

# 相關與迴歸分析

- R/Python/Julia/SQL 程式設計與應用  
(R/Python/Julia/SQL Programming and Application)
- 資料視覺化 (Data Visualization)
- 機器學習 (Machine Learning)
- 統計品管 (Statistical Quality Control)
- 最佳化 (Optimization)



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# 113/07/22 (一) 相關與迴歸分析

- 1.相關分析
- 2.迴歸分析
- 3.ts,POSIXct,POSIXlt日期時間物件
- 4.常用財金套件zoo,xts,timeSeries,quantmod,tidyquant
- 5.shiny簡介
- 6.shiny元件應用
- 7.shiny佈署

# 1. 相關分析

# 相關係數

- 皮爾森積動差相關係數（英語：Pearson product-moment correlation coefficient，又稱作 PPMCC或PCCs, 文章中常用 $\gamma$ 或 Pearson's  $\gamma$ 表示）
- 相關係數用於度量兩個變數X和Y之間的相關程度（**線性相依**），其值介於-1與1之間。 $-1 \leq \gamma \leq 1$
- 在自然科學領域中，該係數廣泛用於度量兩個變數之間的線性相依程度，它是由卡爾·皮爾森所提出。
- 這個相關係數也稱作「皮爾森相關係數  $\gamma$ 」。

參考: [https://en.wikipedia.org/wiki/Pearson\\_correlation\\_coefficient](https://en.wikipedia.org/wiki/Pearson_correlation_coefficient)

# 相關係數之公式

- cov 共變異數(Covariance)
- $\sigma$  標準差

母體

$$\rho_{X,Y} = \frac{\text{cov}(X, Y)}{\sigma_X \sigma_Y} = \frac{E[(X - \mu_X)(Y - \mu_Y)]}{\sigma_X \sigma_Y}$$

樣本

$$r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2} \sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2}}$$

# 相關係數 cor

```

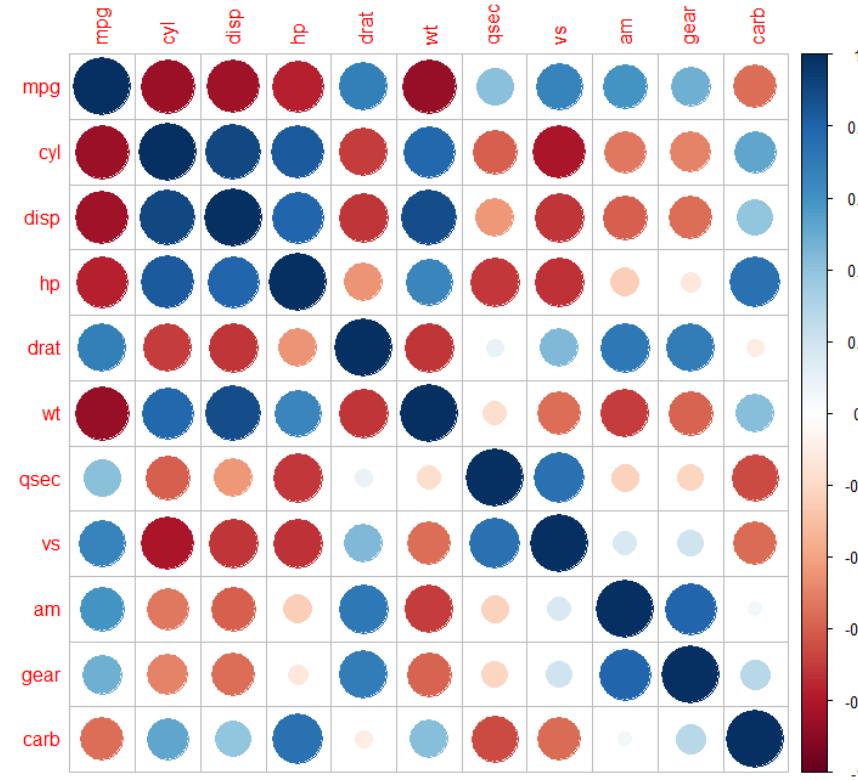
> # 相關圖 - corrplot 套件
> library(corrplot)
> corr <- cor(mtcars)
> corr
      mpg      cyl      disp       hp      drat       wt      qsec       vs       am      gear      carb
mpg  1.0000000 -0.8521620 -0.8475514 -0.7761684  0.68117191 -0.8676594  0.41868403  0.6640389  0.59983243  0.4802848 -0.55092507
cyl -0.8521620  1.0000000  0.9020329  0.8324475 -0.69993811  0.7824958 -0.59124207 -0.8108118 -0.52260705 -0.4926866  0.52698829
disp -0.8475514  0.9020329  1.0000000  0.7909486 -0.71021393  0.8879799 -0.43369788 -0.7104159 -0.59122704 -0.5555692  0.39497686
hp   -0.7761684  0.8324475  0.7909486  1.0000000 -0.44875912  0.6587479 -0.70822339 -0.7230967 -0.24320426 -0.1257043  0.74981247
drat  0.6811719 -0.6999381 -0.7102139 -0.4487591  1.00000000 -0.7124406  0.09120476  0.4402785  0.71271113  0.6996101 -0.09078980
wt   -0.8676594  0.7824958  0.8879799  0.6587479 -0.71244065  1.0000000 -0.17471588 -0.5549157 -0.69249526 -0.5832870  0.42760594
qsec  0.4186840 -0.5912421 -0.4336979 -0.7082234  0.09120476 -0.1747159  1.00000000  0.7445354 -0.22986086 -0.2126822 -0.65624923
vs    0.6640389 -0.8108118 -0.7104159 -0.7230967  0.44027846 -0.5549157  0.74453544  1.0000000  0.16834512  0.2060233 -0.56960714
am    0.5998324 -0.5226070 -0.5912270 -0.2432043  0.71271113 -0.6924953 -0.22986086  0.1683451  1.00000000  0.7940588  0.05753435
gear  0.4802848 -0.4926866 -0.5555692 -0.1257043  0.69961013 -0.5832870 -0.21268223  0.2060233  0.79405876  1.0000000  0.27407284
carb -0.5509251  0.5269883  0.3949769  0.7498125 -0.09078980  0.4276059 -0.65624923 -0.5696071  0.05753435  0.2740728  1.00000000
>

> class(corr)
[1] "matrix" "array"

```

cor 計算結果為 matrix , 父階層是 array

# 相關圖 - corrplot 套件



R demo

<https://cran.r-project.org/web/packages/corrplot/vignettes/corrplot-intro.html>

## 2.迴歸分析

- 迴歸分析是屬於機器學習中監督式學習，主要工作是數值預測。

# 機器學習

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# 機器學習 (Machine learning) → 建模與預測

- 監督式學習 (Supervised learning) 
  - Telling the algorithm what to predict
- 非監督式學習 (Unsupervised learning)
  - No label or target value given for the data
- 半監督學習 (Semi-supervised learning)
  - 具有少量標記資料
- 強化學習 (Reinforcement learning)
  - 為了達成目標，隨著環境的變動，而逐步調整其行為，並評估每一個行動之後所到的回饋是正向的或負向的。
- 深度學習 (Deep learning)
- 生成式人工智慧 (Generative AI)

# 監督式學習 vs. 非監督式學習

- 監督式學習 Supervised learning - 執行  $X \rightarrow$  預測  $\rightarrow Y$ 
  - 迴歸分析 Regression analysis
  - 廣義線性模型 General linear model (GLM)
  - 天真貝氏法 Naïve-Bayes
  - K近鄰法 k-nearest neighbors (KNN)
  - 決策樹 Decision tree
  - 支持向量機 Support vector machine (SVM)
  - 類神經網路 Neural network (NN)
  - 集成學習 Ensemble learning: 使用多種學習算法來獲得比單獨使用演算法更好預測結果
- 非監督式學習 Unsupervised learning
  - 集群法 Clustering
  - 關聯規則 Association rule
  - 主成分分析 Principal Component Analysis

# CRISP-DM標準流程

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# 資料探勘生命週期 (CRISP-DM)

- 跨產業資料探勘標準作業流程 (Cross Industry Standard Process for Data Mining)
- CRISP-DM是一種資料探勘方法論
- CRISP-DM是於1990年起，由SPSS以及NCR兩大廠商在合作戴姆克萊斯勒-賓士(Daimler Benz)的資料倉儲以及資料探勘過程中發展出來的。

# CRISP-DM 資料探勘流程(續)

- 步驟 1：商業理解
- 步驟 2：資料理解
- 步驟 3：資料準備
- 步驟 4：模式建立
- 步驟 5：評估與測試
- 步驟 6：佈署應用

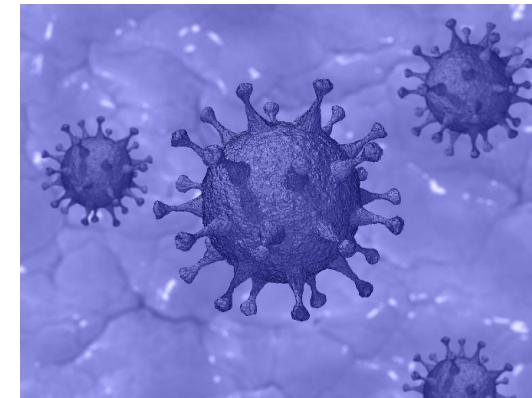
} 佔整專案時間的  
~80%

## 資料準備：

- 訓練資料70%
- 測試資料30%

# 商業理解

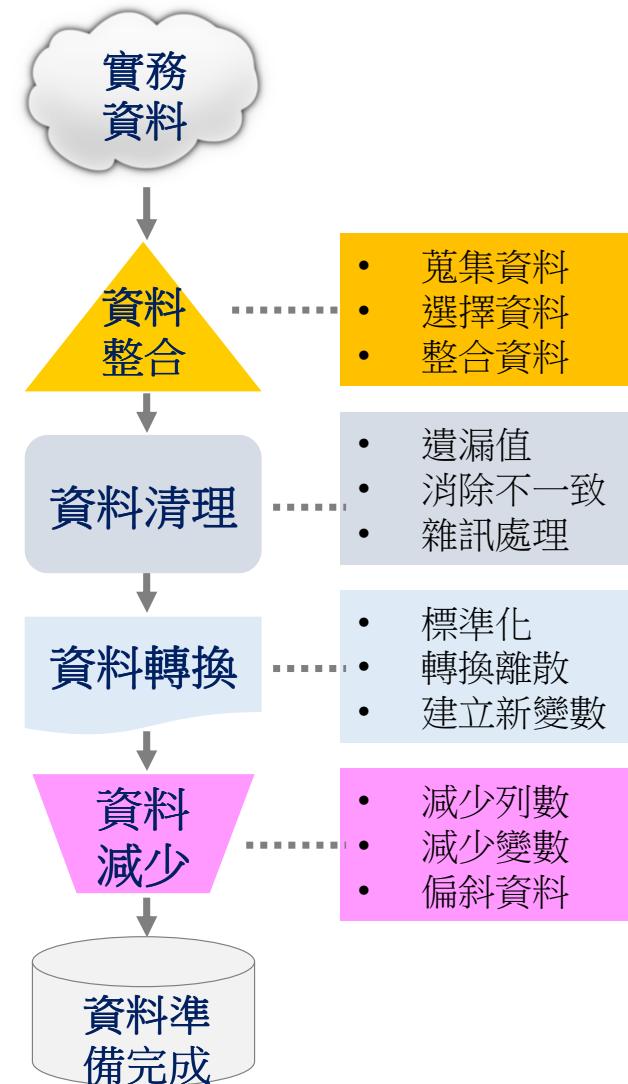
- 終極目標是要解決具體的產業問題，例如：提高購買率、找出詐欺交易、銷售預測與異常偵測等，因此以專業知識 (domain knowledge)進行商業理解是重要的第一步，處理重點：
  - 擬定商業目標
  - 進行當前處境評估
  - 決定資料探勘目標：獲利/成本
  - 產生專案計劃
  - 解決企業問題



