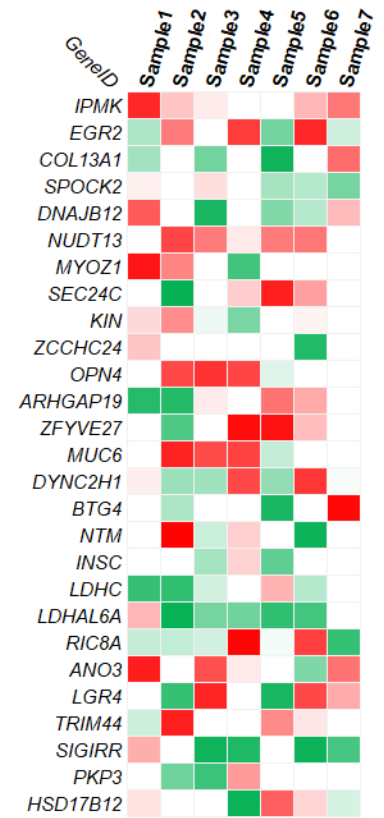


VBA 課程目的:

- 活用自動化巨集能夠降低人工整理數據的錯誤率，產生能夠快速重新繪製 (reproducible) 的圖表數據
 - 使用 Microsoft Excel 進行 Heatmap 分析圖形繪製
 - 使用 VBA 進行數據自動化處理



PART I: EXCEL 繪製圖表

■ 函數

= SUM(A1, A2, A3)

= AVERAGE(A:A)

■ 套用計算規則

The image shows a screenshot of the Microsoft Excel interface. The 'fx' button in the 'Formulas' ribbon is circled in red. Below it, the 'Insert Function' dialog box is open, showing the 'AVERAGE' function selected in the list. The dialog box includes a search field, a category dropdown set to '統計', and a list of functions. The 'AVERAGE' function is highlighted, and its description is visible: '傳回其引數的平均值 (算術平均值)，引數可為數字，或是包含數字的名稱、陣列、或參照位址'. The dialog box also has '確定' (OK) and '取消' (Cancel) buttons.

資料橫條、資料色階 (1/2)

	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5



	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5



資料橫條、資料色階 (2/2)

	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5



	A	B
1	GeneID	Expression_level
2	PAX2	76
3	KCNIP2	85
4	HPS6	61
5	CELF2	99
6	FAM160B1	96
7	ATRNL1	72
8	GFRA1	95
9	C10orf82	0
10	EIF3A	13
11	GRK5	32
12	FAM175B	19
13	MKI67	20
14	UCMA	29
15	DPYSL4	16
16	STK32C-LRRC27	33
17	BEND7	17
18	PTPLA	13
19	STAM	29
20	ARL5B	5

