GUI 程式設計

壹、圖形元件

一、認識圖形元件

指令	說明
hndlgraf	Handle graph 的縮寫

二、認識圖形元件的 handle

指令	說明
get(h, 'pr')	取得 handle h 的某屬性(properity)之數值
get(h)	取得 handle h 的所有屬性之數值
set(h, 'pr1', 'val1', 'pr2', 'val2')	設定 handle h 的某屬性(properity)之數值
set(h)	設定 handle h 的所有屬性之數值

```
x=linspace(-3,3,100);
y=normpdf(x,0,1);
h=plot(x,y)
get(h)
get(h, 'marker')
set(h, 'marker', 'o')
set(h, 'linewidth', 2, 'markersize', 16)
```

指令	說明
Marker	標誌符號
Markersize	標誌符號大小
markeredgecolor	標誌符號的邊框
markerfacecolor	標誌符號的內面
linewidth	線段寬度

三、取得繪圖區與繪圖視窗的 handle

指令	說明
ha=gca	取得繪圖區之 handle，若無則回應[ ]
hf=gcf	取得繪圖視窗之 handle，若無則回應[ ]

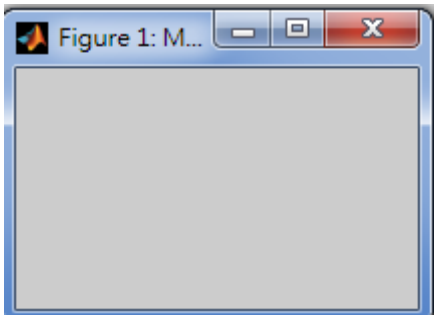
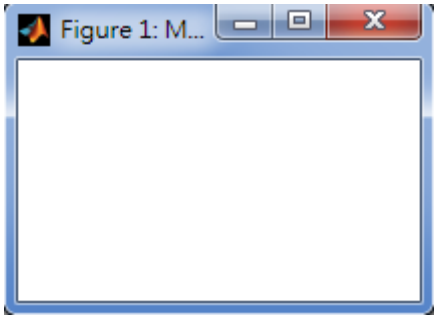
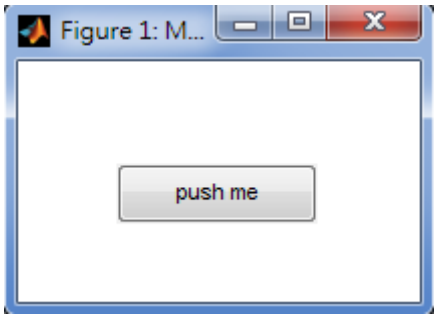
四、關閉繪圖視窗

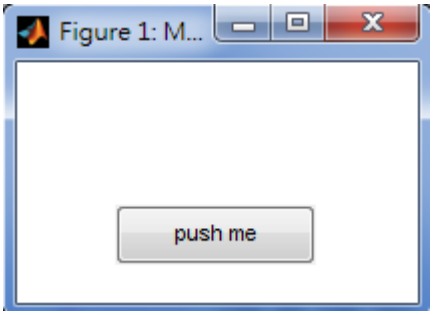
指令	說明
close	關閉目前的視窗
close all	關閉所有的繪圖視窗
close (h)	關閉 handle 爲 h 的繪圖視窗

貳、認識 UI 元件(user interface)

一、UI 元件基本認識

指令	說明
h=figure('pr', 'va1', 'pr2', 'va2',....)	建立一個繪圖視窗並設定 handle 與其屬性值
h=uicontrol('pr', 'va1', 'pr2', 'va2',....)	建立一個 UI 控制元件並設定 handle 與其屬性值

h1=figure('Position', [90 50 200 120], 'Menubar','none','Name','MY GUI')	
get(h1) set(h1, 'color', 'white')	
h2=uicontrol('Style', 'pushbutton', 'Position', [50 40 100 30],'String', 'push me')	

set(h2, 'Position', [50 20 100 30])	