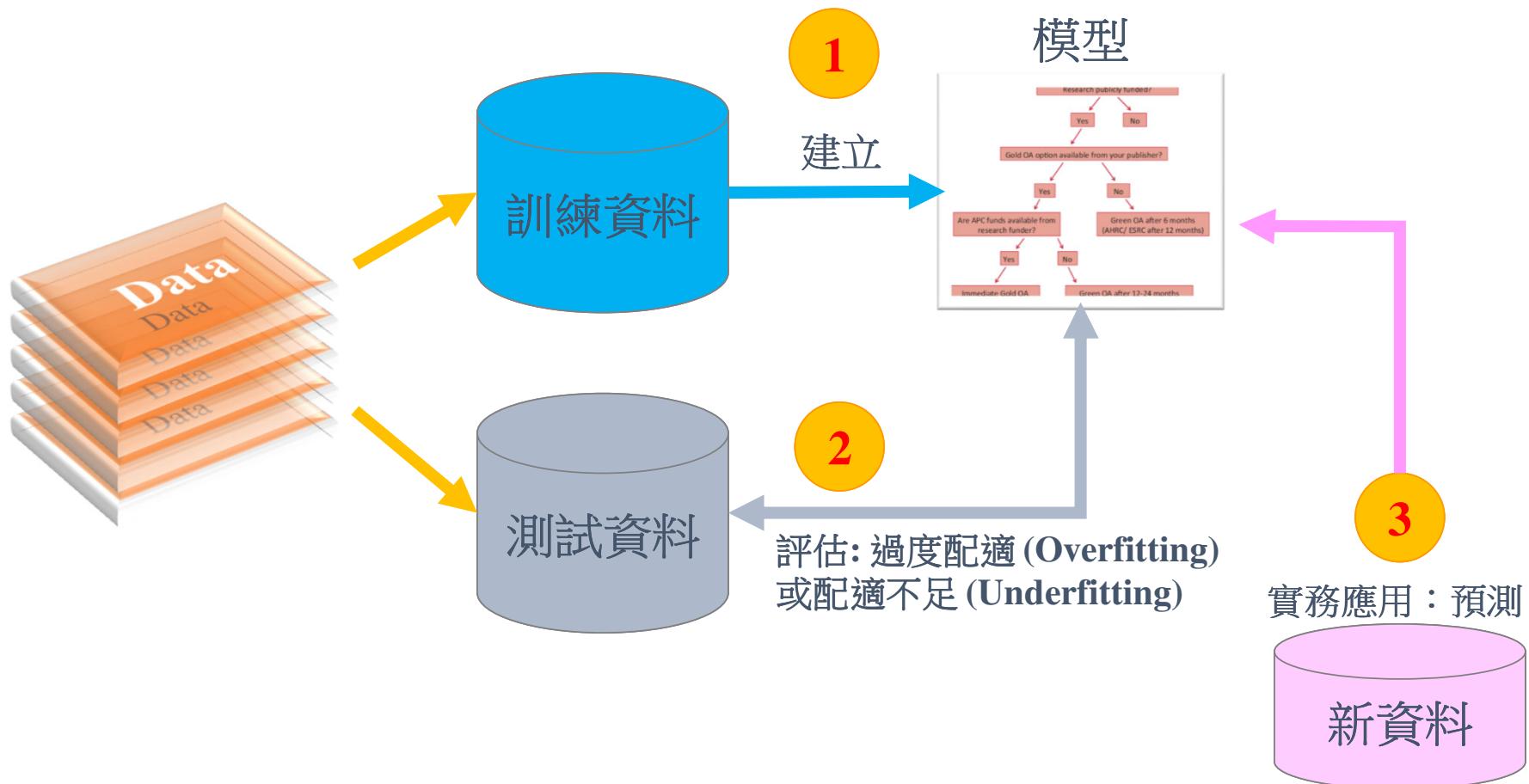
# 資料理解

- 包括描述資料、探索資料、核驗資料品質
- 敘述統計分析
  - 六力分析(summary函數)
- 繪圖
  - 依群組特性
  - 依時間特性
  - 新增評估變數
- 趨勢
- 離群值 (outlier)
- 散佈圖、散佈圖矩陣
- 盒鬚圖

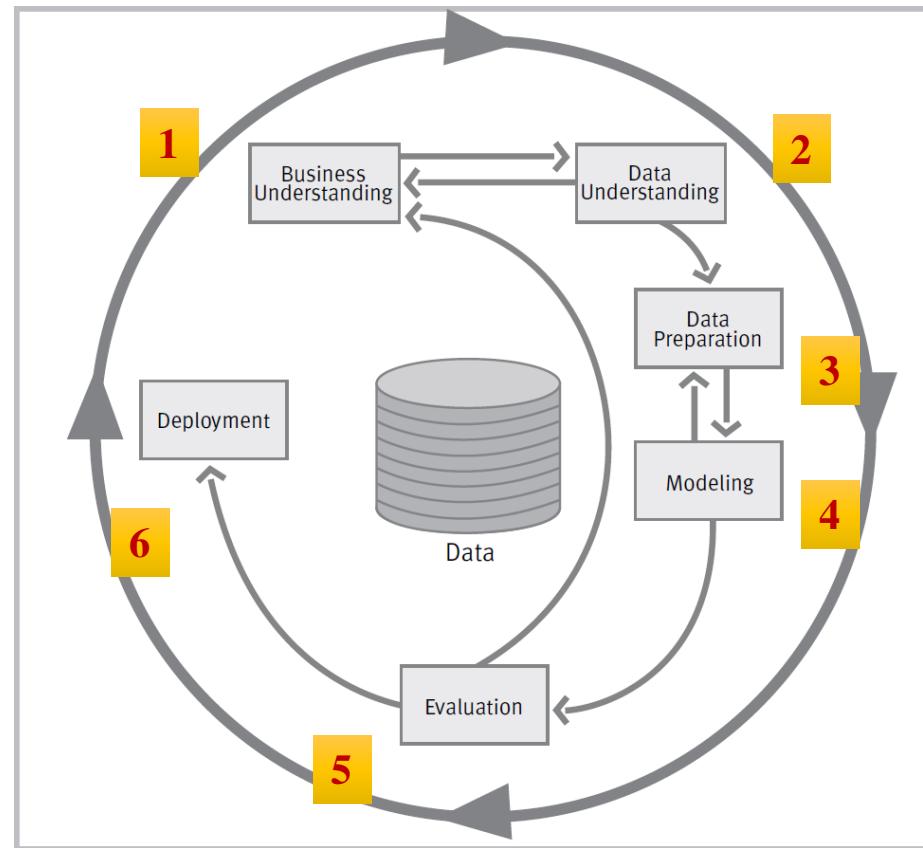
# 資料準備



# 模型建立、評估與預測



# CRISP-DM 資料探勘流程(續)



參考 [https://en.wikipedia.org/wiki/Cross\\_Industry\\_Standard\\_Process\\_for\\_Data\\_Mining](https://en.wikipedia.org/wiki/Cross_Industry_Standard_Process_for_Data_Mining)

# 模型評估

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# 數值模型績效指標

- 不可直接使用誤差的算術平均!

$$\text{Total error} = \frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)$$



- 均方誤差 (Mean Squared Error, MSE)

$$MSE = \frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

- 均方根誤差 (Root Mean Squared Error, RMSE)

$$RMSE = \sqrt{\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2}$$

- 平均絕對誤差 (Mean Absolute Error, MAE)

$$MAE = \frac{1}{n} \sum_{i=1}^n |y_i - \hat{y}_i|$$

# 類別模型績效指標

- <http://rwepa.blogspot.com/2013/01/rocr-roc-curve.html>

```
#           | 真實P類別 真實N類別
# ****|*****
# 預測P類別 | TP真陽數 FP假陽數
# 預測N類別 | FN假陰數 TN真陰數
# ****|*****
#           | P          N

# 1.TPR (True positive rate) 真陽性率，愈大愈好 -----
# =TP/ (TP+FN)
# =TP/P
# =Sensitivity 積敏度
# =Recall 召回率
# =Probability of detection
# =Power
# 實際為陽性的樣本中，判斷為陽性的比例。
# 例如真正有生病的人中，被醫院判斷為有生病者的比例。
```

混淆矩陣  
(Confusion Matrix)

# 線性模型 (Linear Model, *lm*)

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# 二大類型變數

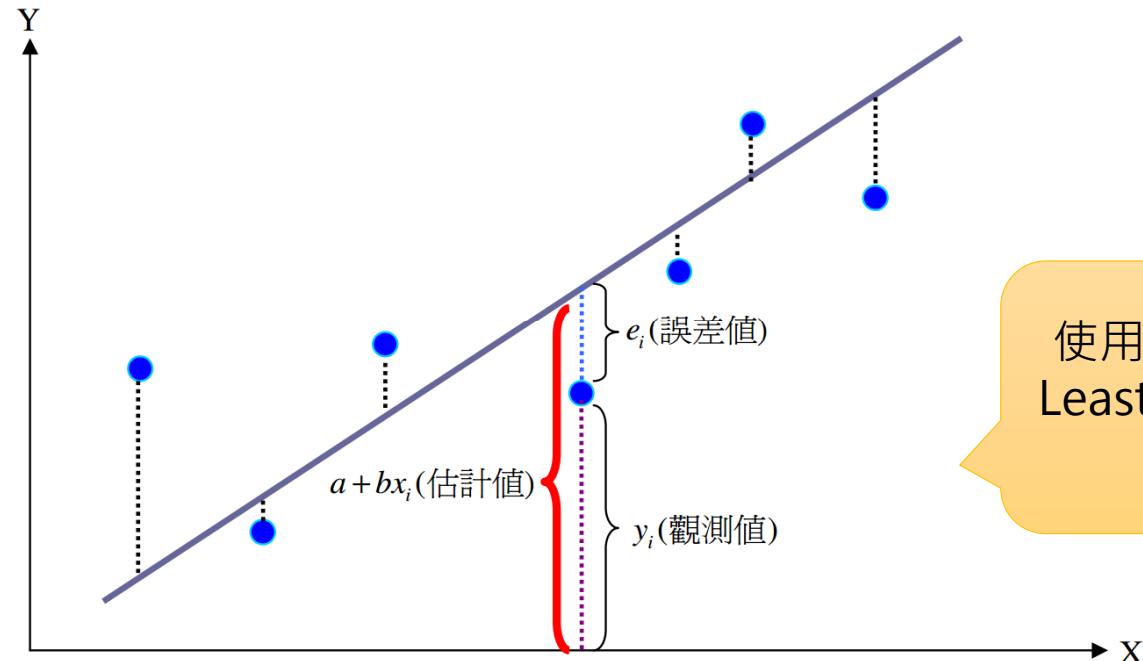
- X:

- 自變數, 獨立變數 independent variable
- 預測變量 predictor variable
- 解釋變量 explanatory variable
- 共變量 covariate

- Y:

- 反應變數 response variable
- 因變數, 依變數, 應變數, 被解釋變數 dependent variable
- 結果變數 outcome variable.

# 迴歸分析推論



使用最小平方法 Ordinary Least Square (OLS) 解線性迴歸的最佳解.

參考: [https://github.com/rwepa/DataDemo/blob/master/regression\\_01.pdf](https://github.com/rwepa/DataDemo/blob/master/regression_01.pdf)

# 迴歸分析範例

- 休閒運動
  - Y : 跑步消耗卡路里
  - X : 時間, 心跳比率, 速度, 年齡, 性別, BMI
- 財務風險管理
  - Y : 財務危機
  - X : 獲利, 經營績效, 穩健程度, 經營管理
- 企業預測
  - Y : 明年電梯市場總量預測
  - X : 出貨數, 建照發照數, 市場占有率, 台灣生活指標, 世界經濟指標

# R 迴歸模型

*lm*

| 迴歸種類                      | 反應變數                | 解釋變數     | 備註                            |
|---------------------------|---------------------|----------|-------------------------------|
| Simple linear<br>簡單線性迴歸   | 1                   | 1        | $y \sim x$                    |
| Polynomial<br>多項式迴歸       | 1                   | 1        | n次多項式<br>$y \sim x + x^2$     |
| Multiple linear<br>多元線性迴歸 | 1                   | $\geq 2$ | $y \sim x_1 + x_2 + x_3$      |
| Multivariate<br>多變數迴歸     | $\geq 2$            | $\geq 1$ |                               |
| glm                       | Logistic<br>邏輯斯迴歸   | 1個類別型變數  | $\geq 1$                      |
| Poisson<br>卜瓦松迴歸          | 1個計數型變數             | $\geq 1$ |                               |
| nls                       | Nonlinear<br>非線性迴歸  | 1        | $\geq 1$                      |
| arima                     | Time series<br>時間序列 | 1        | $y \sim 1/\exp(x_1+\log x_2)$ |

# 迴歸分析的統計假設

- 常態性 Normality: For fixed values of the independent variables, the dependent variable ( $Y$ ) is normally distributed.
- 獨立性 Independence: The  $\varepsilon_i$  values are independent of each other.
- 同質性 Homoscedasticity: The variance of the dependent variable does not vary with the levels of the independent variables.
- 線性關係 Linearity: The dependent variable is linearly related to the independent variables.

