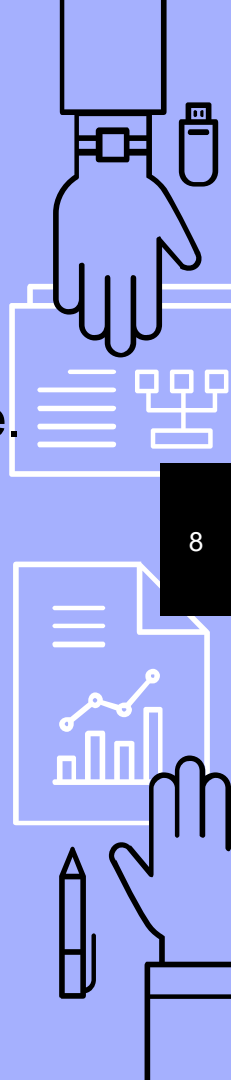
Fields	abc	name	age	gender	height	weight	predata	postdata
17		'NC17'	64	1	168.6986	73.7783	8x450 d...	8x450 d...
18		'NC18'	62	1	164.8790	70.9246	8x450 d...	8x450 d...
19		'NC19'	52	0	171.6970	68.7181	8x450 d...	8x450 d...
20		'NC20'	56	0	164.9102	53.6330	8x450 d...	8x450 d...
21		'NC21'	55	1	166.5719	63.4037	8x450 d...	8x450 d...
22		'NC22'	59	1	171.1880	67.7463	8x450 d...	8x450 d...
23		'NC23'	66	0	160.9877	70.1898	8x450 d...	8x450 d...
24		'NC24'	55	0	170.2819	73.0139	8x450 d...	8x450 d...
25		'NC25'	60	1	170.8547	76.9674	8x450 d...	8x450 d...
26		'NC26'	62	0	166.0561	51.9179	8x450 d...	8x450 d...
27		'NC27'	51	0	162.1981	78.4609	8x450 d...	8x450 d...
28		'NC28'	56	1	168.7833	53.3143	8x450 d...	8x450 d...
29		'NC29'	55	1	166.1138	56.4616	8x450 d...	8x450 d...
30		'NC30'	63	0	171.1190	71.4411	8x450 d...	8x450 d...
31								

Fields	name	age	gender	height	weight	predata	postdata
14	'NC14'	50	0	164.07...	55.5204	8x450 d...	8x450 d...
15	'NC15'	52	1	172.69...	57.2291	8x450 d...	8x450 d...
16	'NC16'	53	0	163.88...	59.1720	8x450 d...	8x450 d...
17	'NC17'	64	1	168.69...	73.7783	8x450 d...	8x450 d...
18	'NC18'	62	1	164.87...	70.9246	8x450 d...	8x450 d...
19	'NC19'	52	0	171.69...	68.7181	8x450 d...	8x450 d...
20	'NC20'	56	0	164.91...	53.6330	8x450 d...	8x450 d...
21	'NC21'	55	1	166.57...	63.4037	8x450 d...	8x450 d...
22	'NC22'	59	1	171.18...	67.7463	8x450 d...	8x450 d...
23	'NC23'	66	0	160.98...	70.1898	8x450 d...	8x450 d...
24	'NC24'	55	0	170.28...	73.0139	8x450 d...	8x450 d...
25	'NC25'	60	1	170.85...	76.9674	8x450 d...	8x450 d...
26	'NC27'	51	0	162.19...	78.4609	8x450 d...	8x450 d...
27	'NC28'	56	1	168.78...	53.3143	8x450 d...	8x450 d...
28	'NC30'	63	0	171.11...	71.4411	8x450 d...	8x450 d...



Useful Functions

- ▶ **isempty**
 - `isempty(X)` returns 1 if `X` is an empty array and 0 otherwise.
- ▶ **fprintf**
 - Write formatted data to text file or display on the screen.
 - Use `\n` to change line



Load & Check Dataset

```
5 %% load data file and check
6 load('NC.mat')
7
8 rejectdata=[]; % record the subject index to remove
9 for i=1:length(NC)
10     if isempty(NC(i).predata)
11         fprintf(['The predata from Subject ' NC(i).name ' are lost! \n'])
12         rejectdata=[rejectdata i];
13     elseif isempty(NC(i).postdata)
14         fprintf(['The postdata from Subject ' NC(i).name ' are lost! \n'])
15         rejectdata=[rejectdata i];
16     end
17 end
18 NC(rejectdata)=[]; % remove the subject with missing data
19
20 %% save the structure array as a *.mat matlab file
21 save('NCcheck.mat','NC')
```