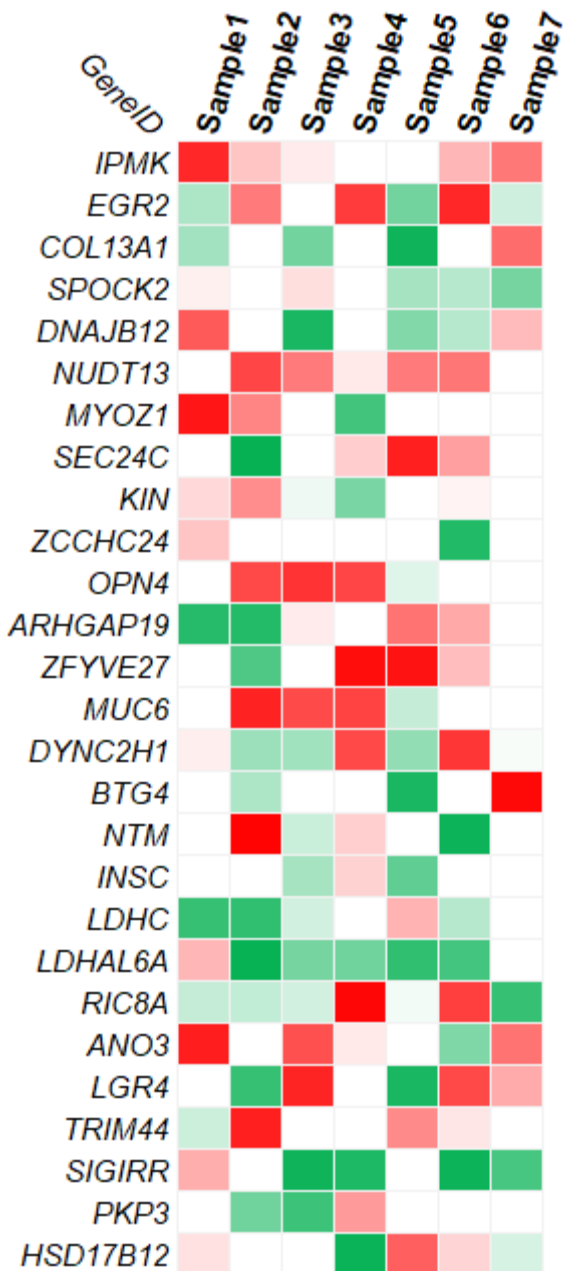
練習: 製作heatmap

	A	B	C	D	E	F	G	H
1	GeneID	Sample1	Sample2	Sample3	Sample4	Sample5	Sample6	Sample7
2	IPMK	85	23	8	0	0	29	53
3	EGR2	-32	52	0	77	-55	85	-19
4	COL13A1	-36	0	-55	0	-94	0	58
5	SPOCK2	6	0	13	0	-35	-29	-54
6	DNAJB12	65	0	-90	0	-49	-29	27
7	NUDT13	0	73	52	9	52	54	0
8	MYOZ1	92	48	0	-74	0	0	0
9	SEC24C	0	-98	0	20	88	38	0
10	KIN	15	45	-7	-52	0	5	0
11	ZCCHC24	23	0	0	0	0	-87	0
12	OPN4	0	72	80	73	-12	0	0
13	ARHGAP19	-85	-86	8	0	55	34	0
14	ZFYVE27	0	-69	0	95	93	26	0
15	MUC6	0	87	71	74	-23	0	0
16	DYNC2H1	7	-39	-37	72	-42	79	-3
17	BTG4	0	-32	0	0	-90	0	97
18	NTM	0	99	-21	19	0	-95	0
19	INSC	0	0	-35	18	-62	0	0
20	LDHC	-79	-81	-18	0	30	-29	0



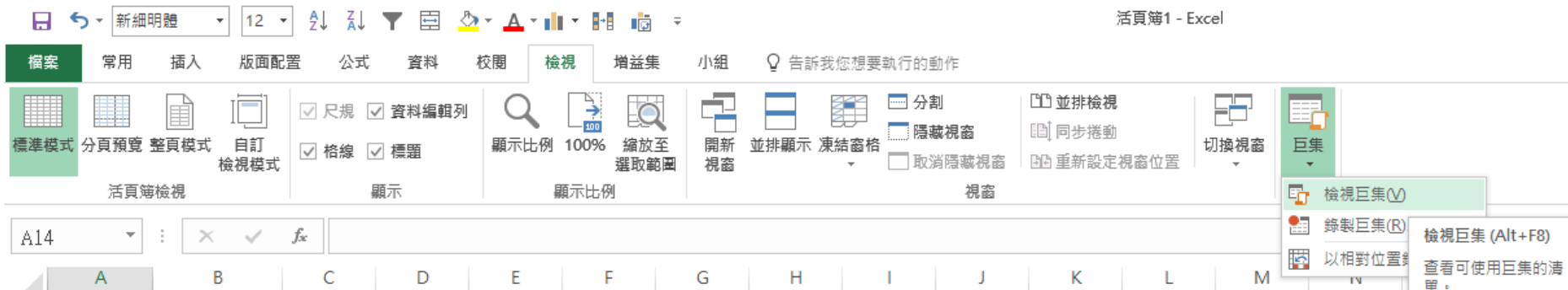
優化!

- 把數字隱藏起來



The first Excel Macro (巨集)

- What is a macro?
 - Record a macro.



檔案 常用 插入 版面配置 公式 資料 校閱 檢視 增益集 小組 告訴我您想要執行的動作

標準模式
 分頁預覽
 整頁模式
 自訂檢視模式
 活頁簿檢視

尺規
 資料編輯列
 格線
 標題
 顯示

顯示比例 100%
 縮放至選取範圍
 顯示比例

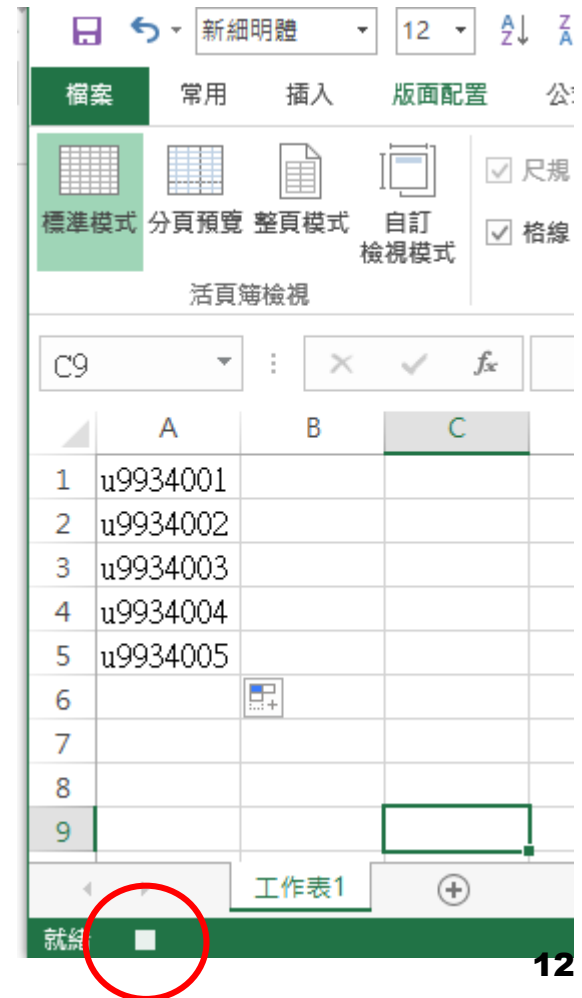
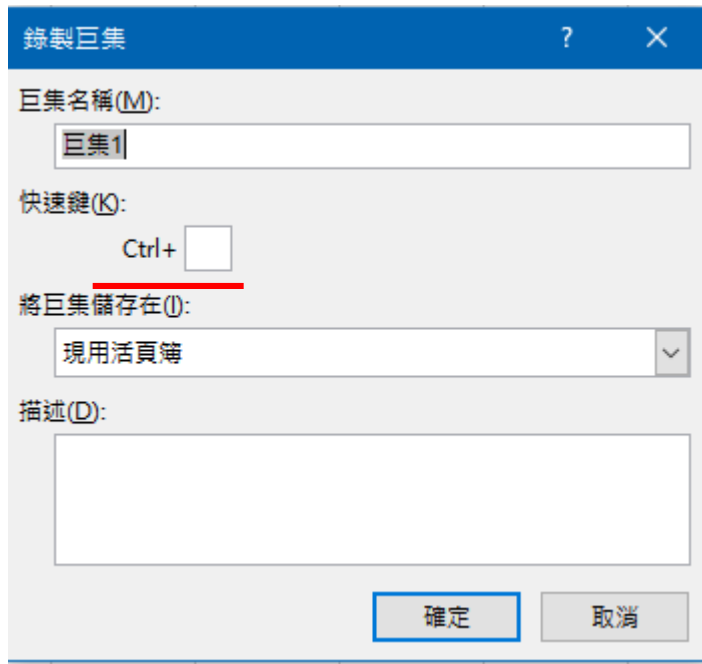
開新視窗
 並排顯示
 凍結窗格
 視窗