二、UI 控制文件設定

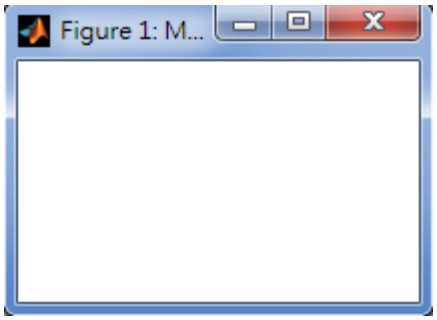
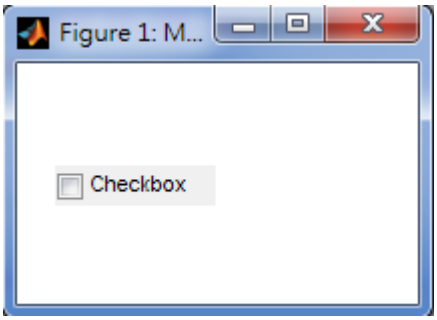
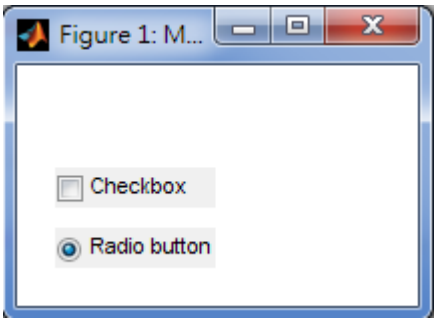
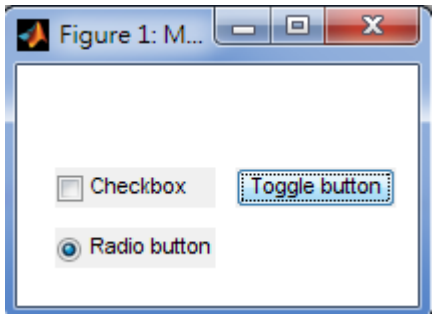
Style	說明	用途
'pushbutton'	按鈕	
'radio'	選擇按鈕	單選
'toggle'	雙態按鈕	按下與彈開兩種狀態
'checkbox'	核取方塊	複選
'edit'	文字方塊	可輸入文字
'popup'	下拉選單	單選
'listbox'	選擇表單	單選或複選
'slider'	捲軸	拖拉方式輸入數值
'text'	靜態文字方塊	靜態文字

三、UI 控制文件的屬性設定

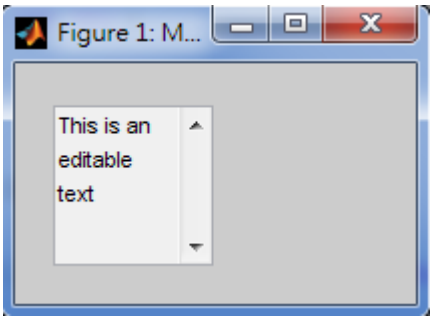
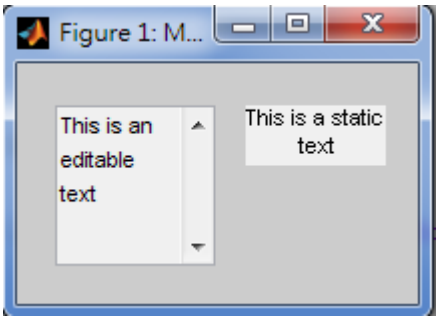
Style	說明	用途
BackgroundColor	[red green blue]	背景顏色
CallBack		設定該元件被觸動時所要執行的指令
Enable	[on {off}]	設定元件是否在可用的情況
ForegroundColor	[red green blue]	前景顏色
HorizontalAlignment	[left | {center} | right]	文字的對齊方式
Max		設定捲軸最大值
Min		
Position	[left button width height]	元件位置與大小
String		
Style	{pushbutton} | radiobutton	
SliderStep		設定捲軸每次可移動的大小
TooltipString		設定工具提示的小字串
Value		

