

MATLAB 圖形架構與資料繪製

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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6週 [上課資料] [materials_L6.zip](#) · 檔案大小約62KB

- 請先將Current Directory切換至materials_L6資料夾!

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本週內容

- 圖形架構與曲線繪製
- 影像繪製

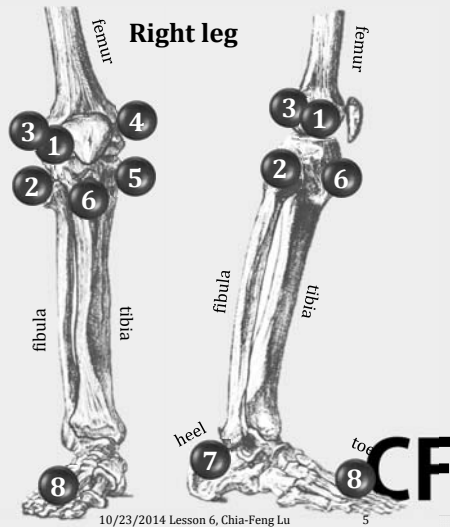


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Motion Capture

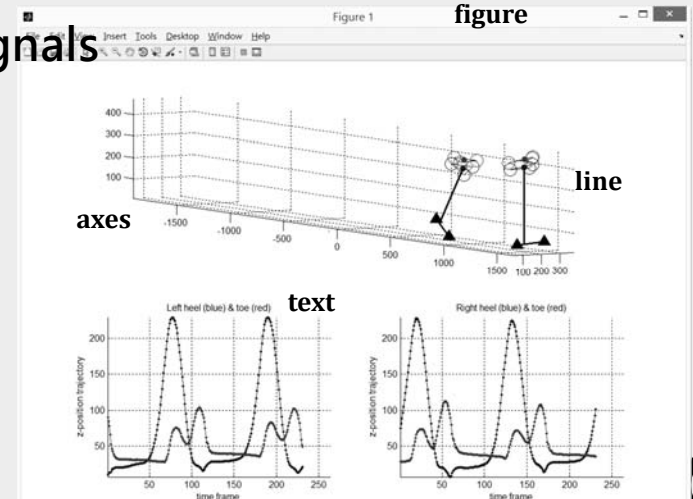
- Record 3D coordinates of VICON markers during walking.

	A	B	C	D	E	F	G
1	LHEE			LTOE			LKNE
2	X	Y	Z	X	Y	Z	X
3	mm	mm	mm	mm	mm	mm	mm
4	-1302.26	307.536	12.3714	-1119.62	337.254	68.9596	-1294.77
5	-1301.05	307.203	12.0885	-1116.68	335.3	61.5159	-1284.19
6	-1301.23	307.717	13.0365	-1113.79	333.352	51.0494	-1273.63
7	-1299.83	308.384	14.4994	-1109.92	332.139	41.7682	-1264.29
8	-1297.92	309.451	16.0093	-1105.4	328.969	41.0194	-1253.56
9	-1296.22	309.963	16.4667	-1102.85	324.964	41.4886	-1243.55
10	-1295.63	310.073	16.7895	-1102.34	325.143	38.4809	-1234.22
11	-1295.23	310.269	17.2871	-1101.25	328.34	34.4016	-1225.65
12	-1294.74	310.584	17.6068	-1099.79	328.815	32.8019	-1217.95
13	-1294.54	310.872	17.7651	-1098.96	327.292	32.9457	-1211.36
14	-1294.56	311.232	17.7646	-1098.72	327.367	32.11	-1205.89
15	-1294.63	311.509	17.6302	-1098.77	328.069	30.5484	-1201.45
16	-1294.77	311.814	17.4298	-1098.8	327.865	30.7754	-1197.4



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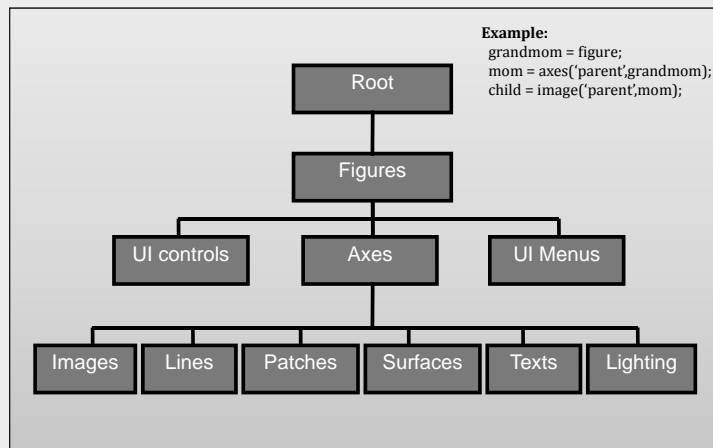
Plot Signals