# 線性模型 linear model: *lm*

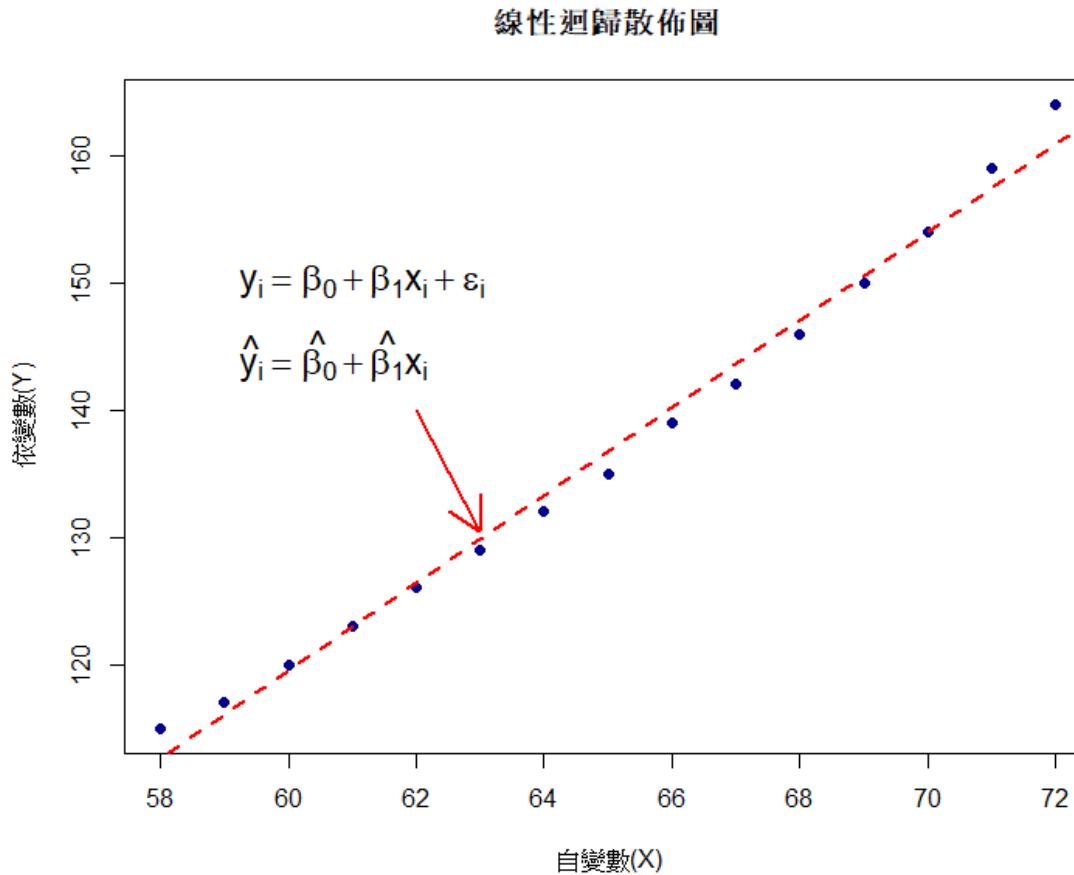
```
> # Simple linear regression  
> ?lm  
> # my.lm <- lm(formula, data="xxx")  
> # formula: y ~ x1 + x2 + ... +xn  
> # end
```

lm 模型中，自變數亦可以使用 factor 資料型態。

# R公式(formula)之符號

| Symbol   | Usage  |
|----------|--|
| $\sim$   | Separates response variables on the left from the explanatory variables on the right. For example, a prediction of $y$ from $x$ , $z$ , and $w$ would be coded $y \sim x + z + w$ .  |
| $+$      | Separates predictor variables.   |
| $:$      | Denotes an interaction between predictor variables. A prediction of $y$ from $x$ , $z$ , and the interaction between $x$ and $z$ would be coded $y \sim x + z + x:z$ . (只有交互作用)  |
| $*$      | A shortcut for denoting all possible interactions. The code $y \sim x * z * w$ expands to $y \sim x + z + w + x:z + x:w + z:w + x:z:w$ . (包括個別變數與交互作用)   |
| $\wedge$ | Denotes interactions up to a specified degree. The code $y \sim (x + z + w)^2$ expands to $y \sim x + z + w + x:z + x:w + z:w$ .   |
| $\cdot$  | A place holder for all other variables in the data frame except the dependent variable. For example, if a data frame contained the variables $x$ , $y$ , $z$ , and $w$ , then the code $y \sim .$ would expand to $y \sim x + z + w$ .   |
| $-$      | A minus sign removes a variable from the equation. For example, $y \sim (x + z + w)^2 - x:w$ expands to $y \sim x + z + w + x:z + z:w$ .   |
| $-1$     | Suppresses the intercept. For example, the formula $y \sim x -1$ fits a regression of $y$ on $x$ , and forces the line through the origin at $x=0$ . (不含截距項)   |
| $I( )$   | Elements within the parentheses are interpreted arithmetically. For example, $y \sim x + (z + w)^2$ would expand to $y \sim x + z + w + z:w$ . In contrast, the code $y \sim x + I((z + w)^2)$ would expand to $y \sim x + h$ , where $h$ is a new variable created by squaring the sum of $z$ and $w$ . |
| function | Mathematical functions can be used in formulas. For example, $\log(y) \sim x + z + w$ would predict $\log(y)$ from $x$ , $z$ , and $w$ .   |

# 線性迴歸散佈圖



# 迴歸模型 – women 資料集

---

```
> # women: Average Heights and Weights for American Women
> # y: weight
> # x: height
> fit.lm <- lm(weight ~ height, data=women)
> summary(fit.lm)
```

```
> str(women)
'data.frame': 15 obs. of 2 variables:
 $ height: num 58 59 60 61 62 63 64 65 66 67 ...
 $ weight: num 115 117 120 123 126 129 132 135 139 142 ...
```

Call:  
`lm(formula = weight ~ height, data = women)`

Residuals:

| Min     | 1Q      | Median  | 3Q     | Max    |
|---------|---------|---------|--------|--------|
| -1.7333 | -1.1333 | -0.3833 | 0.7417 | 3.1167 |

Coefficients:

|             | Estimate  | Std. Error | t value | Pr(> t )            |
|-------------|-----------|------------|---------|---------------------|
| (Intercept) | -87.51667 | 5.93694    | -14.74  | <b>1.71e-09 ***</b> |
| height      | 3.45000   | 0.09114    | 37.85   | <b>1.09e-14 ***</b> |

---

Signif. codes: 0 **\*\*\*** 0.001 **\*\*** 0.01 **\*** 0.05 **.** 0.1 **'** 1

Residual standard error: 1.525 on 13 degrees of freedom

Multiple R-squared: 0.991, Adjusted R-squared: 0.9903

F-statistic: 1433 on 1 and 13 DF, **p-value: 1.091e-14**

`> # weight = -87.52+3.45*height`

- Estimate: 迴歸係數為預測變數對反應變數的影響
- Std. Error: 標準誤差表示不確定性
- t value: t值統計量
- Pr(>|t|): p值顯著性
- 13 DF:  
觀測值個數-1 – 不含常數項的係數個數  
 $= 15-1-1=13$

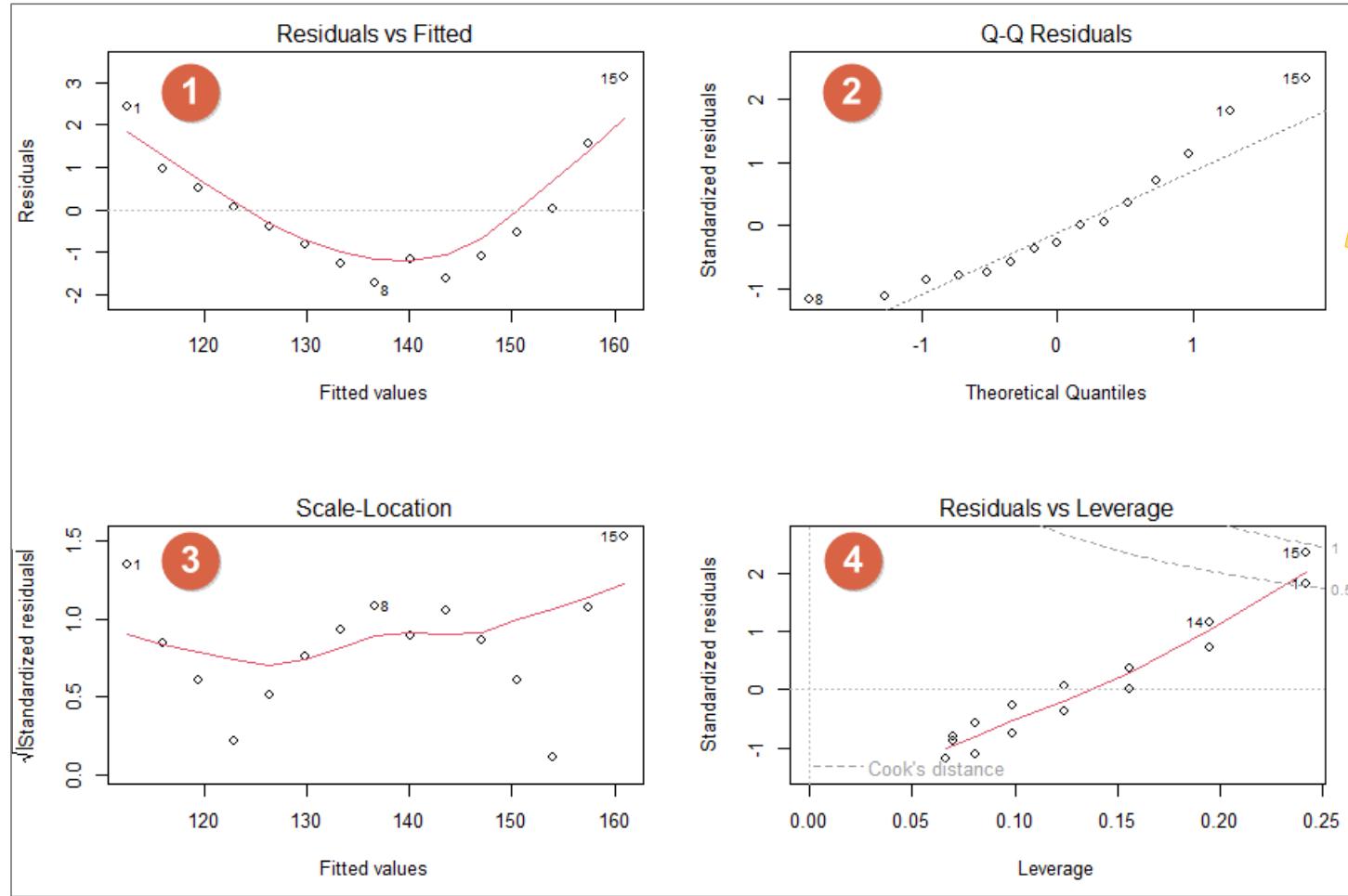
Regression = k (不含常數項)

Error = (n-1) - k

Total = n - 1 自由度

```
> # verify residuals
> names(fit.lm)
[1] "coefficients"   "residuals"      "effects"       "rank"
[5] "fitted.values"  "assign"        "qr"           "df.residual"
[9] "xlevels"         "call"          "terms"        "model"
> women$weight    # actual
[1] 115 117 120 123 126 129 132 135 139 142 146 146 150 154 159 164
> fitted(fit.lm) # predicted
     1      2      3      4      5      6      7      8
112.5833 116.0333 119.4833 122.9333 126.3833 129.8333 133.2833 136.7333
     9     10     11     12     13     14     15
140.1833 143.6333 147.0833 150.5333 153.9833 157.4333 160.8833
> residuals(fit.lm) # residual=actual-predicted
     1      2      3      4      5      6
2.41666667 0.96666667 0.51666667 0.06666667 -0.38333333 -0.83333333
     7      8      9     10     11     12
-1.28333333 -1.73333333 -1.18333333 -1.63333333 -1.08333333 -0.53333333
     13     14     15
0.01666667 1.56666667 3.11666667
> women$weight - fitted(fit.lm)
     1      2      3      4      5      6
2.41666667 0.96666667 0.51666667 0.06666667 -0.38333333 -0.83333333
     7      8      9     10     11     12
-1.28333333 -1.73333333 -1.18333333 -1.63333333 -1.08333333 -0.53333333
     13     14     15
0.01666667 1.56666667 3.11666667
>
```

# 模型診斷

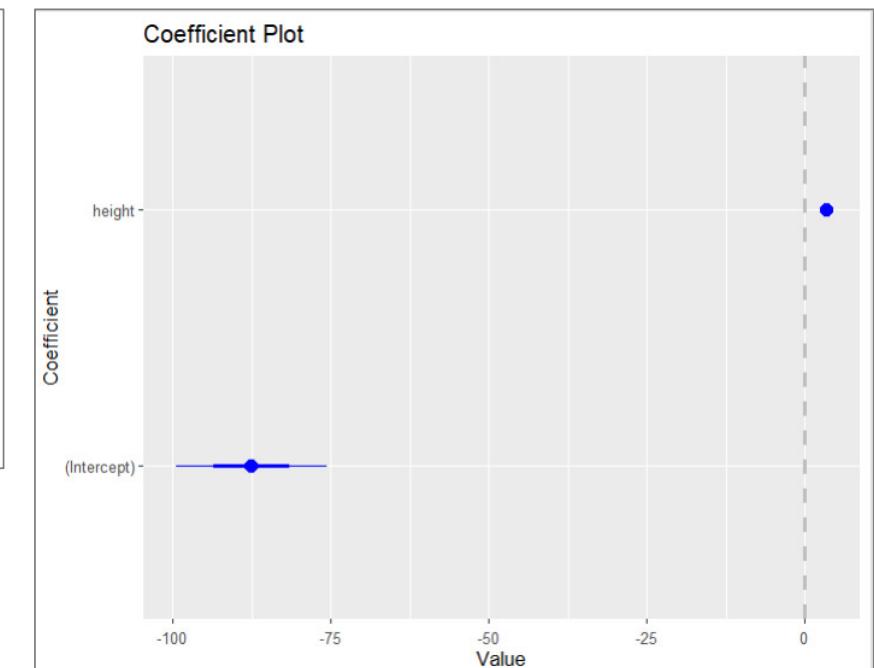


1. **Residuals vs Fitted** : 沒有明顯隨機樣式較佳，即紅色線靠近0。解決方式： $\log(x), \sqrt{x}$ 。
2. **Q-Q Residuals** : 殘差愈靠近直線表示服從常態分配。
3. **Scale-Location (or Spread-Location)** : 殘差同質性，水平線有相同擴散較佳。解決方式： $\log(y), \sqrt{y}$ 。
4. **Residuals vs Leverage** : 殘差與樁桿，影響迴歸結果的極值，每張圖顯示3個最明顯極值。本例庫克距離皆小於1，表示結果尚可以接受。