Load & Check Dataset

```
5 %% load data file and check
6 load('NC.mat')
7
8 rejectdata=[]; % record the subject index to remove
9 for i=1:length(NC)
10     if isempty(NC(i).predata)
11         fprintf(['The predata from Subject ' NC(i).name ' are lost! \n'])
12         rejectdata=[rejectdata i];
13     elseif isempty(NC(i).postdata)
14         fprintf(['The postdata from Subject ' NC(i).name ' are lost! \n'])
15         rejectdata=[rejectdata i];
16     end
17 end
18 NC(rejectdata)=[]; % remove the subject with missing data
19
20 %% save the structure array as a *.mat matlab file
21 save('NCcheck.mat','NC')
```

Switch-case Structure

switch variable

case expression1

statement1

case {expression2, expression3}

statement 2

otherwise

statement3

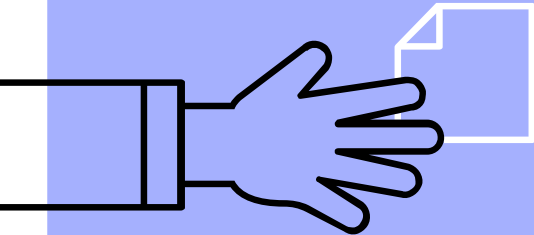
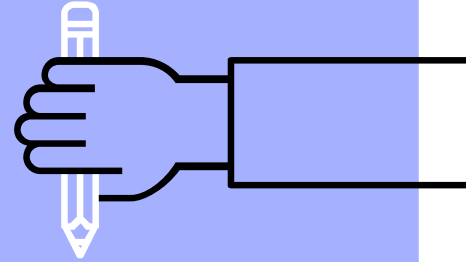
end

```
month=11;

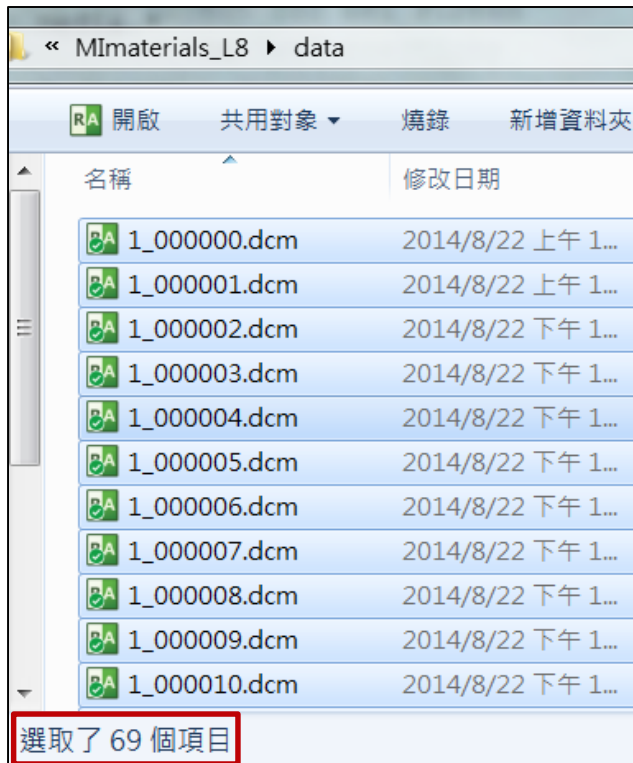
switch month
  case {1,3,5,7,8,10,12}
    fprintf('31 days \n');
  case {4,6,9,11}
    fprintf('30 days \n');
  case 2
    fprintf('28 days \n');
  otherwise
    fprintf('error! \n');
end
```