Tag		設定元件標籤，以方便函數找尋
Visible	[{on} | off]	設定元件是否顯示出來

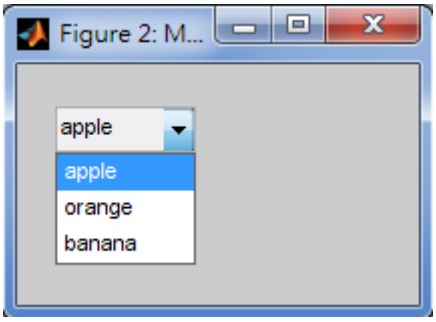
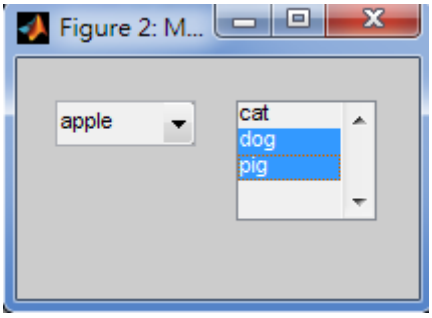
參、建立按鈕與核取方塊

close all figure('Position', [90 50 200 120], 'Menubar','none','Name','MY GUI', 'Color', 'white')	
uicontrol('Style', 'checkbox', 'Position', [20 50 80 20],'String', 'checkbox')	
uicontrol('Style', 'radio', 'Position', [20 20 80 20],'String', 'Radio button', 'Value', 1)	
uicontrol('Style', 'toggle', 'Position', [110 50 80 20],'String', 'Toggle button')	

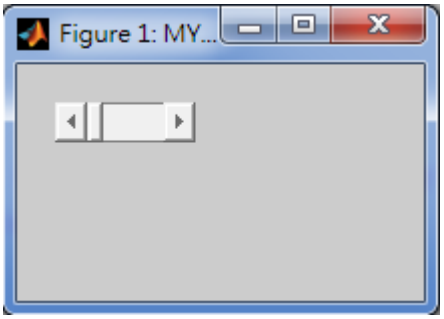
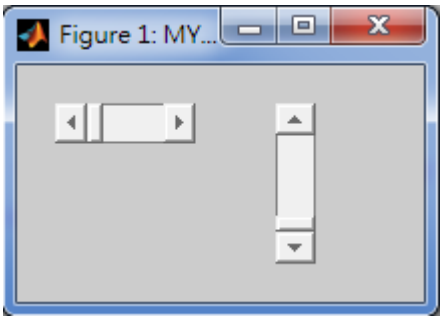
肆、建立動態與靜態文字方塊

close all	
figure('Position', [90 50 200 120], 'Menubar', 'none', 'Name', 'MY GUI')	
uicontrol('Style', 'edit', 'Position', [20 20 80 80], 'String', 'This is an editable text', 'HorizontalAlignment', 'left', 'Max', 2, 'Min', 0)	
uicontrol('Style', 'text', 'Position', [115 70 70 30], 'String', 'This is a static text')	

伍、建立選擇表單與下拉選單

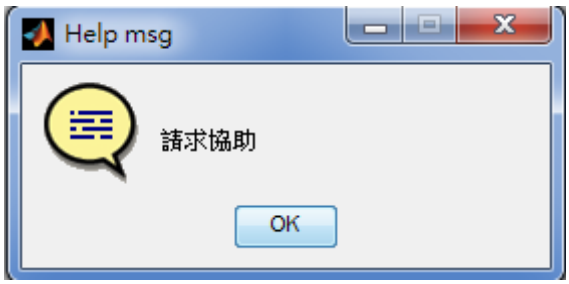
close all	
figure('Position', [50 50 200 120], 'Menubar', 'none', 'Name', 'MY GUI')	
h1=uicontrol('Style', 'popup', 'Position', [20 80 70 20], 'String', 'apple|orange|banana')	
h2=uicontrol('Style', 'listbox', 'Position', [110 40 70 60], 'String', 'cat|dog|pig', 'Max', 2, 'Min', 0)	