請開啟並執行materials_L6\MotionDisp.m

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Hierarchical relation plot of objects



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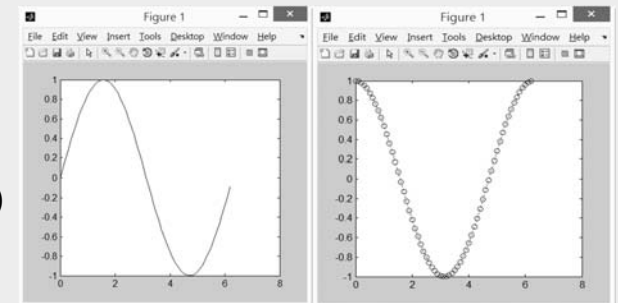
Plot Your First Line!

```
x=[0:0.1:2*pi];
```

```
figure,
```

```
plot(x,sin(x))
```

```
plot(x,cos(x),'ro:')
```

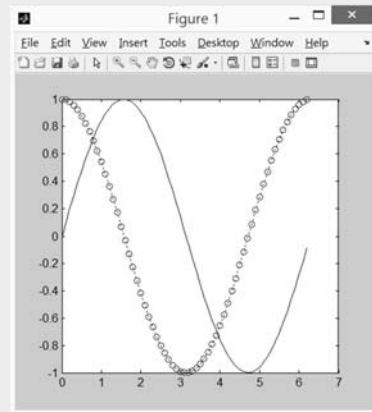


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Plot Two Lines Together

```
x=[0:0.1:2*pi];  
figure,  
plot(x,sin(x))  
hold on  
plot(x,cos(x),'ro:')
```

HINT:
hold on指令可以在同一圖軸
上使用plot繪製多條線。

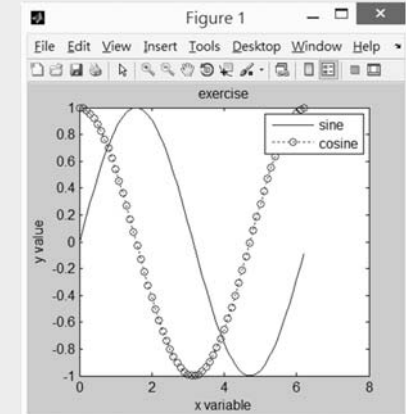


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Add Information to Your Plot

extend from last slide...

```
legend('sine','cosine')  
xlabel('x variable')  
ylabel('y value')  
title('exercise')
```

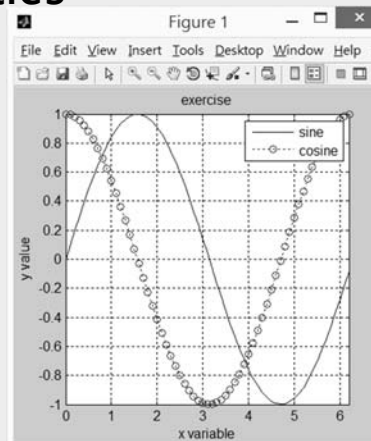


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Control Axes Properties

extend from last slide...

```
grid on,  
axis([min(x) max(x) -1 1])
```

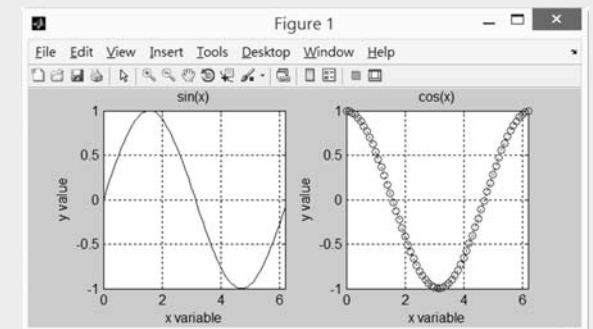


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請開啟並執行materials_L6\DemoPlot01.m