# 迴歸係數視覺化

```
# 迴歸係數視覺化  
library(coefplot)
```

```
# 粗線: 1個標準誤差的信賴區間 (Confidence interval)  
# 細線: 2個標準誤差的信賴區間  
# 圓點: 係數的估計值  
# 灰色垂直線為 0 的參考線  
# 如果2個標準誤差的信賴區間不包括0，則該係數是顯著的。  
coefplot(fit.1m)
```



# 預測新值 (predict)

```
> womenNew <- data.frame(height = c(64.5, 70.2))
>
> womenNew
height
1 64.5
2 70.2
>
> womenPredict <- predict(fit.1m,
+                             newdata = womenNew,
+                             se.fit = TRUE,
+                             interval = "prediction",
+                             levels = 0.95)
> womenPredict$fit
    fit      lwr      upr
1 135.0083 131.6043 138.4124
2 154.6733 151.1200 158.2266
```



練習

# R 練習-行銷資料 marketing

RWEPA 搜尋此網誌 (例: task)

- 關於作者
  - ★★★R入門資料分析與視覺化(付費,字幕)
  - ★★★商業預測與應用(付費,字幕)
- GitHub DataDemo
- R與實驗設計應用影片(6)
  - iPAS-R-tutorial(新增10.安裝專案套件)
  - iPAS-Python-tutorial(新增16.folium地圖)
- Python程式設計PDF(免費)



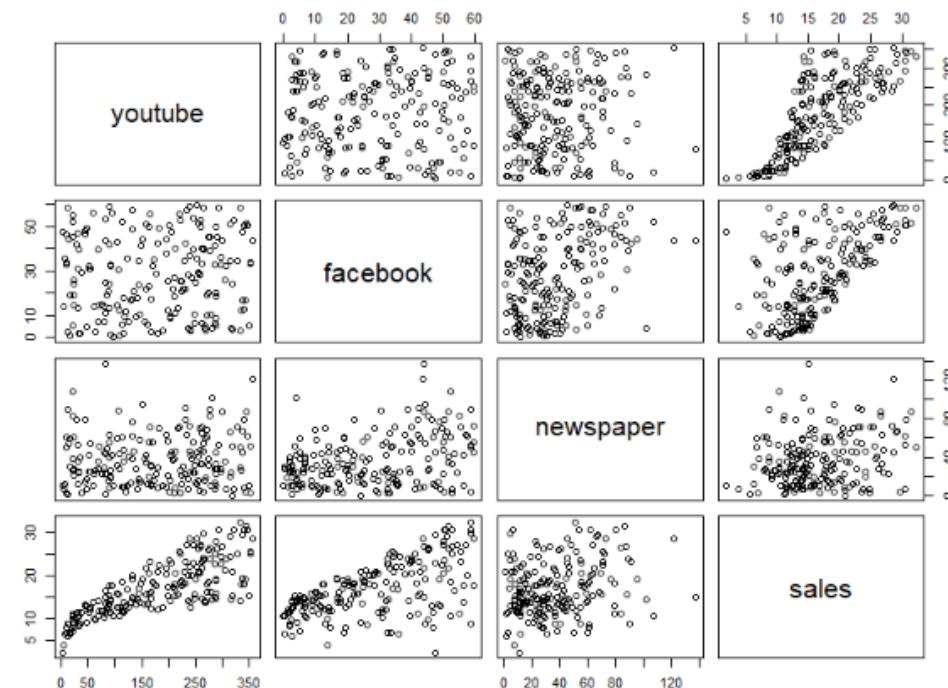
恭喜您, 開啟人生  
R 學習之旅 ^\_^

- 資料檔: <https://github.com/rwepa/DataDemo/blob/master/marketing.csv>
- 程式碼: <https://github.com/rwepa/DataDemo/blob/master/marketing.R>

# 行銷資料 marketing – pairs

```
> # 繪製散佈圖矩陣  
> pairs(marketing) # 發現什麼結果?
```

RStudio 繪圖時, Plots 視窗範圍  
不可太小, 否則會有錯誤:  
figure margins too large



# 行銷資料 marketing – lm 多元迴歸

```
> # 建立完整線性迴歸模型
> # 建立  $y = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + \beta_3 * x_3$  線性迴歸
> # x1: 自變數 youtube, x2: 自變數 facebook, x3: 自變數 newspaper
> # y: 依變數 sales
> sales_lm_all <- lm(sales ~ youtube + facebook + newspaper, data = marketing)
>
> # 檢視模型結果
> summary(sales_lm_all)
```

1

2

1

Call:  
`lm(formula = sales ~ youtube + facebook + newspaper, data = marketing)`

2

Residuals:

| Min      | 1Q      | Median | 3Q     | Max    |
|----------|---------|--------|--------|--------|
| -10.6397 | -1.0508 | 0.2794 | 1.4085 | 3.3923 |

3

Coefficients:

|             | Estimate  | Std. Error | t value | Pr(> t )   |
|-------------|-----------|------------|---------|------------|
| (Intercept) | 3.539162  | 0.374110   | 9.460   | <2e-16 *** |
| youtube     | 0.045618  | 0.001399   | 32.598  | <2e-16 *** |
| facebook    | 0.189209  | 0.008623   | 21.941  | <2e-16 *** |
| newspaper   | -0.000864 | 0.005868   | -0.147  | 0.883      |

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

4

Residual standard error: 2.021 on 195 degrees of freedom  
(1 observation deleted due to missingness)

Multiple R-squared: 0.8977, Adjusted R-squared: 0.8961  
F-statistic: 570.2 on 3 and 195 DF, p-value: < 2.2e-16

結果包括4大項目

1. Call: lm() 線性
2. Residuals: 線性迴歸模型的殘差
3. Coefficients: 迴歸係數, newspaper 的p值大於 0.05, 考慮刪除此自變數.
4. 統計值: 殘差標準差, R平方, 調整後R平方, F統計值, 自由度(DF), p-value

# 常用操作 Excel 套件

| 套件        | 功能                                     |
|-----------|--|
| readxl    | 讀取 Excel 【推薦】                          |
| writexl   | 寫入至 Excel 【推薦】                         |
| openxlsx  | 讀取 Excel, 格式設定(包括plot), 寫入至 Excel 【推薦】 |
| xlsx      | 讀取 Excel, 格式設定, 寫入, 需安裝 Java JDK或JRE   |
| XLConnect | 讀取 Excel, 格式設定, 寫入, 需安裝 Java JDK或JRE   |

## 3.ts,POSIXct,POSIXlt日期時間物件

# 時間序列物件 - ts (Time Series)

---

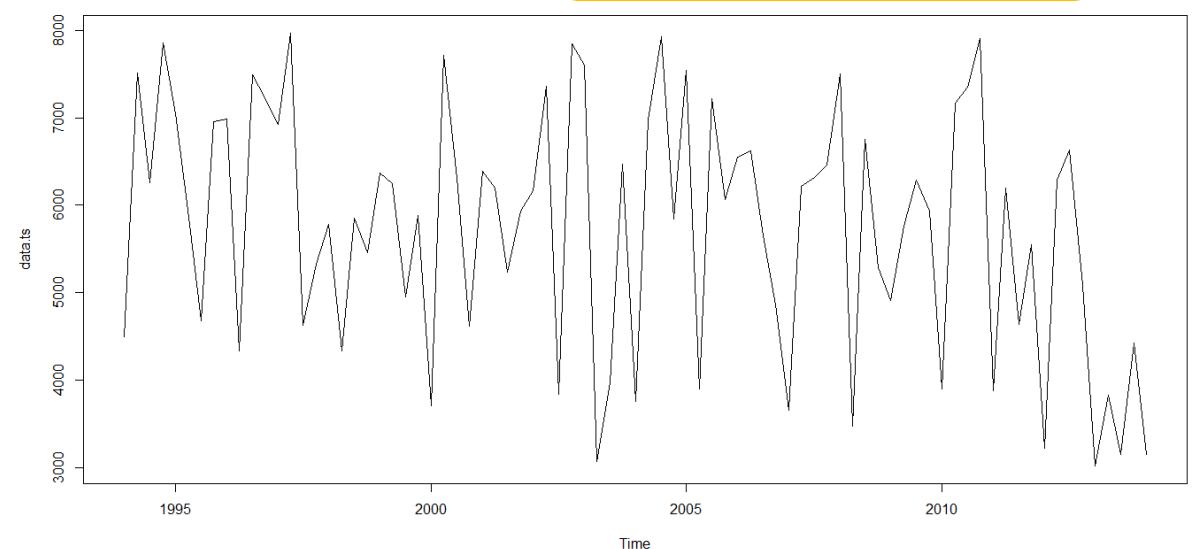
# ts 資料物件

- 觀測變數隨時間變化並加以記錄，例如每日股票指數，每日平均溫度，每月銷售量。
- 時間序列中的迴歸函數 (例：ar, arima) 採用 ts 物件。
- 時間序列物件包括多種特定繪圖方法。

# ts 資料物件 (續)

```
> # Time series  
> set.seed(168)  
> data.ts <- ts(round(runif(81,3000,8000)), start=c(1994,1), frequency=4)  
> is.ts(data.ts)  
[1] TRUE  
> start(data.ts)  
[1] 1994 1  
> end(data.ts)  
[1] 2014 1  
> frequency(data.ts)  
[1] 4  
> deltat(data.ts) # 0.25(=1/4)  
[1] 0.25  
> plot(data.ts)
```

- frequency 4:季
- frequency 12:月



# 日期/時間

---

# 日期時間物件

| 類別                 | 套件   | 說明  |
|--------------------|------|---|
| Date<br>日期         | base | Represent calendar dates as the number of days since 1970-01-01   |
| POSIXct<br>日期時間    |      | Represent calendar dates and times within the day as the (signed) number of seconds since the beginning of 1970 as a numeric vector. Supports various time zone specifications (e.g. GMT, PST, EST etc.)            |
| POSIXlt<br>日期時間-串列 |      | Represents local dates and times within the day as named list of vectors with date-time components. (串列表示)  |
| Yearmon<br>年月      | zoo  | Represent monthly data. Internally it holds the data as year plus 0 for January, 1/12 for February, 2/12 for March and so on in order that its internal representation is the same as ts class with frequency = 12. |
| Yearqtr<br>年季      |      | Represent quarterly data. Internally it holds the data as year plus 0 for Quarter 1, 1/4 for Quarter 2 and so on in order that its internal representation is the same as ts class with frequency = 4.              |

# 日期 as.Date()

- as.Date("西元年/月/日")

```
> # Date 類別 -----
> mydate <- as.Date("1970/1/1")
> mydate
[1] "1970-01-01"
> class(mydate)
[1] "Date"
> as.numeric(mydate)
[1] 0
> as.character(mydate)
[1] "1970-01-01"
```

# as.Date( , format=...)

- as.Date("西元年/月/日", format="%m/%d/%Y")

```
> # as.Date( , format=...) ----  
> # as.Date( , format=...) ----  
> as.Date("5/26/2022", format="%m/%d/%Y")  
[1] "2022-05-26"  
> as.Date("05/26/2022", format="%m/%d/%Y")  
[1] "2022-05-26"  
> as.Date("May 26, 2022", format="%B %d, %Y") # NA  
[1] NA  
> as.Date("五月 26, 2022", format="%B %d, %Y")  
[1] "2022-05-26"  
>
```



解決方法：參考程式碼

# format() – 日期輸出格式

```
> # CTRL + SHIFT + F10
> # format() – 調整輸出格式
> # CTRL + SHIFT + F10
> # format() – 調整輸出格式
> mydate <- sys.Date()
> mydate
[1] "2022-05-17"
> format(mydate, format="%m-%d-%Y")
[1] "05-17-2022"
> class(format(mydate, format="%m-%d-%Y"))
[1] "character"
```

- 預設日期輸出是YYYY-m-d
- 使用 format 函數改變輸出格式，或取出部份結果

# format() – 日期輸出格式 (續)

```
> # 日  
> format(mydate, format="%d")  
[1] "17"  
>  
> # 月  
> months(mydate)  
[1] "五月"  
>  
> # 星期  
> weekdays(mydate)  
[1] "星期二"  
>  
> # 季  
> quarters(mydate)  
[1] "Q2"  
>  
> # 年  
> format(mydate, format="%Y")  
[1] "2022"  
>  
> # 民國年  
> paste0("民國", as.numeric(format(mydate, format="%Y")) - 1911, "年")  
[1] "民國111年"
```