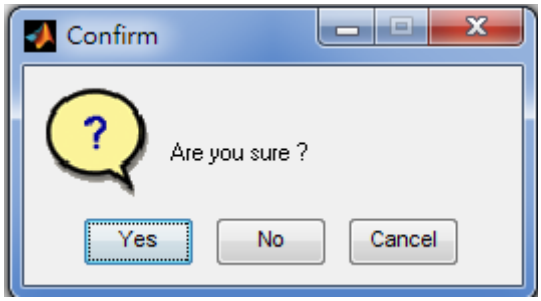
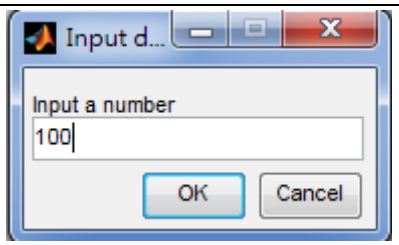
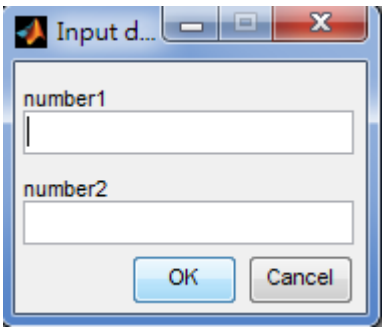
陸、建立捲軸

figure('Position', [50 50 200 120], 'Menubar', 'none', 'Name', 'MY GUI')	
h1=uicontrol('Style', 'slider', 'Position', [20 80 70 20])	
h2=uicontrol('Style', 'slider', 'Position', [130 20 20 80])	

柒、對話方塊的設計

指令	說明
msgbox(message, title, icon)	建立對話方塊
questdlg(question, title, b1, b2,....)	建立可供選擇的對話方塊
inputdlg(prompt, title)	建立輸入對話方塊

msgbox('輸入必須爲整數', 'Warning msg' , 'warn')	
msgbox('輸入錯誤，請重新輸入' , 'Error msg' , 'error')	
msgbox('請求協助' , 'Help msg' , 'help')	
questdlg('Are you sure ?', 'Confirm' , 'yes' , 'no' , 'no')	

questdlg('Are you sure ?', 'Confirm')	
str=inputdlg('Input a number', 'Input dialog') num=str2num(str{1})	
str=inputdlg({'number1', 'number2'} ,'Input dialog')	

捌、簡單的事件處理

一、按鈕的事件設計

```
figure('Position',[80 80 270 150], 'Menubar', 'none');
hclose=uicontrol('Style', 'pushbutton', 'String', 'Close');
hwhite=uicontrol('Style', 'pushbutton', 'String', 'White',
'Position',[20 80 60 20]);
hred=uicontrol('Style', 'pushbutton', 'String', 'Red', 'Position',[20 110
60 20]);
htxt=uicontrol('Style', 'text', 'Position',[100 20 150 110]);

cmd1='set(htxt, ''BackgroundColor'', ''white'')';
cmd2='set(htxt, ''BackgroundColor'', ''red'')';

set(hclose, 'Callback', 'close');
set(hwhite, 'Callback', cmd1);
set(hred, 'Callback', cmd2);
```

二、將 Callback 所要執行的指令寫成 M 檔案

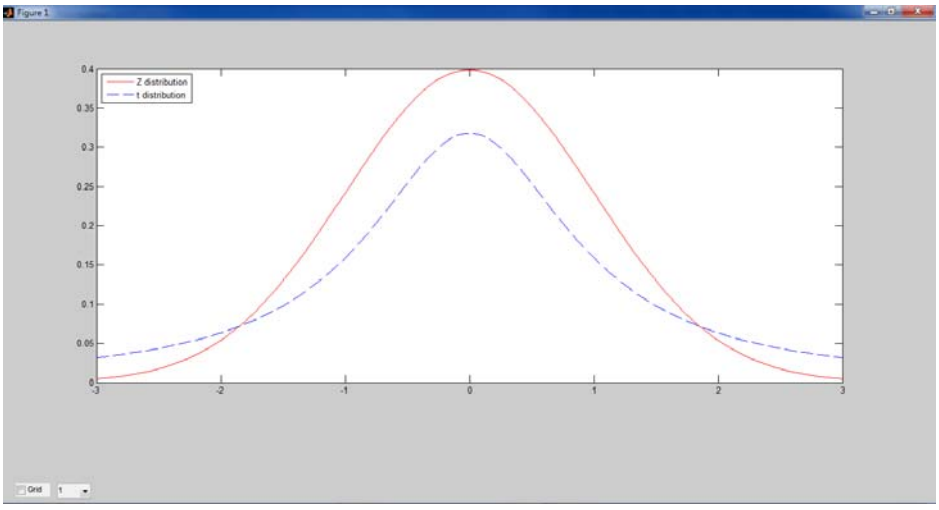
```
%script17_2.m

figure('Position',[80 80 270 150], 'Menubar', 'none');
hclose=uicontrol('Style', 'pushbutton', 'String', 'Close');
hwhite=uicontrol('Style', 'pushbutton', 'String', 'White',
'Position',[20 80 60 20]);
hred=uicontrol('Style', 'pushbutton', 'String', 'Red', 'Position',[20 110
60 20]);
htxt=uicontrol('Style', 'text', 'Position',[100 20 150 110]);

cmd1='set(htxt, ''BackgroundColor'', ''white'')';
cmd2='set(htxt, ''BackgroundColor'', ''red'')';

set(hclose, 'Callback', 'close_check');
set(hwhite, 'Callback', cmd1);
set(hred, 'Callback', cmd2);
```

```
result=questdlg('確定要關閉?', 'Window closing', 'yes', 'no', 'no');
if strcmp(result, 'yes')
   close
end
```

