

## MATLAB流程控制 迴圈與條件敘述

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## 請先下載本週上課資料

- <http://www.ym.edu.tw/~cflu>
- 點選左欄 [ 課程資料 ] → [ MATLAB圖形使用者介面 ]
- 下載第5週 [ 上課資料 ] [materials\\_L5.zip](#) · 檔案大小約1.53MB
  
- 請先將Current Directory切換至materials\_L5資料夾!

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## 本週內容

- 迴圈控制(重複疊代)
  - for-loop
  - while-loop
- 條件敘述(選擇性處理)
  - if-else
  - switch-case
  
- 以資料整理為例~

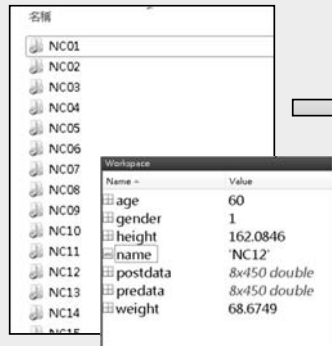


## 迴圈控制

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## Load Dataset 請開啟並執行materials\_L5\LoadDataDir.m

- Load data from separated folders
- Save data in a structure array

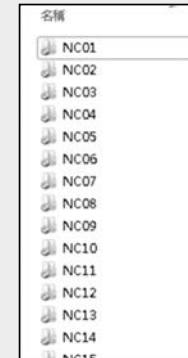


Fields	name	age	gender	height	weight	predata	postdata
1	'NC01'	67	1	168.9951	79.9885	8x450 d...	8x450 d...
2	'NC02'	59	1	170.9523	63.6980	8x450 d...	8x450 d...
3	'NC03'	57	1	161.8978	52.8100	8x450 d...	8x450 d...
4	'NC04'	63	1	168.9596	57.9199	8x450 d...	8x450 d...
5	'NC05'	68	0	167.8267	62.2405	8x450 d...	8x450 d...
6	'NC06'	67	1	169.2874	68.6386	8x450 d...	8x450 d...
7	'NC07'	57	1	173.4562	59.3461	8x450 d...	8x450 d...
8	'NC08'	65	1	161.4962	51.5521	8x450 d...	8x450 d...
9	'NC09'	63	1	163.6110	51.5550	8x450 d...	8x450 d...
10	'NC10'	63	1	167.6989	73.5794	8x450 d...	8x450 d...
11	'NC11'	61	0	160.4540	65.5484	8x450 d...	8x450 d...
12	'NC12'	60	1	162.0846	68.6749	8x450 d...	8x450 d...
13	'NC13'	59	0	165.8496	68.3210	8x450 d...	8x450 d...
14	'NC14'	50	0	164.8730	53.5264	8x450 d...	8x450 d...
15	'NC15'	52	1	172.6919	57.2291	8x450 d...	8x450 d...
16	'NC16'	53	0	163.8899	59.1720	8x450 d...	8x450 d...

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## Required Commands

- Load data in different folders in a similar way
  - for-loop, load, save
- Access directory information (path, content)
  - dir
- Construct a structure array
  - for-loop
  - Lesson 4 from last week
  - <http://youtu.be/exUqtOEVLns>
- Useful function
  - eval



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## For-loop Structure

for variable=expression  
Statement  
end

```
for i=1:4
    i
end
```

```
for i=4:1
    i
end
```

```
for i=4:-1:1
    i
end
```

```
subjects=[1 3 4];
for i=subject
    i
end
```

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## for-loop: Construct an array

- Create a 1 x 30 structure array "Data"
  - "age" field: a random number (35~50)
  - "measure" field: a 8 x 450 random array
- for i=1:30
  - Data(i).age=round(rand(1)\*15+35);
  - Data(i).measure=rand(8,450);
- end

請開啟並執行materials\_L5\Array\_forloop.m

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## Nested Structure

```
for variable1=expression1
    Statement1
    for variable2=expression2
        Statement2
    end
end
end
```

```
for i=1:2
    for j=1:3
        ind=[i,j]
    end
end
```

**HINT:**  
整理版面對齊: "Ctrl+" (Smart indent)

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## Nested for-loop

- Execute element-by-element matrix operations

```
A=rand(5,6);
B=rand(5,6);
for i=1:size(A,1)
    for j=1:size(A,2)
        C(i,j)=A(i,j)*B(i,j);
    end
end
```

The transpose of a matrix?