分割
 隱藏視窗
 取消隱藏視窗
 並排檢視
 同步捲動
 重新設定視窗位置

N15													
	A	B	C	D	E	F	G	H	I	J	K	L	
1	u9934001												
2	u9934002												
3	u9934003												
4	u9934004												
5	u9934005												
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													

Record a Macro

- Just like a video recording



錄製巨集

- 按下錄製
- 點一下A1儲存格
- 依序輸入 u99034001~ u99034005
- 按下 左下角 停止錄製



執行巨集

- 先把A1~A5清除
- 再執行 Test1 巨集

	A
1	u9934001
2	u9934002
3	u9934003
4	u9934004
5	u9934005

檢視 顯示 顯示比例 顯示

活頁簿檢視 顯示

顯示比例

巨集

巨集名稱(M):

Test1

Test1

執行(R)

逐步執行(S)

編輯(E)

建立(O)

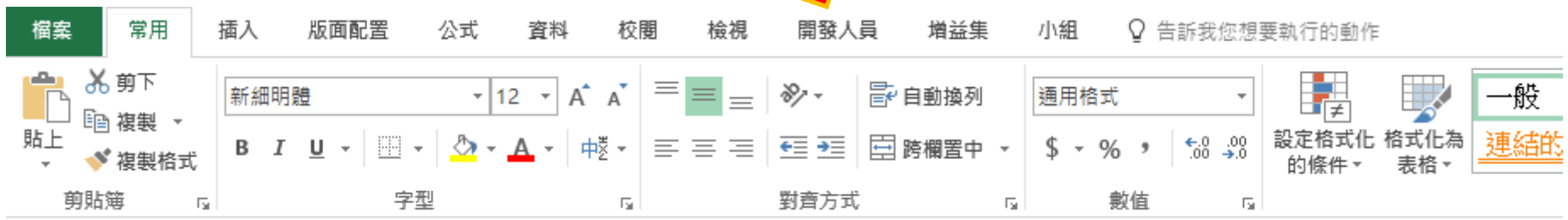
刪除(D)

選項(O)...