(一)下拉選單與核取方塊的練習：製作 Z 分配與 t 分配圖形比較 GUI

```
% Z¤À°t»PT¤À°t¤ñ¸û

figure('Position',[80 80 280 220],'Menubar','none');
axes('Position',[0.1 0.25 0.8 0.65]);   % «Ø¥ßÃ¸¹Ï°Ï¤¸¥ó

chk=uicontrol('Style','checkbox','String','Grid',...
     'position',[20 10 50 20]);
pop=uicontrol('Style','popupmenu','String','1|5|10|30|100|1000',...
     'position',[80 10 50 20]);

set(pop,'Callback','ztplot'); % ·í¤U©Ô¿ï³æ³Q¿ï¾Ü®É¡A«K°õ¦æztplot.m
set(chk,'Callback','grid');   % ·í®Ö¨ú¤è¶ô³Q¿ï¾Ü®É¡A«K°õ¦ægrid«ü¥O
```

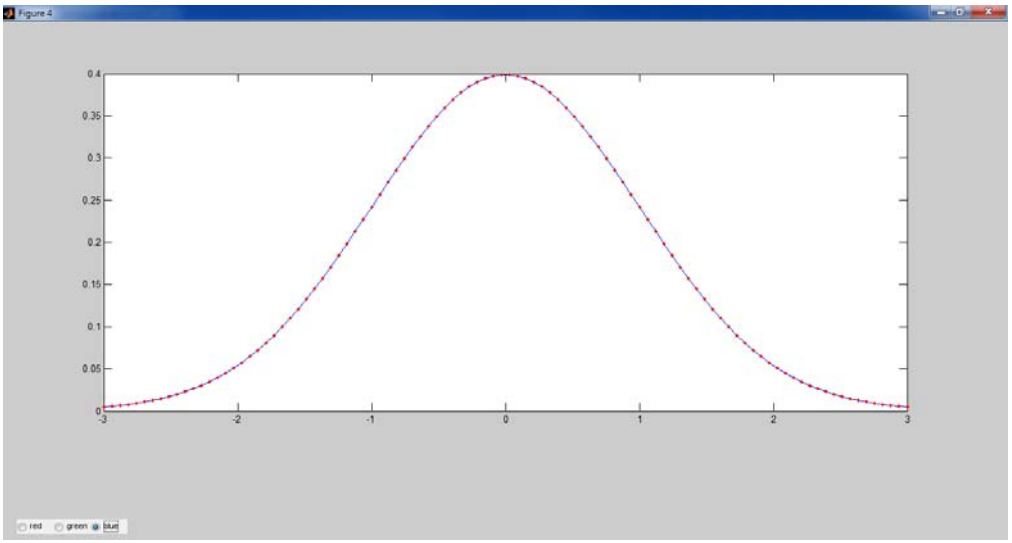
```
switch get(pop, 'Value')
   case 1
      df=1;
   case 2
      df=5;
   case 3
      df=10;
   case 4
      df=30;
   case 5
      df=100;
   case 6
      df=1000;
end
x=linspace(-3,3,100);
y=normpdf(x,0,1);
y1=tpdf(x, df);
plot(x,y,'-r', x, y1, '--b');
legend('Z distribution', 't distribution',2);

if get(chk, 'Value')==1
   grid on
end
```