請開啟並執行materials\_L5\MatrixOp\_Nestfor.m

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## Recursive Data Import

- **dir**  
`D = dir(FOLDERNAME)`  
returns the results in an M-by-1 structure with the fields:
  - name -- Filename
  - date -- Modification date
  - bytes -- Number of bytes allocated to the file
  - isdir -- 1 if name is a directory and 0 if not
  - datenum -- Modification date as a MATLAB serial date number.

- **load**
  - Load data from MAT-file into workspace.`S = load(FILENAME)`

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## Directory list

- `dirinfo=dir('data');`

- Watch out the first 2 elements!!
- `.` is the current folder.
- `..` is the upper folder. (上一層)

Fields	name	date	bytes	isdir	datenum
1	.	'16-十月-2014 07:45:43'	0	1	7.3589e+05
2	..	'16-十月-2014 11:51:54'	0	1	7.3589e+05
3	'NC01'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
4	'NC02'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
5	'NC03'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
6	'NC04'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
7	'NC05'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
8	'NC06'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
9	'NC07'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
10	'NC08'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
11	'NC09'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
12	'NC10'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
13	'NC11'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
14	'NC12'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
15	'NC13'	'16-十月-2014 07:44:56'	0	1	7.3589e+05
16	'NC14'	'16-十月-2014 07:44:56'	0	1	7.3589e+05

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## Recursive Data Import

```
dirname=[pwd filesep 'data'];  
dirinfo=dir(dirname);  
dirinfo(1:2)=[]; % remove . and ..
```

```
for i=1:length(dirinfo)  
    load([dirname filesep dirinfo(i).name filesep dirinfo(i).name '.mat'])  
end
```

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## Recursive Data Import

```
dirname=[pwd filesep 'data'];  
dirinfo=dir(dirname);  
dirinfo(1:2)=[]; % remove . and ..
```

```
for i=1:length(dirinfo)  
    load([dirname filesep dirinfo(i).name filesep dirinfo(i).name '.mat'])  
end
```

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## Useful Function - eval

- **eval**
  - Execute string with MATLAB expression.
  - **eval(EXPRESSION)**
- Try it..
  - `A=rand(2,3)`
  - `eval('A=rand(2,3)')`
- Can you understand `materials_L5\LoadDataDir.m` now?

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## While-loop Structure

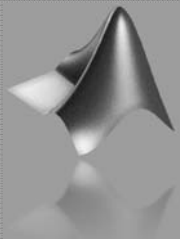
```
while condition  
    Statement  
end
```

**HINT:**  
Use "Ctrl+c" to interrupt the current work in MATLAB.

```
total=0;  
for i=1:100  
    total=total+i;  
end
```

```
total=0;  
i=1;  
while i<=100  
    total=total+i;  
    i=i+1;  
end
```

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# 條件敘述

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# Load Dataset

- Load data from separated folders **check data integrity?!**
- Save data in a structure array

請開啟並執行materials\_L5\LoadDataDir\_check.m

# CF

# 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

```

# CF

# If-else structure

```

If condition          If condition1
    statement 1        statement 1
    .....
else                   elseif condition2
    statement 2        statement 2
    .....
end                    end

```

# CF

## 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



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## 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

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## Check data integrity

```
if isempty(predata)  
    fprintf(['The predata from Subject ' name ' are lost! \n'])  
elseif isempty(postdata)  
    fprintf(['The postdata from Subject ' name ' are lost! \n'])  
end
```

Can you understand materials\_L5\LoadDataDir\_check.m now?

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## 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
```

請開啟並執行materials\_L5\DaysinMonth.m

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## Flow control command - break

```
total=0;
for i=1:100
    total=total+i;
    if total>3000
        fprintf(['i=' num2str(i) ', total=' num2str(total) '\n'])
        break
    end
end
```

**HINT:**  
help break!!

**CF**

## Flow control command - break

```
A= [1 2 3 4;5 6 7 8;9 10 11 12];
total=0;
for i=1:3
    for j=1:4
        if j==3
            break
        else
            total=total+A(i,j);
        end
    end
end
```

1	2	3	4
5	6	7	8
9	10	11	12

執行break，跳出此層迴圈。

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## Flow control command - continue

```
A= [1 2 3 4;5 6 7 8;9 10 11 12];
total=0;
for i=1:3
    for j=1:4
        if j==3
            continue
        else
            total=total+A(i,j);
        end
    end
end
```

1	2	3	4
5	6	7	8
9	10	11	12

執行continue，僅跳出j=3時的計算。

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## Excercise

- Can we combine the loading process and automatically email send together?

請先關防毒!!  
改寄送地址!!

請開啟並執行materials\_L5\LoadDataDir\_sendmail.m

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**THE END**

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