取消

巨集存放在(A): 所有開啟的活頁簿

描述



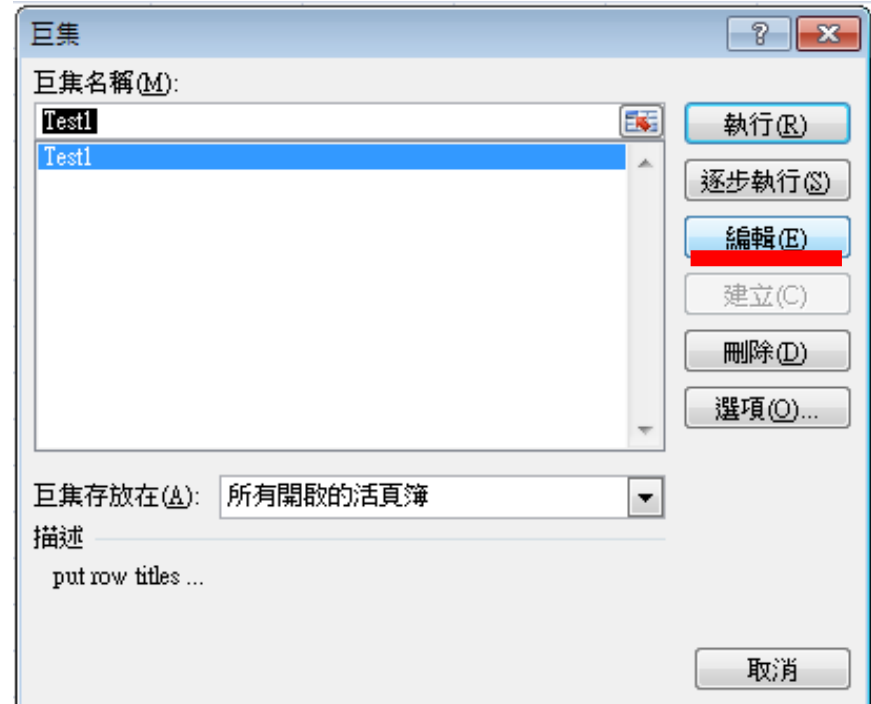
PART II: 從程式碼的角度思考

Visual Basic for Application

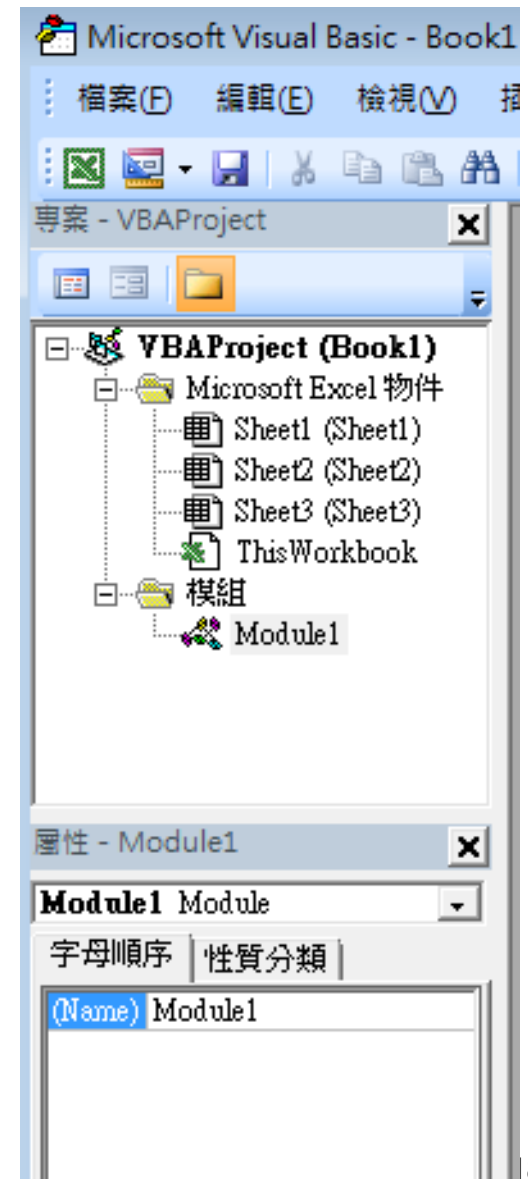
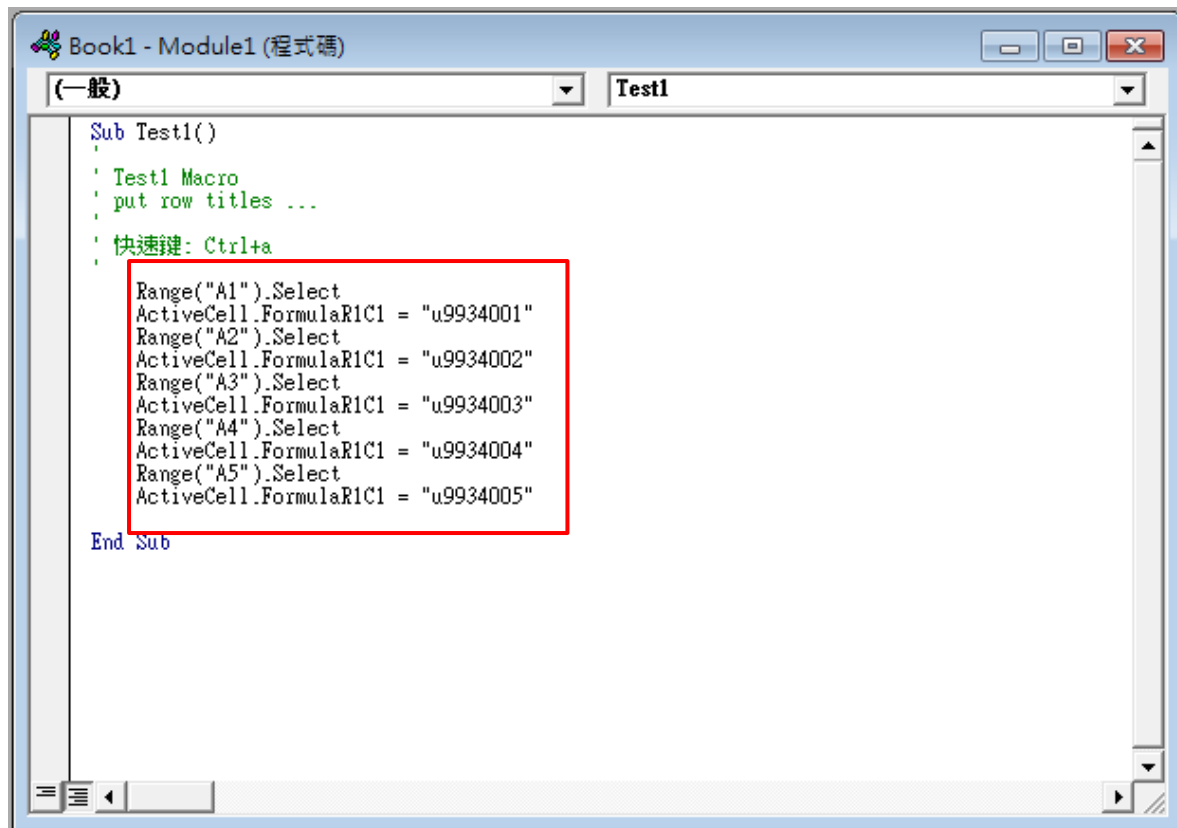
- Visual Basic for Microsoft Office
 - Excel, Office, PowerPoint, Access ...
 - A VBA program is only executable in Office.
- Object-oriented concept, e.g., in Office Excel,
 - Workbook
 - Worksheet
 - Range
- We will focus on VBA for Excel in this section.