Plot Two Lines Separately

```
x=[0:0.1:2*pi];  
figure,  
subplot(1,2,1),  
plot(x,sin(x))  
subplot(1,2,2),  
plot(x,cos(x),'ro:')
```



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請開啟並執行materials_L6\DemoPlot02.m

Plot vs. Line

- Actually, plot is a kind of line!
- Understand the properties of line can help us to fully understand the usage of plot.

```
x=[0:0.1:2*pi];
```

```
figure,
```

Both commands print out the same results!!

```
plot(x,cos(x),'ro:')
```

```
figure,
```

```
line('xdata',x,'ydata',cos(x),'color','r','marker','o','linestyle',':');
```

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Control Line Properties

<Command Window>

```
set(line)
```

- Parent
- Xdata, Ydata, Zdata
- color
- Linestyle, Linewidth
- Marker, MarkerSize
- MarkerEdgeColor, MarkerFaceColor

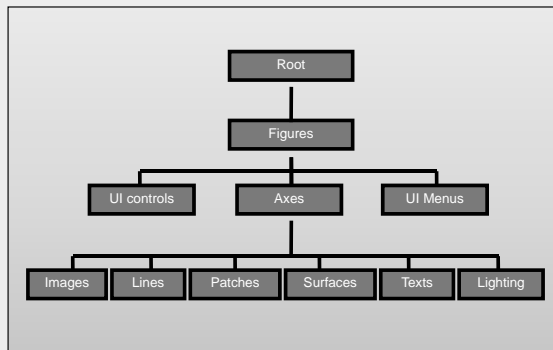
```
Color
EraseMode: [ (normal) | background | xor | none ]
LineStyle: [ (-) | - | : | . | - | none ]
LineWidth
Marker: [ + | o | * | . | x | square | diamond | v | ^ | > | < | pentagram | hexagram | none ]
MarkerSize
MarkerEdgeColor: [ none | (auto) ] -or- a ColorSpec.
MarkerFaceColor: [ (none) | auto ] -or- a ColorSpec.
XData
YData
ZData

ButtonDownFcn: string -or- function handle -or- cell array
Children
Clipping: [ (on) | off ]
CreateFcn: string -or- function handle -or- cell array
DeleteFcn: string -or- function handle -or- cell array
BusyAction: [ (queue) | cancel ]
HandleVisibility: [ (on) | callback | off ]
HitTest: [ (on) | off ]
Interruptible: [ (on) | off ]
Parent
Selected: [ on | off ]
SelectionHighlight: [ (on) | off ]
Tag
UIContextMenu
UserData
Visible: [ (on) | off ]
```

Control Line Properties: handle

- 請開啟materials_L6\DemoLine.m

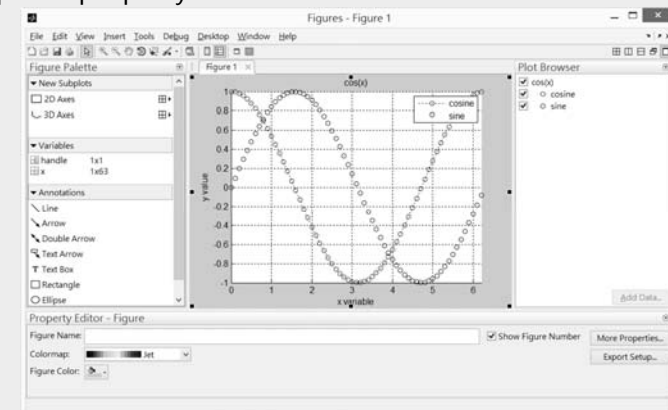
- set(figure)
- set(axes)
- set(line)



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propedit

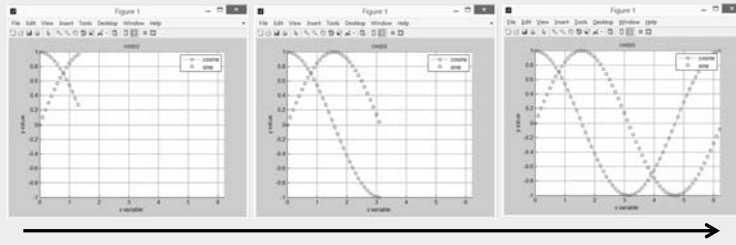
- Graphical property editor



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Plot Signal Sequentially

- Rewrite materials_L6\DemoLine.m...
- Please use...
 - For-loop
 - Pause
 - line