# 年月日時分秒

- POSIXct 類別

- 年月日時分秒
- GMT(Greenwich Mean Time 格林威治標準時間) 1970年1月1日午夜 00:00開始

- POSIXlt 類別(*l : List*)

- 包括年月日時分秒的串列(list)
- 秒(sec), 分(min), 時(hour)
- 日(mday), 月(mon), 年(year)
- 星期(wday)
- 1年中第幾天 (yday)
- 日光節約時間 daylight savings time flag (isdst)

線上說明  
?POSIXt

# 1. 建立 POSIXct 物件

```
> # 建立 POSIXct 物件  
> myPOSIXct <- as.POSIXct(sys.time())  
> myPOSIXct  
[1] "2018-07-23 22:19:52 CST"  
> class(myPOSIXct)  
[1] "POSIXct" "POSIXt"  
> Sys.timezone()  
[1] "Asia/Taipei"  
> attributes(myPOSIXct)  
$`class`  
[1] "POSIXct" "POSIXt"
```

```
> class(myPOSIXct)  
[1] "POSIXct" "POSIXt"  
                1                2
```

- 左側(1)的位置為子類別
- 右側(2)的位置為父類別
- 子類別POSIXct會繼承父類別POSIXt的屬性與方法
- R是物件導向程式語言

```
>  
> myDateTimeStr1 <- "4-7-2011 09:10:01"  
> myPOSIXct1 <- as.POSIXct(myDateTimeStr1, format="%d-%m-%Y %H:%M:%S")  
> myPOSIXct1  
[1] "2011-07-04 09:10:01 CST"  
> ?strptime
```

# 高頻資料(High Frequency Data)

- [https://en.wikipedia.org/wiki/High\\_frequency\\_data](https://en.wikipedia.org/wiki/High_frequency_data)

```
> # 高頻資料(High Frequency Data)
> HfDateTimestr <- "2018-7-23 10:17:07.125"
>
> HfPOSIXct <- as.POSIXct(HfDateTimestr)
>
> HfPOSIXct
[1] "2018-07-23 10:17:07.125 CST"
>
> # 調整小數點顯示位數
> options(digits.secs = 3)
> HfPOSIXct
[1] "2018-07-23 10:17:07.125 CST"
```

## 2. 建立 POSIXlt 物件

```
> # 建立 POSIXlt 物件
> myPOSIXlt <- as.POSIXlt(sys.time())
> myPOSIXlt
[1] "2018-07-23 22:21:29 CST"
> class(myPOSIXlt)
[1] "POSIXlt" "POSIXt"
>
> names(unclass(myPOSIXlt))
[1] "sec"      "min"      "hour"     "mday"     "mon"      "year"     "wday"     "yday"     "isdst"    "zone"     "gmtoff"
> myPOSIXlt$sec
[1] 29.24111
> myPOSIXlt$min
[1] 21
> myPOSIXlt$yday
[1] 203
>
```

## 4. 常用財金套件 **zoo,xts,timeSeries,quantmod,tidyquant**

# 財金套件

| 套件                | 功能  |
|-------------------|---|
| <b>zoo</b>        | S3 Infrastructure for Regular and Irregular Time                              |
| <b>xts</b>        | Extension of zoo class  |
| <b>timeSeries</b> | S4 class and Financial Time Series Objects (Rmetrics Association)             |
| <b>quantmod</b>   | Quantitative Financial Modelling Framework                                    |
| <b>tidyquant</b>  | Tidy Quantitative Financial Analysis (結合 dplyr, tidyr, ggplot2, lubridate 套件) |

# zoo 套件

---

<https://cran.r-project.org/web/packages/zoo/index.html>

# 建立 zoo 物件

```
> # zoo 物件 -----
> library(zoo)

Attaching package: 'zoo'

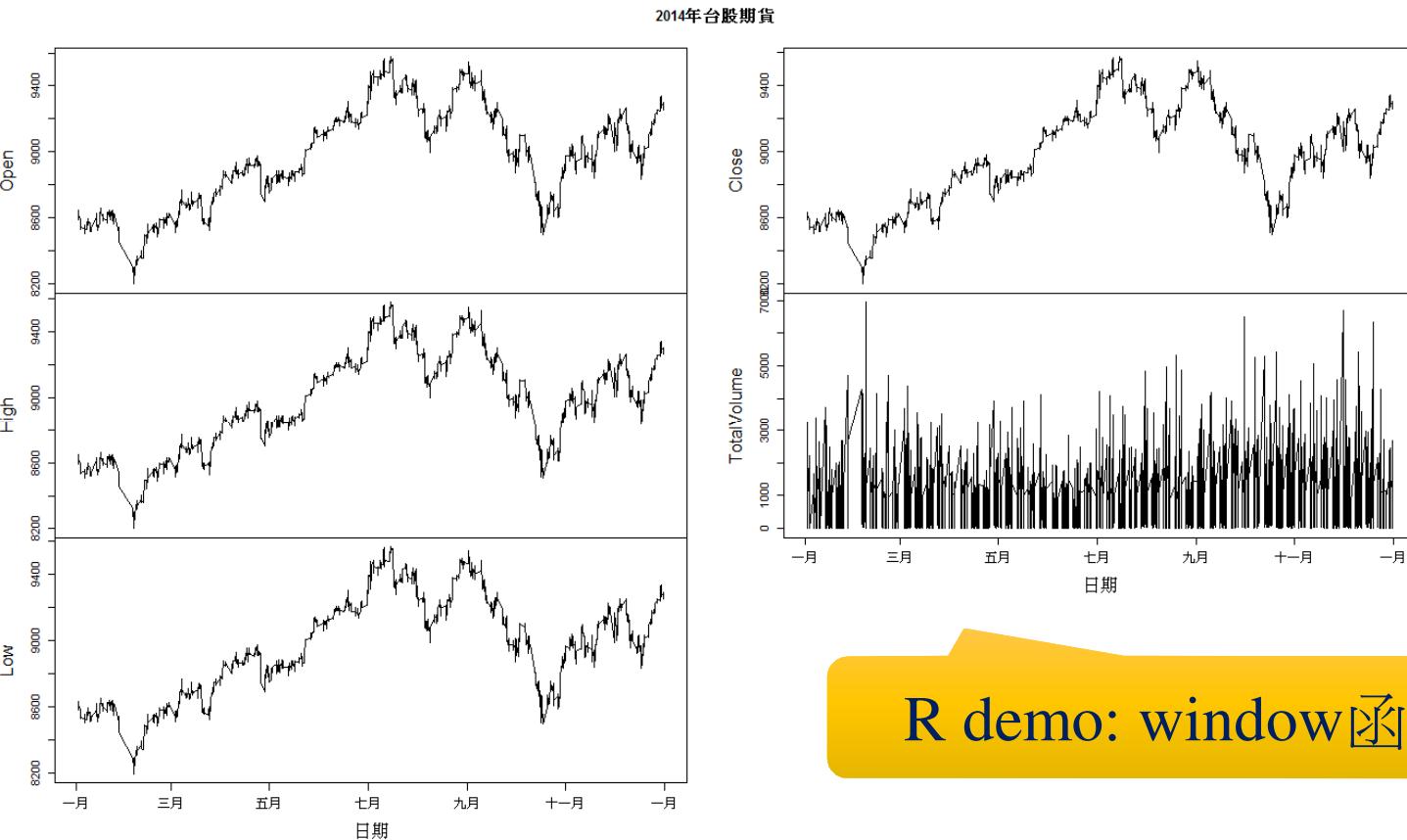
The following objects are masked from 'package:base':

  as.Date, as.Date.numeric

> f <- function(a, b) {
+   c <- paste(a, b)
+   return(strptime(c, format = "%Y%m%d %H%M"))
+ }
> d <- read.zoo(text="TICKER,PER,DATE,TIME,CLOSE
+                      SYMBOL1,1,20180728,1001,14180
+                      SYMBOL2,1,20180728,1002,14241",
+                      FUN = f,
+                      index.column = list("DATE", "TIME"),
+                      header=TRUE, sep=",")
> d
      TICKER          PER CLOSE
2018-07-28 10:01:00 SYMBOL1 1    14180
2018-07-28 10:02:00 SYMBOL2 1    14241
>
```



練習



R demo: window函數

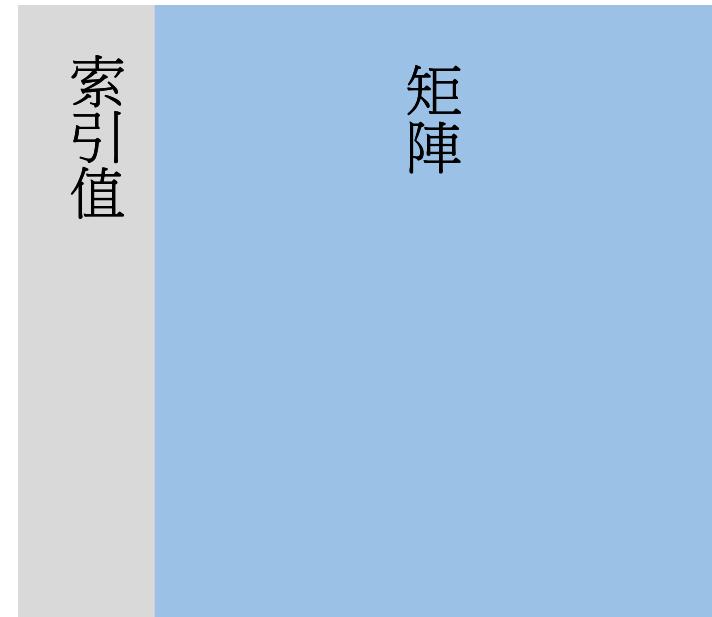
# xts 套件

---

<https://cran.r-project.org/web/packages/xts/index.html>

# xts 物件

- eXtensible Time Series (可擴充時間序列)
- 延伸自 zoo 物件
- 採用 索引值 + 矩陣 架構
- 時間 + 觀測值



# 建立 xts 物件

```
> # xts 物件 -----
> library(xts)
Loading required package: zoo

Attaching package: 'zoo'

The following objects are masked from 'package:base':

  as.Date, as.Date.numeric

> (xts1 <- xts(x=1:10, order.by=Sys.Date()-1:10))
[,1]
2018-07-13 10
2018-07-14 9
2018-07-15 8
2018-07-16 7
2018-07-17 6
2018-07-18 5
2018-07-19 4
2018-07-20 3
2018-07-21 2
2018-07-22 1
>
> dates <- seq(as.Date("2017-04-01"), length=5, by="days")
> data <- rnorm(5)
> xts2 <- xts(x=data, order.by=dates)
> xts2
[,1]
2017-04-01 -0.05250685
2017-04-02 -0.72876008
2017-04-03 -0.54389162
2017-04-04  0.63619164
2017-04-05  0.24488028
> xts3 <- xts(x=rnorm(10), order.by=as.POSIXct(Sys.Date()+1:10))
> xts3
[,1]
2018-07-24 08:00:00 -0.72755900
2018-07-25 08:00:00  1.18864171
2018-07-26 08:00:00  0.62354472
2018-07-27 08:00:00  1.78914937
2018-07-28 08:00:00  0.02353092
2018-07-29 08:00:00 -0.56436924
2018-07-30 08:00:00  0.50262802
2018-07-31 08:00:00  0.67097142
2018-08-01 08:00:00  0.21197451
2018-08-02 08:00:00 -0.09796220
>
```