巨集程式碼 (Macro)

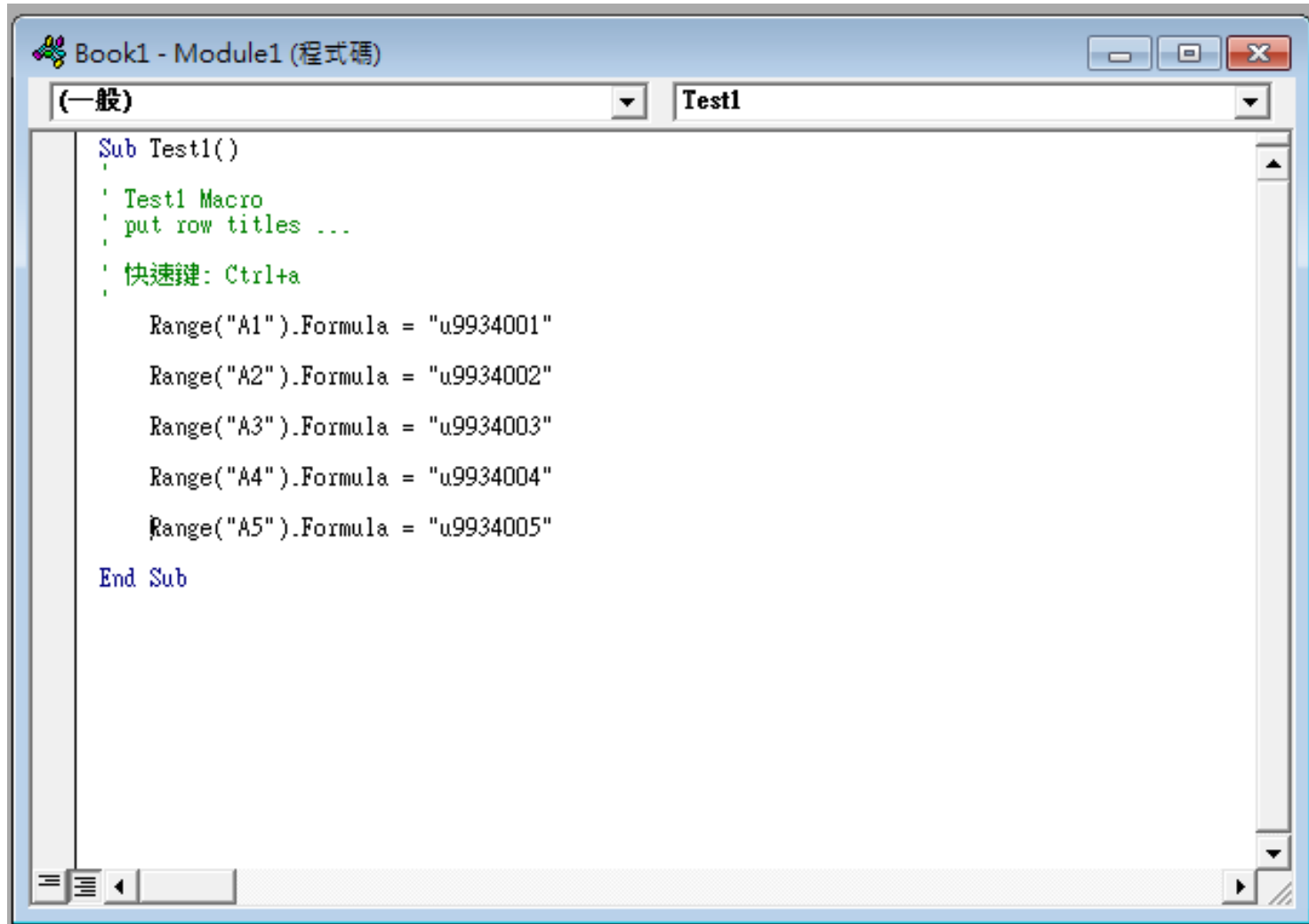
- 執行
 - via menu
 - via shortcut key
(例如 Ctrl + \$)
- 編輯



VBA Interface



Code



```
Book1 - Module1 (程式碼)
(一般) Test1
Sub Test1()
    Test1 Macro
    put row titles ...
    快速鍵: Ctrl+a
    Range("A1").Formula = "u9934001"
    Range("A2").Formula = "u9934002"
    Range("A3").Formula = "u9934003"
    Range("A4").Formula = "u9934004"
    Range("A5").Formula = "u9934005"
End Sub
```

請仿照Test1做出 Test2巨集

- B1~B5分別填入
- 80, 65, 72, 93, 58
- 執行 Test2 巨集

	A	B
1	u9934001	80
2	u9934002	65
3	u9934003	72
4	u9934004	93
5	u9934005	58

```
活頁簿1 - Module1 (程式碼)
(一般)
Sub Test1()
    ' Test1 巨集
    ' 快速鍵: Ctrl+a
    Range("A1").Select
    ActiveCell.FormulaR1C1 = "u9934001"
    Range("A2").Select
    ActiveCell.FormulaR1C1 = "u9934002"
    Range("A3").Select
    ActiveCell.FormulaR1C1 = "u9934003"
    Range("A4").Select
    ActiveCell.FormulaR1C1 = "u9934004"
    Range("A5").Select
    ActiveCell.FormulaR1C1 = "u9934005"
End Sub

Sub Test2()
    ' Test2 巨集
    ' 快速鍵: Ctrl+b
    Range("B1").Select
    ActiveCell.FormulaR1C1 = "80"
    Range("B2").Select
    ActiveCell.FormulaR1C1 = "65"
    Range("B3").Select
    ActiveCell.FormulaR1C1 = "72"
    Range("B4").Select
    ActiveCell.FormulaR1C1 = "93"
    Range("B5").Select
    ActiveCell.FormulaR1C1 = "58"
End Sub
```