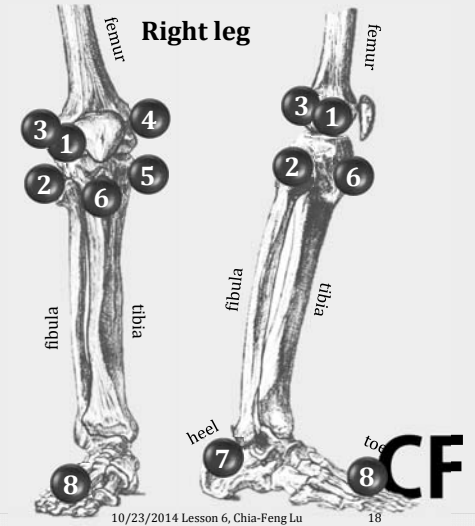
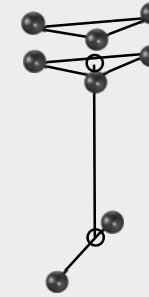


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How Many lines...

- do we need to represent the marker locations?

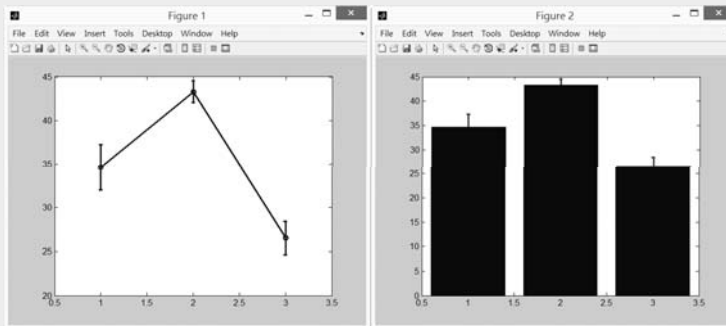


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Data variation - errorbar

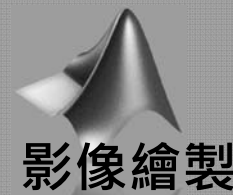
Useful function

- errorbar
- bar



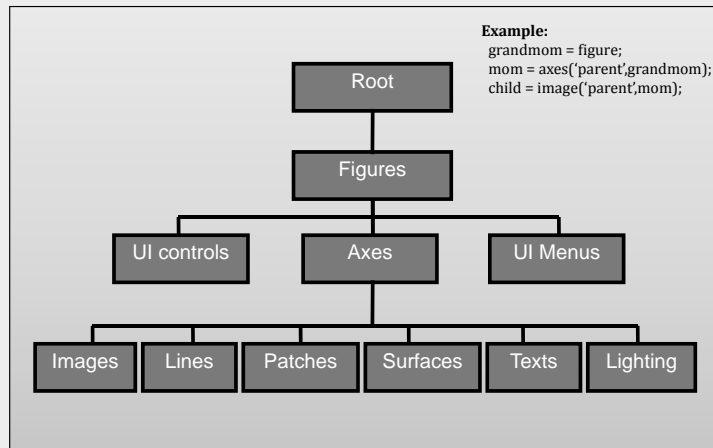
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Hierarchical relation plot of objects