MImaterials_L8\DaysinMonth.m

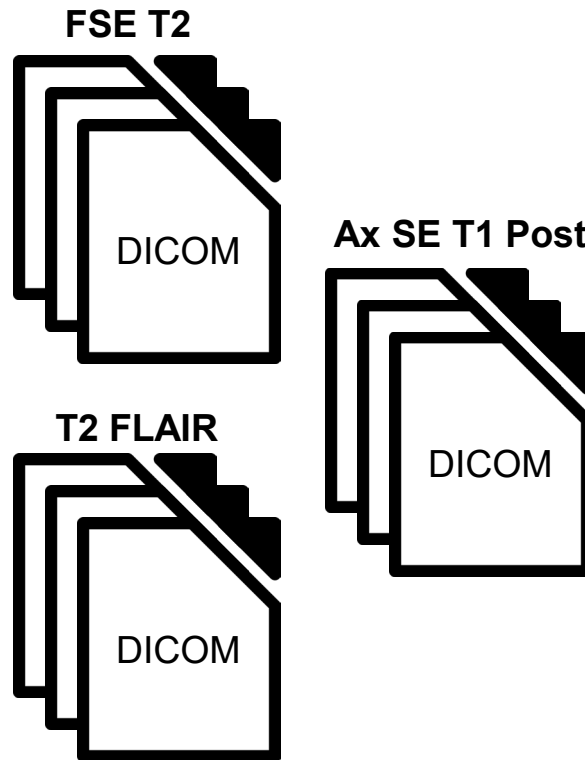
Region of Interest & Thresholding



Step 1 – Identify images by 'Series Description' of DICOM



dicominfo
→



Step 1 – Identify images by 'Series Description' of DICOM

```
5 %% Step 1: Identify images by Series Description of DICOM header
6 dirpath = '\data';
7 dirinfo = dir(dirpath);
8 dirinfo(1:2) = []; % remove . and ..
9 SeriesDescrip = {};
10 for i = 1:length(dirinfo)
11     info = dicominfo ([dirpath filesep dirinfo(i).name]);
12     SeriesDescrip{i,1} = info.SeriesDescription;
13 end
14 SeriesType = unique(SeriesDescrip);
```

help unique

Step 2 – Sequential display of target series

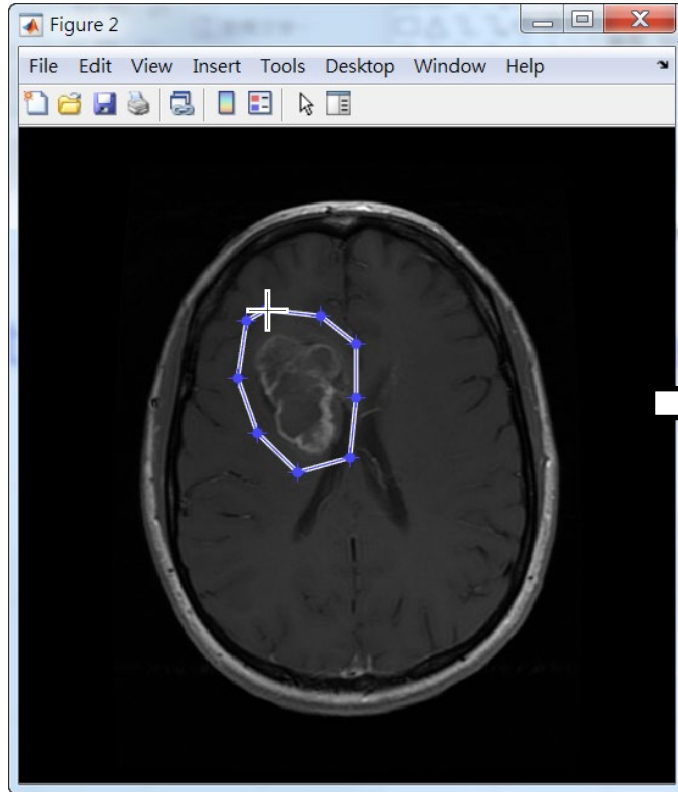


Step 2 – Sequential display of target series

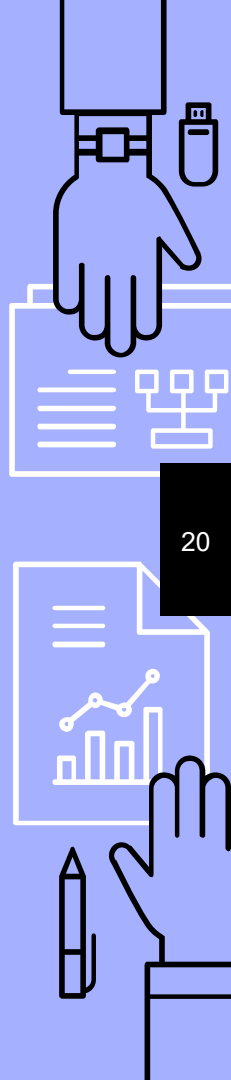
```
16 %% Step 2: Sequential display of target series
17 TargetSeries='Ax SE T1 Post';
18
19 check=ismember(SeriesDescrip,TargetSeries);
20 fileind=find(check==1);
21 img=[];
22 for i=1:length(fileind)
23     img(:,:,i)=dicomread([dirpath filesep dirinfo(fileind(i)).name]);
24 end
25 figure,
26 for i=1:size(img,3)
27     imshow(img(:,:,i),[])
28     title(num2str(i))
29     pause
30 end
```

help title

Step 3 – Create region of interest (ROI)