Range("B1").Select
ActiveCell.FormulaR1C1=

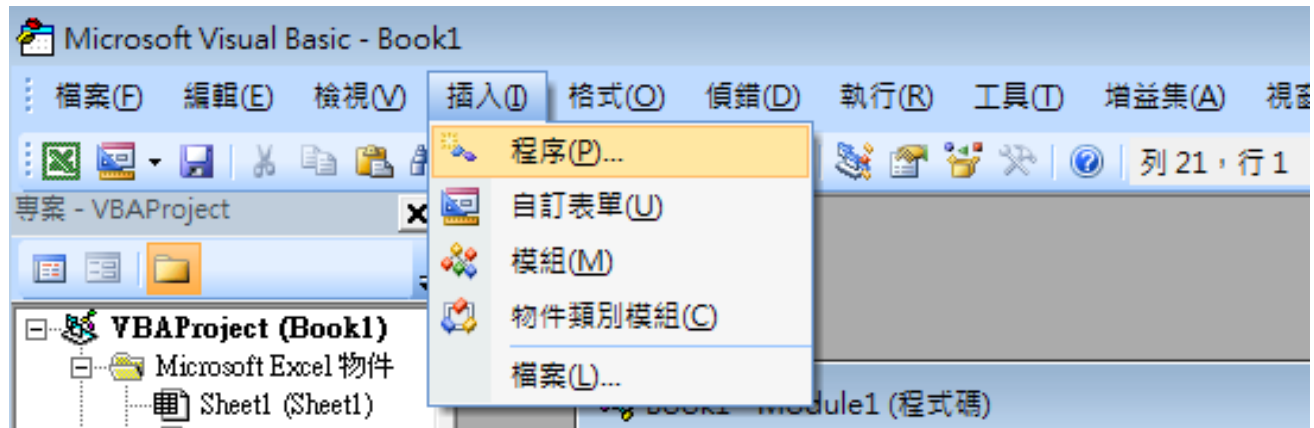
How to Edit an Excel Macro

- `Range("A1").Value = 0`
 - `Worksheets("Sheet1").Range("A1").Value= 0`
 - `Workbooks("Book1").Worksheets("Sheet1").Range("A1").Value=0`

- `Workbooks("Book1").Close`
 - 關閉Book1.xls的活頁簿

- `Worksheets("Sheet2").Activate`
 - 切換至Sheet2工作表

Add Sub



Example

The screenshot shows the VBA editor for 'File01.xlsm - Module1 (程式碼)'. The 'ave_compute' procedure is selected. The code includes a 'Test2' subprocedure and a 'Public Sub ave_compute()' procedure. The 'ave_compute' procedure is highlighted with a red box. To the right, the '新增程序' (Add Procedure) dialog box is open, showing the name 'ave_compute', type 'Sub(S)', and visibility 'Public(B)'. Below the dialog, a table shows the results of the calculation.

```
File01.xlsm - Module1 (程式碼)
(一般) ave_compute

Range("A5").Select
ActiveCell.FormulaR1C1 = "u9934005"

End Sub

Sub Test2()
' Test2 巨集
' 快速鍵: Ctrl+b
Range("B1").Select
ActiveCell.FormulaR1C1 = "80"
Range("B2").Select
ActiveCell.FormulaR1C1 = "65"
Range("B3").Select
ActiveCell.FormulaR1C1 = "72"
Range("B4").Select
ActiveCell.FormulaR1C1 = "93"
Range("B5").Select
ActiveCell.FormulaR1C1 = "58"

End Sub

Public Sub ave_compute()
Dim k, sum As Integer
sum = 0
For k = 1 To 5
sum = sum + Cells(k, 2).Value
Next
Cells(k, 2).Value = sum / (k - 1)

End Sub
```

新增程序

名稱(N): ave_compute

型態

- Sub(S)
- Function(F)
- Property(P)