(二)選擇按鈕的練習

```
figure('Position',[80 80 280 220], 'Menubar', 'none');
axes('Position', [0.1 0.25 0.8 0.65]);

h(1)=uicontrol('Style', 'radio', 'String', 'red',
'Value',1 ,'Position',[20 10 50 20]);
h(2)=uicontrol('Style', 'radio', 'String', 'green' ,'Position',[70 10 50
20]);
h(3)=uicontrol('Style', 'radio', 'String', 'blue' ,'Position',[120 10 50
20]);

set( h(1), 'Callback', 'plot_data(h, ''r'', 1)' );
set( h(2), 'Callback', 'plot_data(h, ''g'', 2)' );
set( h(3), 'Callback', 'plot_data(h, ''b'', 3)' );

plot_data(h, 'r', 1);
```

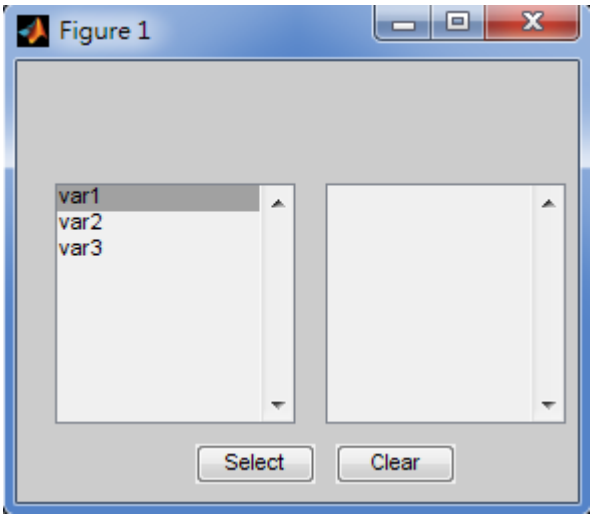
```
function plot_data(h, color, i)
set(h, 'Value', 0);
set(h(i),'Value',1);

x=linspace(-3,3,100);
y=normpdf(x,0,1);
lin_color=color;
plot(x,y,lin_color, x, y, '.r');
```



(三)選擇表單的練習

```
figure('Position',[80 80 280 220], 'Menubar', 'none');

hlist1=uicontrol('Style', 'listbox', 'Position',[20 40 120 120],
'Max',2, 'Min', 0, 'HorizontalAlignment', 'left', 'String',
'var1|var2|var3' );
hlist2=uicontrol('Style', 'listbox', 'Position',[155 40 120 120],
'HorizontalAlignment', 'left');

hcopy=uicontrol('Position', [90 10 60 20], 'String', 'Select');
hclear=uicontrol('Position', [160 10 60 20], 'String', 'Clear');

clr='set(hlist2, ''String'','' '' )';
set(hcopy, 'Callback', 'item_copy');
set(hclear, 'Callback', clr);
```

```
val=get(hlist1, 'Value');
str=get(hlist1, 'String');
set(hlist2, 'String', str(val,:));
```



(四)捲軸的練習

```
figure('Position',[80 80 280 220], 'Menubar', 'none');
axes('Position', [0.1 0.25 0.8 0.65]);

hsld=uicontrol('Style', 'slider', 'Position', [30 20 100 20],'Max', 1000,
'Min', 1, 'Value', 1, 'SliderStep' , [1/1000, 10/1000]);

df=get(hsld, 'Value') ;
chi2=chi2inv(.95, df) ;

hedit1=uicontrol('Style', 'edit', 'Position', [150 20 50 20], 'String',
df);
hedit2=uicontrol('Style', 'edit', 'Position', [200 20 50 20], 'String',
chi2);

set(hsld, 'Callback', 'chisqplot');
```

```
df=get(hsld, 'Value');
chi2=chi2inv(.95, df) ;

set(hedit1, 'String', round(df) );
set(hedit2, 'String', chi2 );

x=linspace(0,100,1000);
```

```
y=chi2pdf(x,df);
plot(x,y)
```