# 建立 xts 物件 (續)

```

`> data(AirPassengers)
> xts4 <- as.xts(AirPassengers)
> head(xts4)
[1,]
一月 1949 112
二月 1949 118
三月 1949 132
四月 1949 129
五月 1949 121
六月 1949 135
> index(xts4)
[1] "一月 1949"   "二月 1949"   "三月 1949"   "四月 1949"   "五月 1949"   "六月 1949"   "七月 1949"   "八月 1949"
[9] "九月 1949"   "十月 1949"   "十一月 1949"  "十二月 1949"  "一月 1950"   "二月 1950"   "三月 1950"   "四月 1950"
[17] "五月 1950"   "六月 1950"   "七月 1950"   "八月 1950"   "九月 1950"   "十月 1950"   "十一月 1950"  "十二月 1950"
[25] "一月 1951"   "二月 1951"   "三月 1951"   "四月 1951"   "五月 1951"   "六月 1951"   "七月 1951"   "八月 1951"
[33] "九月 1951"   "十月 1951"   "十一月 1951"  "十二月 1951"  "一月 1952"   "二月 1952"   "三月 1952"   "四月 1952"
[41] "五月 1952"   "六月 1952"   "七月 1952"   "八月 1952"   "九月 1952"   "十月 1952"   "十一月 1952"  "十二月 1952"
[49] "一月 1953"   "二月 1953"   "三月 1953"   "四月 1953"   "五月 1953"   "六月 1953"   "七月 1953"   "八月 1953"
[57] "九月 1953"   "十月 1953"   "十一月 1953"  "十二月 1953"  "一月 1954"   "二月 1954"   "三月 1954"   "四月 1954"
[65] "五月 1954"   "六月 1954"   "七月 1954"   "八月 1954"   "九月 1954"   "十月 1954"   "十一月 1954"  "十二月 1954"
[73] "一月 1955"   "二月 1955"   "三月 1955"   "四月 1955"   "五月 1955"   "六月 1955"   "七月 1955"   "八月 1955"
[81] "九月 1955"   "十月 1955"   "十一月 1955"  "十二月 1955"  "一月 1956"   "二月 1956"   "三月 1956"   "四月 1956"
[89] "五月 1956"   "六月 1956"   "七月 1956"   "八月 1956"   "九月 1956"   "十月 1956"   "十一月 1956"  "十二月 1956"
[97] "一月 1957"   "二月 1957"   "三月 1957"   "四月 1957"   "五月 1957"   "六月 1957"   "七月 1957"   "八月 1957"
[105] "九月 1957"   "十月 1957"   "十一月 1957"  "十二月 1957"  "一月 1958"   "二月 1958"   "三月 1958"   "四月 1958"
[113] "五月 1958"   "六月 1958"   "七月 1958"   "八月 1958"   "九月 1958"   "十月 1958"   "十一月 1958"  "十二月 1958"
[121] "一月 1959"   "二月 1959"   "三月 1959"   "四月 1959"   "五月 1959"   "六月 1959"   "七月 1959"   "八月 1959"
[129] "九月 1959"   "十月 1959"   "十一月 1959"  "十二月 1959"  "一月 1960"   "二月 1960"   "三月 1960"   "四月 1960"
[137] "五月 1960"   "六月 1960"   "七月 1960"   "八月 1960"   "九月 1960"   "十月 1960"   "十一月 1960"  "十二月 1960"
> coredata(xts4)
[1,]
[1,] 112
[2,] 118
[3,] 132
[4,] 129
[5,] 121

```

# timeSeries 套件

---

# timeSeries 套件

## timeSeries: Financial Time Series Objects (Rmetrics)

'S4' classes and various tools for financial time series: Basic functions such as scaling and sorting, subsetting, mathematical operations and statistical functions.

|                   |   |
|-------------------|---|
| Version:          | 3062.100  |
| Depends:          | R ( $\geq$ 2.10), graphics, grDevices, stats, methods, utils, <a href="#">timeDate</a> ( $\geq$ 2150.95)  |
| Suggests:         | <a href="#">RUnit</a> , <a href="#">robustbase</a> , <a href="#">xts</a> , <a href="#">PerformanceAnalytics</a> , <a href="#">fTrading</a>  |
| Published:        | 2020-01-24  |
| Author:           | Diethelm Wuertz [aut] (original code), Tobias Setz [cre], Yohan Chalabi [ctb], Martin Maechler  [ctb]   |
| Maintainer:       | Tobias Setz <tobias.setz at live.com>   |
| License:          | <a href="#">GPL-2</a>   <a href="#">GPL-3</a> [expanded from: GPL ( $\geq$ 2)]  |
| Copyright:        | see file <a href="#">COPYRIGHTS</a>   |
| URL:              | <a href="https://r-forge.r-project.org/scm/viewvc.php/pkg/timeSeries/?root=rmetrics">https://r-forge.r-project.org/scm/viewvc.php/pkg/timeSeries/?root=rmetrics</a> , <a href="http://www.rmetrics.org">http://www.rmetrics.org</a> |
| NeedsCompilation: | no  |
| Materials:        | <a href="#">ChangeLog</a>   |
| In views:         | <a href="#">Finance</a> , <a href="#">MissingData</a> , <a href="#">TimeSeries</a>  |
| CRAN checks:      | <a href="#">timeSeries results</a>  |
| Documentation:    |   |
| Reference manual: | <a href="#">timeSeries.pdf</a>  |
| Vignettes:        | <a href="#">Plotting 'timeSeries' Objects</a>   |

參考線上說明

# quantmod 套件

---

# quantmod 套件

**quantmod**: Quantitative Financial Modelling Framework

Specify, build, trade, and analyse financial trading strategies.

Version: 0.4.20  
Depends: R (>= 3.2.0), [xts](#) (>= 0.9-0), [zoo](#), [TTR](#) (>= 0.2), methods  
Imports: [curl](#)  
Suggests: [DBI](#), [RMySQL](#), [RSQLite](#), [timeSeries](#), [xml2](#), [downloader](#), [jsonlite](#) (>= 1.1)  
Published: 2022-04-29  
Author: Jeffrey A. Ryan [aut, cph], Joshua M. Ulrich [cre, aut], Ethan B. Smith [ctb], Wouter Thielen [ctb], Paul Teator [ctb], Steve Bronder [ctb]  
Maintainer: Joshua M. Ulrich <josh.m.ulrich at gmail.com>  
BugReports: <https://github.com/joshualrich/quantmod/issues>   
License: [GPL-3](#)  
URL: <http://www.quantmod.com> <https://github.com/joshualrich/quantmod>  
NeedsCompilation: no  
Materials: [NEWS](#)  
In views: [Finance](#)  
CRAN checks: [quantmod results](#)  
  
Documentation:  
Reference manual: [quantmod.pdf](#)

# quantmod 簡介

- 定量財務模型架構(quantitative financial modelling framework)
- 功能
  1. 下載全球財金資料
  2. 財金資料視覺化
  3. 建立技術指標 (technical indicator)
  4. 將交易指標應用於交易之中
  5. 根據回報數據評估交易規則

# 安裝 quantmod 套件

```
# quantmod 套件 -----

# 載入 quantmod 套件會有Error
# library(quantmod)
# Error in new.session() : Could not establish session after 5 attempts

# 解決方法，使用 install_github
# Ctrl + Shift + F10
remotes::install_github("joshuaulrich/quantmod@358-getsymbols-new.session")
# 顯示以下4個選項，選取2
# 1: All
# 2: CRAN packages only
# 3: None
# 4: zoo (1.8-9 -> 1.8-10) [CRAN]
```

# getSymbols 函數

```
> library(quantmod)
>
> # 讀取IBM在Yahoo Finance 股票資料
> getSymbols("IBM", src="google") # from google finance (Google不再提供)
Error: 'getSymbols.google' is defunct.
Google Finance stopped providing data in March, 2018.
You could try setting src = "yahoo" instead.
See help("Defunct") and help("quantmod-defunct")
>
> getSymbols("IBM", src="yahoo") # from yahoo finance
[1] "IBM"
>
> getSymbols("IBM") # 不用加註src
[1] "IBM"
>
> head(IBM, n=3)
      IBM.Open IBM.High IBM.Low IBM.Close IBM.Volume IBM.Adjusted
2007-01-03 92.90631 94.07265 92.02677 92.99236    9619853     58.14252
2007-01-04 92.97323 94.44550 92.61950 93.98662   11008627     58.76419
2007-01-05 93.30784 93.64245 92.64819 93.13576   7553480     58.23219
>
> class(IBM)
[1] "xts" "zoo"
```

xts, zoo 物件

# 資料處理

```
# 讀取資料-台灣加權指數  
# TWII (TSEC weighted index)  
getSymbols("^TWII") # Warning message: ^TWII contains missing values.  
head(TWII, n=3)  
str(TWII)  
dim(TWII) # 3779*6  
  
# 刪除NA資料  
TWII <- na.omit(TWII)  
dim(TWII) # 3763*6
```

# 繪圖 chartSeries(TWII)



# 建立R環境(命名空間)

```
# 建立R環境(命名空間)
twii.env <- new.env()
getSymbols("^TWII", from="2019-1-1", env=twii.env)

twii.2019 <- twii.env$TWII
twii.1 <- get("TWII", envir=twii.env)
twii.2 <- with(twii.env, TWII)

rm(list=c("twii.1","twii.2"))
```

rm: 刪除

## 台積電範例

---

- 上市 2330.TW
- 上櫃 4506.TWO

# 資料篩選 \$

```
getSymbols("2330.TW", from="2000-1-1")
`2330.TW` <- na.omit(`2330.TW`)

2330.TW # error
`2330.TW` # OK
chartSeries(`2330.TW`)

# 資料篩選
head(`2330.TW`)

# Error: unexpected numeric constant in "head(`2330.TW`$2330."
head(`2330.TW`$2330.TW.Close)
```

head(`2330.TW`\$2330.TW.Close)

```
tail(`2330.TW`)

dim(`2330.TW`)
names(`2330.TW`)
```

# gsub 函數: 取代

```
> # 修改欄位名稱  
> names(`2330.TW`) <- gsub(pattern='2330.TW.', replacement = "", x =names(`2330.TW`))  
1  
> names(`2330.TW`)  
[1] "open"      "High"       "Low"        "Close"       "Volume"     "Adjusted"  
2  
> tw2330 <- `2330.TW`  
3  
> rm(`2330.TW`)  
>  
> # 選取 2021年5月 所有資料  
> # 選取 2021年5月 所有資料  
4  
> tw2330["2021-05"]
```

|            | Open | High | Low | Close | Volume    | Adjusted |
|------------|------|------|-----|-------|-----------|----------|
| 2021-05-03 | 595  | 597  | 588 | 588   | 41762441  | 577.3860 |
| 2021-05-04 | 588  | 594  | 582 | 591   | 40273595  | 580.3319 |
| 2021-05-05 | 594  | 594  | 585 | 585   | 29254785  | 574.4402 |
| 2021-05-06 | 590  | 590  | 580 | 587   | 30725590  | 576.4040 |
| 2021-05-07 | 594  | 600  | 589 | 599   | 28075722  | 588.1874 |
| 2021-05-10 | 596  | 597  | 588 | 589   | 20434079  | 578.3680 |
| 2021-05-11 | 579  | 580  | 570 | 571   | 59349193  | 560.6929 |
| 2021-05-12 | 567  | 571  | 518 | 560   | 131741482 | 549.8915 |
| 2021-05-13 | 547  | 563  | 541 | 547   | 66765627  | 537.1261 |
| 2021-05-14 | 556  | 562  | 552 | 557   | 37533726  | 546.9456 |
| 2021-05-17 | 544  | 558  | 541 | 549   | 56270958  | 539.0900 |
| 2021-05-18 | 563  | 573  | 555 | 572   | 43689316  | 561.6749 |
| 2021-05-19 | 571  | 572  | 565 | 567   | 28908777  | 556.7651 |
| 2021-05-20 | 567  | 571  | 560 | 567   | 29709287  | 556.7651 |
| 2021-05-21 | 572  | 577  | 568 | 573   | 27376731  | 562.6568 |
| 2021-05-24 | 570  | 572  | 566 | 568   | 15629736  | 557.7471 |
| 2021-05-25 | 576  | 584  | 573 | 583   | 33039911  | 572.4763 |
| 2021-05-26 | 587  | 588  | 581 | 585   | 18703987  | 574.4402 |
| 2021-05-27 | 580  | 582  | 573 | 582   | 62169719  | 571.4943 |
| 2021-05-28 | 587  | 592  | 582 | 590   | 29086873  | 579.3499 |
| 2021-05-31 | 595  | 597  | 590 | 597   | 30657474  | 586.2236 |

# 範圍區隔運算子 '/'

```
# 範圍區隔運算子 '/': 啟始日期至2021-05-15  
tw2330["/2021-05-15"]  
  
# 範圍區隔運算子 '/': 2022-05-01至最近日期  
tw2330["2022-05-01/"]  
  
# 最後一年開始的資料  
tw2330_Last_1Year <- last(tw2330, '1 year')  
tw2330_Last_1Year  
  
# 開始前2年資料  
tw2330_First_2Year <- first(tw2330, '2 year')  
tw2330_First_2Year  
head(tw2330_First_2Year)  
tail(tw2330_First_2Year)
```

# s&P500, 港股

```
# S&P500 index  
getSymbols("^GSPC", from=as.Date("1960-01-04"))  
chartSeries(GSPC)  
  
# 中國移動  
getSymbols("0941.hk")  
head(`0941.HK`)
```