有效範圍

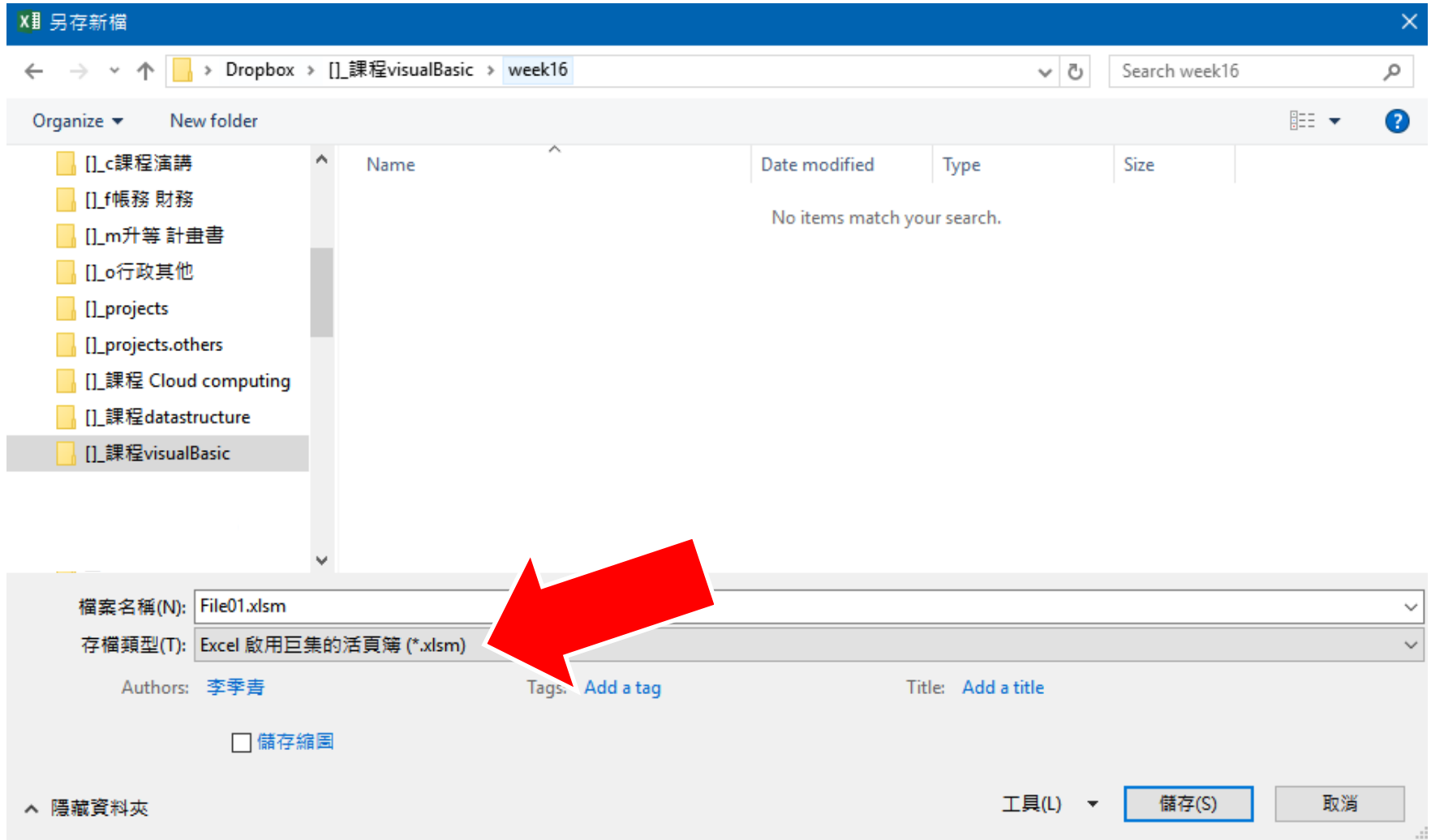
- Public(B)
- Private(Y)

將所有區域變數設定為靜態變數(A)

	A	B	C
1	u9934001	80	
2	u9934002	65	
3	u9934003	72	
4	u9934004	93	
5	u9934005	58	
6		73.6	
7			

Cells(K, 2)

儲存包含巨集的試算表



再次打開的時候

■ 要到檔案選單裏面解鎖

partII_VBA_demo_xlsm - Excel

資訊

partII_VBA_demo_

C: > Users > Ching > OneDrive > []_課程演講 > 10803 TBI (高醫)

啟用內容

安全性警告

主動式內容可能含有病毒及其他安全性危險。下列內容已停用:

- 巨集

您僅應在信任此檔案的內容時，才啟用內容。

啟用所有內容

永遠啟用此文件的主動式內容 (將此文件標示為信任的文件)

進階選項

選取應啟用哪些主動式內容。這些內容將僅在此工作階段中啟用。

控制人員能對此活頁簿所做的變更類型。

保護活頁簿

檢查活頁簿

在發佈此檔案前，請注意此檔案包含:

- 文件摘要資訊、作者名稱和絕對路徑
- 巨集、表單或 ActiveX 控制項

管理活頁簿

存回、取出和復原未儲存的變更。

資訊

新增

開啟舊檔

儲存檔案

另存新檔

列印

共用

匯出

發佈

關閉

帳戶

選項

PART III:

用Excel 自動下載資料


```

1 Sub 巨集1()
2 '
3 ' 巨集1 巨集
4 '
5 Dim myURL As String
6 myURL = "https://od.cdc.gov.tw/eic/covid19/covid19_tw_stats.csv"
7
8 Dim WinHttpRequest As Object
9 Set WinHttpRequest = CreateObject("Microsoft.XMLHTTP")
10 WinHttpRequest.Open "GET", myURL, False
11 WinHttpRequest.Send
12
13 myURL = WinHttpRequest.ResponseBody
14 If WinHttpRequest.Status = 200 Then
15     Set oStream = CreateObject("ADODB.Stream")
16     oStream.Open
17     oStream.Type = 1
18     oStream.Write WinHttpRequest.ResponseBody
19     oStream.SaveToFile ("C:\Users\userName\Desktop\file.csv")
20     oStream.Close
21 End If
22 '
23 End Sub

```

原程式碼出自: <https://social.msdn.microsoft.com/Forums/en-US/bd0ee306-7bb5-4ce4-8341-edd9475f84ad/excel-2007-use-vba-to-download-amp-save-csv-from-url?forum=isvvba>

程式碼

```
Dim myURL As String  
myURL = "https://od.cdc.gov.tw/eic/covid19/covid19_tw_stats.csv"
```

```
Dim WinHttpRequest As Object  
Set WinHttpRequest = CreateObject("Microsoft.XMLHTTP")  
WinHttpRequest.Open "GET", myURL, False  
WinHttpRequest.Send
```

```
myURL = WinHttpRequest.ResponseBody  
If WinHttpRequest.Status = 200 Then  
    Set oStream = CreateObject("ADODB.Stream")  
    oStream.Open  
    oStream.Type = 1  
    oStream.Write WinHttpRequest.ResponseBody  
    oStream.SaveToFile ("C:\Users\使用者名子\Desktop\file.csv")  
    oStream.Close  
End If
```