ROI Mask



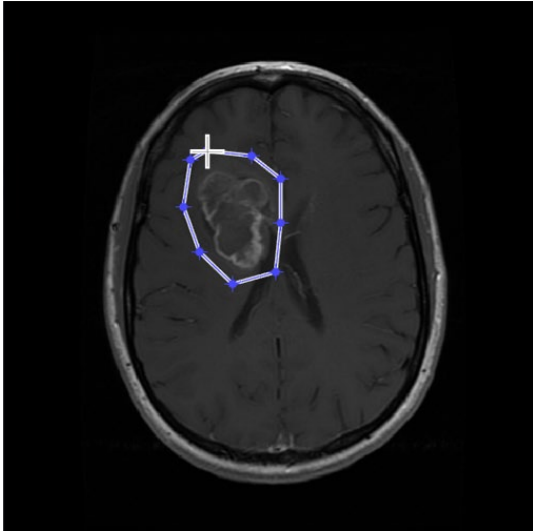
Step 3 – Create region of interest (ROI)

```
32     %% Step 3: Perform region of interest (ROI)
33 -   targetslice=14;
34
35 -   figure,imshow(img(:,:,targetslice),[],'border','tight')
36     % perform manual ROI
37 -   Mask=roipoly;
38
39 -   figure,
40 -   subplot(1,2,1),imshow(Mask,[]),
41 -   title('ROI mask')
```

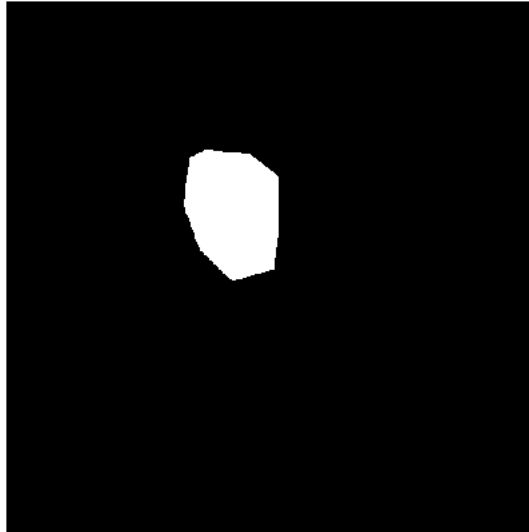
help roipoly

Step 4 – Perform thresholding in ROI

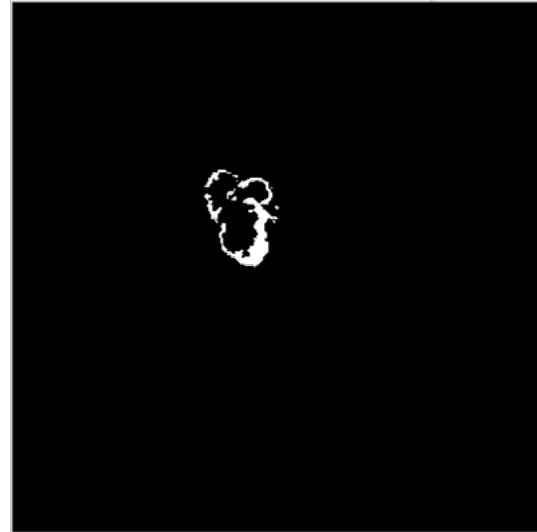
Original image



ROI mask



ROI mask with thresholding



Step 4 – Perform thresholding in ROI

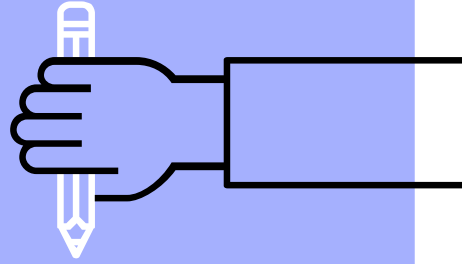
```
43 %% Step 4: Perform thresholding in ROI
44 - threshold=1700;
45
46 % perform thresholding in ROI
47 - Mask_thres=(img(:,:,targetslice).*Mask>threshold);
48
49 - subplot(1,2,2),imshow(Mask_thres,[]),
50 - title('ROI mask with thresholding')
```



Homework...

- ▶ Confirm all the previous homework was done!
- ▶ Prepare MATLAB midterm exam **wholeheartedly**.
- ▶ **GOOD LUCK** on your midterm exam!





THE END

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