# S&P 500

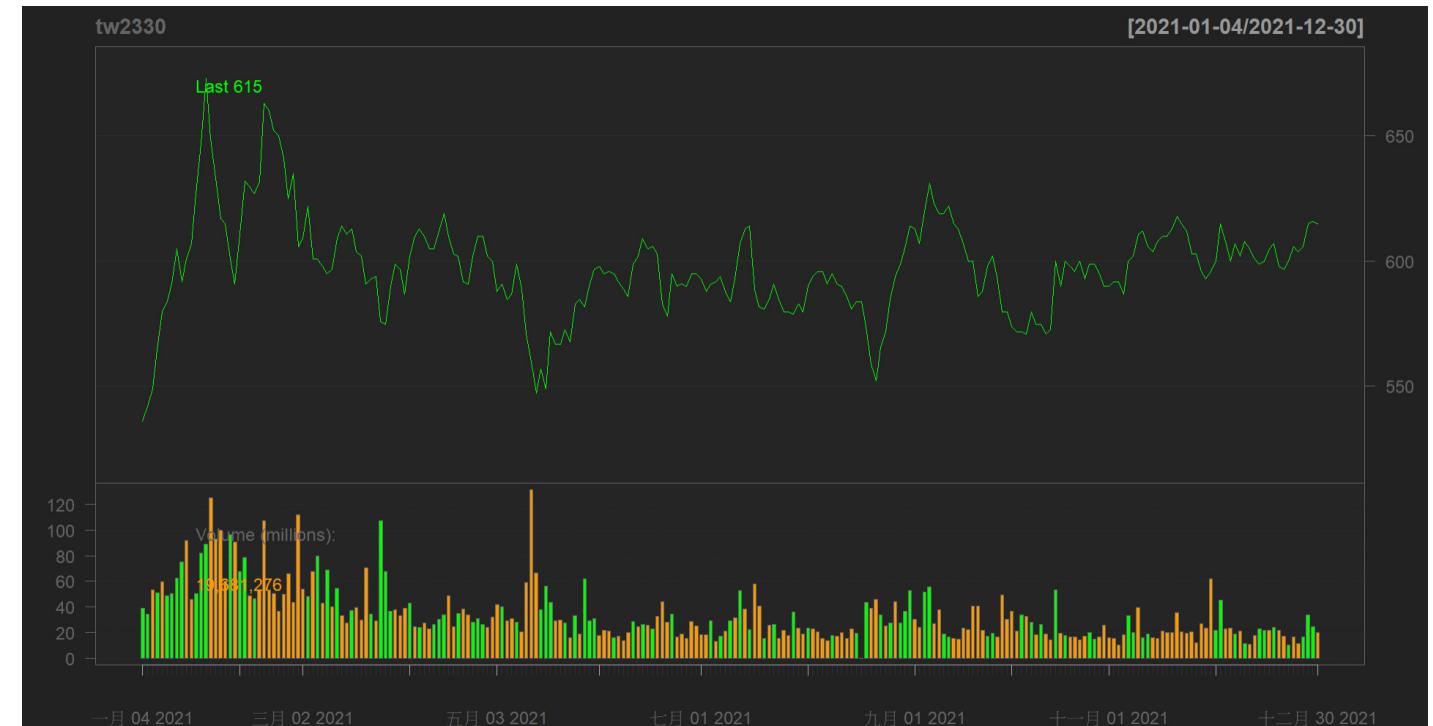


# apply.week

```
# 每週 apply.week  
# 每月 apply.monthly  
# 每季 apply.quarterly  
# 每年 apply.yearly  
  
# 每週成交量總計  
WeekVo<- apply.weekly(Vo(tw2330), sum)  
head(WeekVo)  
  
# 每週平均成交量  
DayVoMean <- apply.weekly(Vo(tw2330), mean)  
DayVoMean  
  
# 每年成交量總計  
YearVo <- apply.yearly(Vo(tw2330), sum)  
YearVo
```

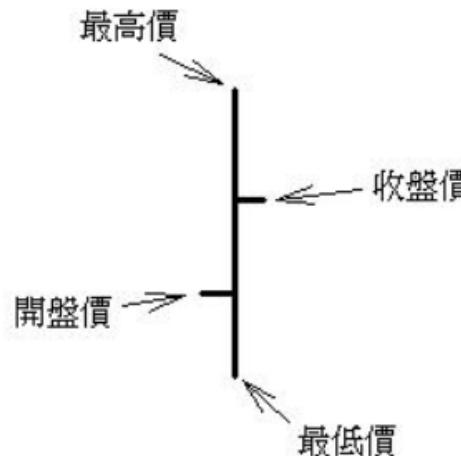
# 線圖 type="line"

```
# 繪圖 ----  
# Line  
# bars  
# candlesticks  
  
# 篩選2021年資料，預設黑色背景  
chartSeries(tw330,  
            type="line",  
            subset='2021')
```



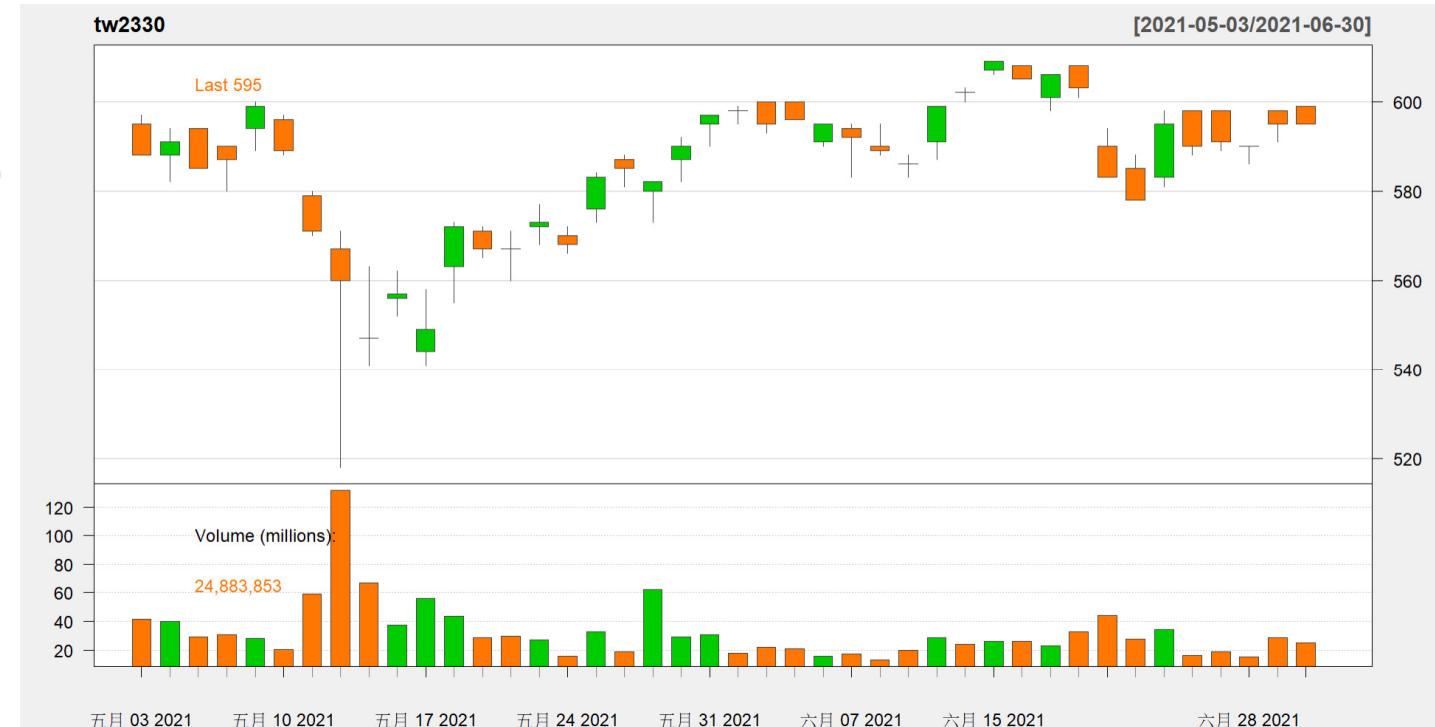
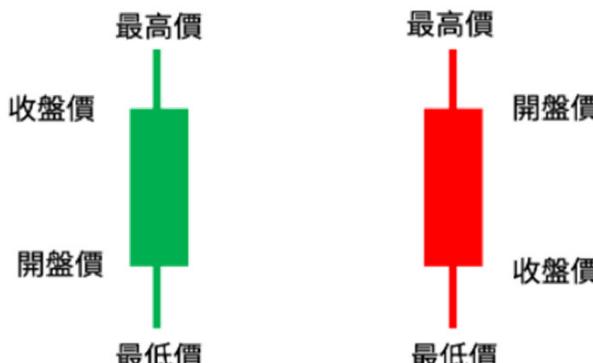
# 柱狀圖(直線圖) type="bar"

```
chartSeries(tw2330,  
           type="bar",  
           subset='2021-05::2021-06',  
           theme=chartTheme('white'))
```



# 蠟燭圖 (K線圖) type="candlesticks"

```
chartSeries(tw2330,  
           type="candlesticks",  
           subset='2021-05::2021-06',  
           theme=chartTheme('white'))
```



# 財金技術指標

---

# 簡單移動平均 SMA, addSMA

```
# 簡單移動平均 Simple Moving Average  
  
sma <- SMA(c1(tw2330), n=20)  
tail(sma, n=5)  
  
# 繪圖,加入移動平均  
chartSeries(tw2330,  
            type="line",  
            subset='2021-01::',  
            theme=chartTheme('white'))  
  
addSMA(n=30, col= "blue")  
addSMA(n=100, col = "red")
```



# 指數移動平均 EMA, addEMA

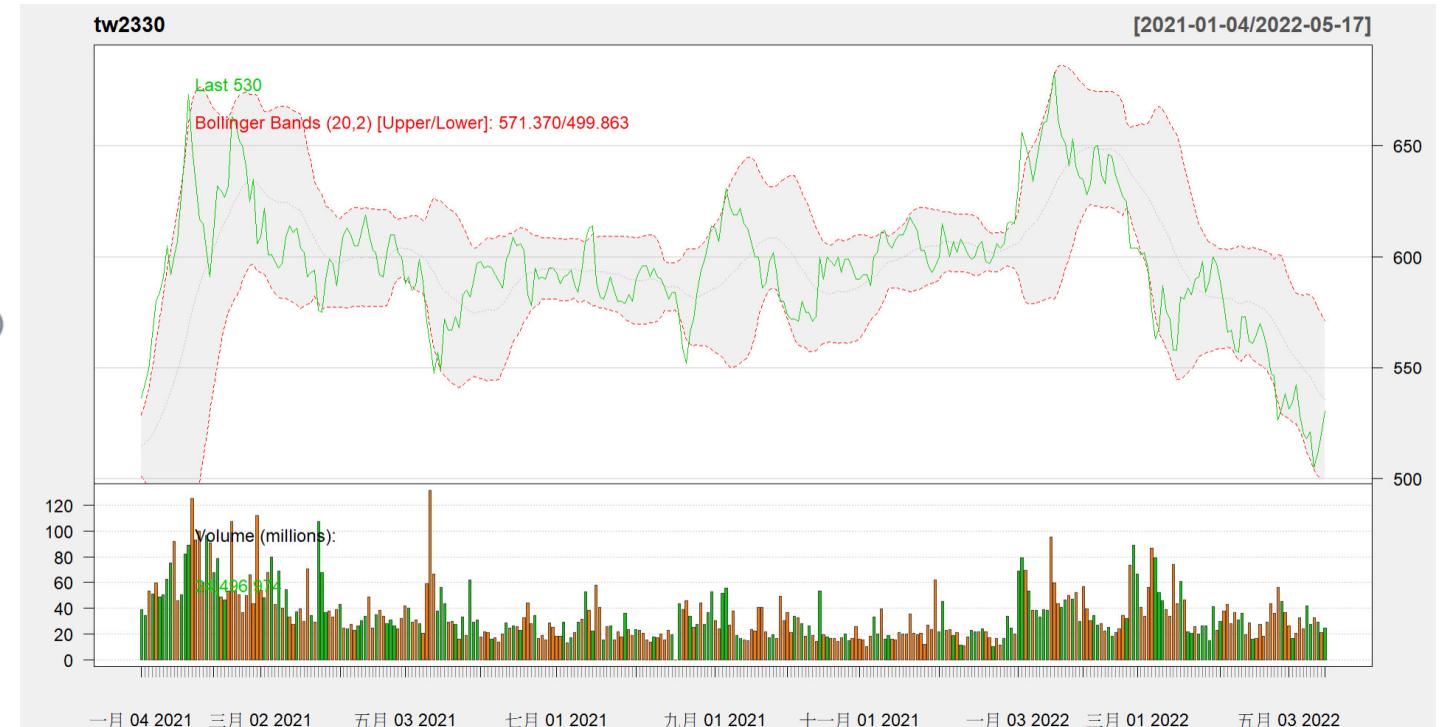
```
# 指數移動平均 Exponential moving average  
ema <- EMA(Cl(tw2330), n=20)  
tail(ema, n=5)  
  
chartSeries(tw2330,  
            type="line",  
            subset='2021-01::',  
            theme=chartTheme('white'))  
addEMA(n=30, on=1, col = "blue")  
addEMA(n=200, on=1, col = "red")
```



# 布林通道 Bbands, addBbands

```
bb <- BBands(Cl(tw2330), sd=2)
tail(bb, n=5)

chartSeries(tw2330,
            type="line",
            subset='2021-01::',
            theme=chartTheme('white'))
addBbands(n=20, sd=2)
```



# tidyquant 套件

---

# tidyquant 套件

## tidyquant: Tidy Quantitative Financial Analysis

Bringing business and financial analysis to the 'tidyverse'. The 'tidyquant' package provides a convenient wrapper to various 'xts', 'zoo', 'quantmod', 'TTR' and 'PerformanceAnalytics' package functions and returns the objects in the tidy 'tibble' format. The main advantage is being able to use quantitative functions with the 'tidyverse' functions including 'purrr', 'dplyr', 'tidy', 'ggplot2', 'lubridate', etc. See the 'tidyquant' website for more information, documentation and examples.