以下列網址為例

https://data.cdc.gov.tw/download?resourceid=3c1e263d-16ec-4d70-b56c-21c9e2171fc7&dataurl=https://od.cdc.gov.tw/eic/Day_Confirmation_Age_County_Gender_19CoV.csv

去掉前段

```
Untitled - Notepad
File Edit View Settings ?
[Icons]
1 Sub 巨集1()
2 '
3 ' 巨集1 巨集
4 '
5 Dim myURL As String
6 myURL = "https://data.cdc.gov.tw/download?resourceid=3c1e263d-16ec-4d70-b56c-21c9e2171fc7&dataurl=https://od.cdc.gov.tw/eic/Day_Confirmation_Age_County_Gender_19CoV.csv"
7
8 Dim WinHttpRequest As Object
9 Set WinHttpRequest = CreateObject("Microsoft.XMLHTTP")
10 WinHttpRequest.Open "GET", myURL, False
11 WinHttpRequest.Send
12
13 myURL = WinHttpRequest.ResponseBody
14 If WinHttpRequest.Status = 200 Then
15     Set oStream = CreateObject("ADODB.Stream")
16     oStream.Open
17     oStream.Type = 1
18     oStream.Write WinHttpRequest.ResponseBody
19     oStream.SaveToFile ("C:\Users\userName\Desktop\file2.csv")
20     oStream.Close
21 End If
22 '
23 End Sub
24
```

執行下載巨集

```
1 確定病名,個案研判日,縣市,性別,是否為境外移入,年齡層,確定病例數
2 嚴重特殊傳染性肺炎,2020/01/22,高雄市,女,是,55-59,1
3 嚴重特殊傳染性肺炎,2020/01/24,台北市,女,是,50-54,1
4 嚴重特殊傳染性肺炎,2020/01/24,高雄市,男,是,55-59,1
5 嚴重特殊傳染性肺炎,2020/01/26,台北市,女,是,55-59,1
6 嚴重特殊傳染性肺炎,2020/01/27,彰化縣,女,是,50-54,1
7 嚴重特殊傳染性肺炎,2020/01/28,台中市,女,是,70+,2
8 嚴重特殊傳染性肺炎,2020/01/28,彰化縣,男,否,50-54,1
9 嚴重特殊傳染性肺炎,2020/01/30,南投縣,女,否,40-44,1
10 嚴重特殊傳染性肺炎,2020/01/31,南投縣,男,是,40-44,1
11 嚴重特殊傳染性肺炎,2020/02/04,桃園市,男,是,50-54,1
12 嚴重特殊傳染性肺炎,2020/02/06,台北市,男,是,45-49,1
13 嚴重特殊傳染性肺炎,2020/02/06,台南市,女,是,45-49,1
14 嚴重特殊傳染性肺炎,2020/02/06,宜蘭縣,女,是,25-29,1
15 嚴重特殊傳染性肺炎,2020/02/07,台北市,女,是,50-54,1
16 嚴重特殊傳染性肺炎,2020/02/07,台北市,男,是,50-54,1
17 嚴重特殊傳染性肺炎,2020/02/08,台北市,男,是,20-24,1
18 嚴重特殊傳染性肺炎,2020/02/09,台北市,男,是,20-24,1
```

練習

■ 請批次下載下列網址的檔案

https://od.cdc.gov.tw/eic/Day_Confirmation_Age_County_Gender_19CoV.csv

COVID-19 Cumulative Cases and Deaths (各國累積病例數與死亡數)

https://od.cdc.gov.tw/eic/covid19/covid19_global_cases_and_deaths.csv

COVID-19 Taiwan Stats 台灣COVID-19最新統計數字

https://od.cdc.gov.tw/eic/covid19/covid19_tw_stats.csv

_id	確診	解除隔離	死亡	送驗	排除(新)	昨日確診	昨日排除	昨日送驗
1	425	217	6	55,476	52,150	2	931	1,853

進階改良，加入時間日期戳記

' 回傳現在的日期與時間

```
MsgBox ("年：" & DatePart("yyyy", Now))
```

```
MsgBox ("月：" & DatePart("m", Now))
```

```
MsgBox ("日：" & DatePart("d", Now))
```

```
MsgBox ("時：" & DatePart("h", Now))
```

```
MsgBox ("分：" & DatePart("n", Now))
```

```
MsgBox ("秒：" & DatePart("s", Now))
```

字串之間的合併 使用 **&**

```

'
' 巨集3 巨集
'
Dim myURL As String
myURL = "https://od.cdc.gov.tw/eic/Day_Confirmation_Age_County_Gender_19CoV.csv"

Dim WinHttpRequest As Object
Set WinHttpRequest = CreateObject("Microsoft.XMLHTTP")
WinHttpRequest.Open "GET", myURL, False
WinHttpRequest.Send

myURL = WinHttpRequest.ResponseBody
If WinHttpRequest.Status = 200 Then
    Set oStream = CreateObject("ADODB.Stream")
    oStream.Open
    oStream.Type = 1
    oStream.Write WinHttpRequest.ResponseBody
    oStream.SaveToFile ("C:\Users\Ching\Desktop\file1" & DatePart("h", Now) & "_" & DatePart("n", Now) & "_" & DatePart("s", Now) & ".csv")
    oStream.Close
End If
'

```