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Concept of image

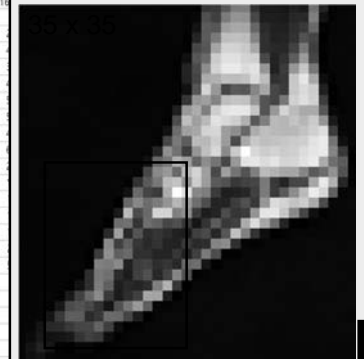
- Pixel value and gray level

3	4	5	6	7	8	9	10	11	12	13	14	15	16
13	17	20	18	19	18	17	19	19	19	20	20	19	15
14	17	19	18	19	17	18	18	18	19	21	20	22	20
15	17	17	17	19	18	18	20	20	19	22	23	22	116
16	19	19	21	20	20	20	23	22	22	24	21	56	322
17	18	21	19	20	19	21	20	22	24	27	24	223	429
18	19	18	20	18	20	23	21	24	25	14	158	284	376
19	17	17	18	18	19	20	21	21	22	60	331	214	183
20	16	16	17	16	18	21	21	26	0	321	419	337	386
21	17	16	15	17	20	22	22	17	83	582	242	329	654
22	16	15	17	19	21	20	24	4	339	353	165	344	308
23	15	17	10	19	19	21	10	135	495	130	262	144	164
24	16	17	17	18	18	21	11	424	203	299	167	132	157
25	17	17	18	18	20	3	189	444	300	332	153	150	116
26	16	17	18	19	20	9	395	383	424	108	191	206	145
27	18	16	18	17	15	142	370	347	139	95	197	252	126
28	17	18	19	12	59	145	384	298	97	128	111	146	397
29	19	19	15	85	205	324	429	178	91	142	201	513	507
30	18	15	76	236	260	228	158	69	253	366	476	297	25
31	21	70	180	295	287	136	176	331	326	219	95	2	21
32	67	129	134	180	218	220	313	199	46	7	11	24	26
33	76	57	67	84	162	202	176	47	12	20	20	21	21
34	111	75	17	10	31	35	10	15	20	21	18	19	20
35	62	26	16	16	13	13	17	20	18	18	18	18	24

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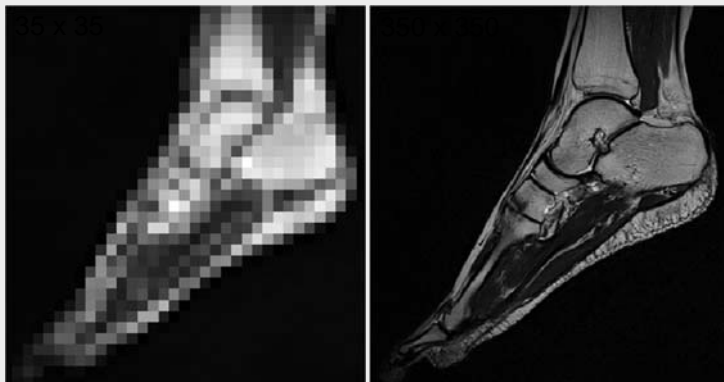
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Concept of image

- Pixel number and spatial resolution



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Image Display Function

- `imshow`
 - Displays the grayscale image.
- `image`
 - Display image.
- `imagesc`
 - Scale data and display as image.

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Try it

```
load('footimg.mat')
```

```
imshow(data)
```

```
imshow(data,[])
```

```
image(data)
```

```
imagesc(data)
```



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colormap 請開啟並執行materials_L6\ImageColorbar.m



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RGB Color Style

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

RED	GREEN	BLUE	
1	1	1	White
0	0	0	Black
1	0	0	Red
0	1	0	Green
0	0	1	Blue
1	1	0	Yellow

the value must between 0 and 1!!

- usetcolor (can help you determine the color vector)

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Index vs. Color

3
R G B
cmap=[0 0 0; 1 0 0; 0 1 0; . ; n(n<=255) . . . 1 1 1];

<=數值1所對應到的顏色成分
<=數值2所對應到的顏色成分
.
n(n<=255)
.
.
.
<=數值n所對應到的顏色成分

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Index vs. Color

- $X = [4\ 5\ 6; 3\ 1\ 2];$
`image(X);`
`colormap([1 0 0; 0 1 0; 0 0 1; 1 1 0; 0 1 1; 1 0 1])`
axis off
- `colormap([1 0 0; 0 1 0; 0 0 1]);`

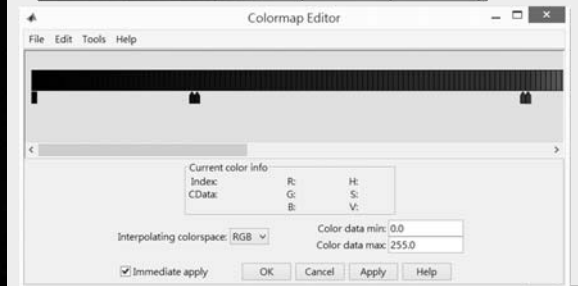


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Colormapeditor



32 64 32 128
Black → blue → red → yellow → white



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THE END

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