|                   |   |
|-------------------|---|
| Version:          | 1.0.3   |
| Depends:          | R ( $\geq$ 3.5.0), <a href="#">lubridate</a> , <a href="#">PerformanceAnalytics</a> , <a href="#">quantmod</a> ( $\geq$ 0.4-13)   |
| Imports:          | <a href="#">dplyr</a> ( $\geq$ 1.0.0), <a href="#">ggplot2</a> , <a href="#">jsonlite</a> , <a href="#">httr</a> , <a href="#">curl</a> , <a href="#">lazyeval</a> , <a href="#">magrittr</a> , <a href="#">purrr</a> , <a href="#">Quandl</a> , <a href="#">riingo</a> , <a href="#">readr</a> , <a href="#">alphavantager</a> ( $\geq$ 0.1.2), <a href="#">stringr</a> , <a href="#">tibble</a> , <a href="#">tidy</a> ( $\geq$ 1.0.0), <a href="#">timetk</a> ( $\geq$ 2.4.0), <a href="#">timeDate</a> , <a href="#">TTR</a> , <a href="#">xts</a> , <a href="#">rlang</a> , <a href="#">tidyselect</a> , <a href="#">rstudioapi</a> , <a href="#">crayon</a> , <a href="#">cli</a> , <a href="#">janitor</a> |
| Suggests:         | <a href="#">tidyverse</a> , <a href="#">tibbletime</a> , <a href="#">forcats</a> , <a href="#">broom</a> , <a href="#">knitr</a> , <a href="#">rmarkdown</a> , <a href="#">testthat</a> ( $\geq$ 2.1.0), <a href="#">scales</a> , <a href="#">Rblpapi</a> , <a href="#">readxl</a>  |
| Published:        | 2021-03-05  |
| Author:           | Matt Dancho [aut, cre], Davis Vaughan [aut]   |
| Maintainer:       | Matt Dancho <mdancho at business-science.io>  |
| BugReports:       | <a href="https://github.com/business-science/tidyquant/issues">https://github.com/business-science/tidyquant/issues</a>   |
| License:          | <a href="#">MIT</a> + file <a href="#">LICENSE</a>  |
| URL:              | <a href="https://github.com/business-science/tidyquant">https://github.com/business-science/tidyquant</a>   |
| NeedsCompilation: | no  |
| Materials:        | <a href="#">README</a> <a href="#">NEWS</a>   |
| In views:         | <a href="#">Finance</a>   |
| CRAN checks:      | <a href="#">tidyquant results</a>   |
| Documentation:    |   |
| Reference manual: | <a href="#">tidyquant.pdf</a>   |
| Vignettes:        | <a href="#">Introduction to tidyquant</a> <a href="#">Core Functions in tidyquant</a>   |

線上說明



# 台股代碼表

---

# 台股代碼表

- 本國上市證券國際證券辨識號碼一覽表
- 下載 [https://github.com/rwepa/DataDemo/blob/master/tw\\_stock\\_list.xlsx](https://github.com/rwepa/DataDemo/blob/master/tw_stock_list.xlsx)

| A | B      | C    | D                 | E          | F   | G    |
|---|--------|------|-------------------|------------|-----|------|
| 1 | 有價證券代號 | 股票名稱 | 國際證券辨識號碼_ISINCode | 上市日        | 市場別 | 產業別  |
| 2 | 1101   | 台泥   | TW0001101004      | 1962/2/9   | 上市  | 水泥工業 |
| 3 | 1102   | 亞泥   | TW0001102002      | 1962/6/8   | 上市  | 水泥工業 |
| 4 | 1103   | 嘉泥   | TW0001103000      | 1969/11/14 | 上市  | 水泥工業 |
| 5 | 1104   | 環泥   | TW0001104008      | 1971/2/1   | 上市  | 水泥工業 |
| 6 | 1108   | 幸福   | TW0001108009      | 1990/6/6   | 上市  | 水泥工業 |

資料來源 [https://isin.twse.com.tw/isin/C\\_public.jsp?strMode=2](https://isin.twse.com.tw/isin/C_public.jsp?strMode=2)

# readxl 套件

```
library(readxl)
stockcode <- read_excel("C:/rdata/tw_stock_list.xlsx")
stockcode # 1758 × 7
class(stockcode)
save(stockcode, file = "stockcode.RData")

# CTRL + SHIFT + F10
load(file = "stockcode.RData")
head(stockcode)
```

|   | 有價證券代號 | 股票名稱 | 國際證券辨識號碼<br>_ISINCode | 上市日        | 市場別 | 產業別  | CFICode |
|---|--------|------|-----------------------|------------|-----|------|---------|
| 1 | 1101   | 台泥   | TW0001101004          | 1962-02-09 | 上市  | 水泥工業 | ESVUFR  |
| 2 | 1102   | 亞泥   | TW0001102002          | 1962-06-08 | 上市  | 水泥工業 | ESVUFR  |
| 3 | 1103   | 嘉泥   | TW0001103000          | 1969-11-14 | 上市  | 水泥工業 | ESVUFR  |
| 4 | 1104   | 環泥   | TW0001104008          | 1971-02-01 | 上市  | 水泥工業 | ESVUFR  |
| 5 | 1108   | 幸福   | TW0001108009          | 1990-06-06 | 上市  | 水泥工業 | ESVUFR  |
| 6 | 1109   | 信大   | TW0001109007          | 1991-12-05 | 上市  | 水泥工業 | ESVUFR  |

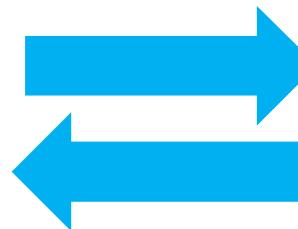
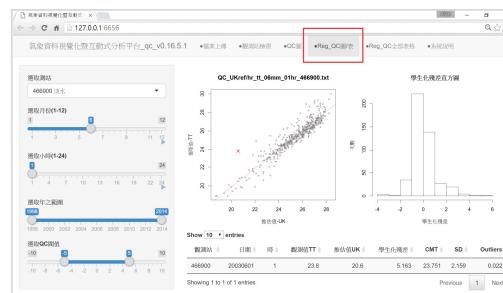
# 5.shiny簡介



# shiny 簡介

- 隨著資訊科技技術的進步，如何提供WEB化的應用服務。
- shiny 套件提供更方便，互動式與動態更新等應用
  - 輸入 - 文字方塊、下拉式選單、按鈕。
  - 處理 - 執行 R 運算、建立模型。
  - 輸出 - 網頁中呈現文字摘要、表格與圖表等。
- 參考資源 <https://shiny.rstudio.com/>

# shiny (server) 架構



ui.R



server.R

# CRAN shiny 套件

互動式網頁應用

shiny: Web Application Framework for R

Makes it incredibly easy to build interactive web applications with R. Automatic "reactive" binding between inputs and outputs and extensive prebuilt widgets make it possible to build beautiful, responsive, and powerful applications with minimal effort.

|             |  |
|-------------|--|
| Version:    | 1.7.1  |
| Depends:    | R (≥ 3.0.2), methods   |
| Imports:    | utils, grDevices, <a href="#">httpuv</a> (≥ 1.5.2), <a href="#">mime</a> (≥ 0.3), <a href="#">jsonlite</a> (≥ 0.9.16), <a href="#">xtable</a> , <a href="#">fontawesome</a> (≥ 0.2.1), <a href="#">htmltools</a> (≥ 0.5.2), <a href="#">R6</a> (≥ 2.0), <a href="#">sourcetools</a> , <a href="#">later</a> (≥ 1.0.0), <a href="#">promises</a> (≥ 1.1.0), tools, <a href="#">crayon</a> , <a href="#">rlang</a> (≥ 0.4.10), <a href="#">fastmap</a> (≥ 1.1.0), <a href="#">withr</a> , <a href="#">commonmark</a> (≥ 1.7), <a href="#">glue</a> (≥ 1.3.2), <a href="#">bslib</a> (≥ 0.3.0), <a href="#">cachem</a> , <a href="#">ellipsis</a> , <a href="#">lifecycle</a> (≥ 0.2.0)   |
| Suggests:   | datasets, <a href="#">Cairo</a> (≥ 1.5-5), <a href="#">testthat</a> (≥ 3.0.0), <a href="#">knitr</a> (≥ 1.6), <a href="#">markdown</a> , <a href="#">rmarkdown</a> , <a href="#">ggplot2</a> , <a href="#">reactlog</a> (≥ 1.0.0), <a href="#">magrittr</a> , <a href="#">shinytest</a> (≥ 1.4.0.9003), <a href="#">yaml</a> , <a href="#">future</a> , <a href="#">dygraphs</a> , <a href="#">ragg</a> , <a href="#">showtext</a> , <a href="#">sass</a>  |
| Published:  | 2021-10-02   |
| Author:     | Winston Chang  [aut, cre], Joe Cheng [aut], JJ Allaire [aut], Carson Sievert  [aut], Barret Schloerke  [aut], Yihui Xie [aut], Jeff Allen [aut], Jonathan McPherson [aut], Alan Dipert [aut], Barbara Borges [aut], RStudio [cph], jQuery Foundation [cph] (jQuery library and jQuery UI library), jQuery contributors [ctb, cph] (jQuery library; authors listed in inst/www/shared/jquery-AUTHORS.txt), jQuery UI contributors [ctb, cph] (jQuery UI library; authors listed in inst/www/shared/jqueryui-AUTHORS.txt), Mark Otto [ctb] (Bootstrap library), Jacob Thornton [ctb] (Bootstrap library), Bootstrap contributors [ctb] (Bootstrap library), Twitter, Inc [cph] (Bootstrap library), Prem Nawaz Khan [ctb] (Bootstrap accessibility plugin), Victor Tsaran [ctb] (Bootstrap accessibility plugin), Dennis Lembree [ctb] (Bootstrap accessibility plugin), Srinivasu Chakravarthula [ctb] (Bootstrap accessibility plugin), Cathy O'Connor [ctb] (Bootstrap accessibility plugin), PayPal, Inc [cph] (Bootstrap accessibility plugin), Stefan Petre [ctb, cph] (Bootstrap-datepicker library), Andrew Rowls [ctb, cph] (Bootstrap-datepicker library), Brian Reavis [ctb, cph] (selectize.js library), Salmen Bejaoui [ctb, cph] (selectize-plugin-a11y library), Denis Ineshin [ctb, cph] (ion.rangeSlider library), Sami Samhuri [ctb, cph] (Javascript strftime library), SpryMedia Limited [ctb, cph] (DataTables library), John Fraser [ctb, cph] (showdown.js library), John Gruber [ctb, cph] (showdown.js library), Ivan Sagalaev [ctb, cph] (highlight.js library), R Core Team [ctb, cph] (tar implementation from R) |
| Maintainer: | Winston Chang <winston at rstudio.com>   |
| BugReports: | <a href="https://github.com/rstudio/shiny/issues">https://github.com/rstudio/shiny/issues</a>  |

# Shiny 參考資料-Get Started

- <http://shiny.rstudio.com/tutorial/>

The screenshot shows the 'Get Started' section of the Shiny website. At the top, there's a navigation bar with links: 'Get Started' (highlighted with a red box and arrow), 'Gallery', 'Articles', 'App Stories', 'Reference', 'Deploy', 'Help', and 'Contribute'. Below the navigation, the title 'Learn Shiny' is displayed, followed by a brief description: 'The video and written tutorials on this page are primarily designed for users who are new to Shiny and want a guided introduction.' It also notes that regular users might prefer the 'articles' section. A large image features the Shiny logo (a blue hexagon with the word 'Shiny' in white) on the left and the text 'Building Web Applications WITH SHINY' in the center, set against a background of scientific and mathematical sketches like a lightbulb, a graph, and a chemical structure. Below this image, a paragraph explains that the tutorial consists of four modules covering basics, reactive programming, and user interfaces. The 'Watch' section is introduced, followed by a link to the 'How to Start Shiny tutorial'. A note at the bottom states that the tutorial is two hours and 25 minutes long and includes slides and exercises.

Shiny from R Studio

Get Started

Gallery Articles App Stories Reference Deploy Help Contribute

Learn Shiny

The video and written tutorials on this page are primarily designed for users who are new to Shiny and want a guided introduction.

If you use Shiny on a regular basis, you may want to skip these tutorials and visit the [articles](#) section where we cover individual Shiny topics at a more advanced level.

Interact

**Building Web Applications**  
WITH SHINY

Building Web Applications with Shiny is comprised of four modules, will take you through the basics of Shiny, reactive programming, and building a user interface.

Watch

How to Start Shiny tutorial

The How to Start Shiny video series will take you from R programmer to Shiny developer. Watch the complete tutorial, or jump to a specific chapter by clicking a link below. The entire tutorial is two hours and 25 minutes long. Download the slides and exercises [here](#).

# Shiny 參考資料-Articles

The screenshot shows the 'Articles' section of the Shiny from RStudio website. At the top, there is a navigation bar with links: Get Started, Gallery, **Articles**, App Stories, Reference, Deploy, Help, Contribute, and a user icon. A red box highlights the 'Articles' link, and a red arrow points to it from below. Below the navigation bar, the word 'Articles' is displayed in a large, bold, dark font. The main content area is organized into four horizontal sections, each with a title and a numbered callout circle (1, 2, 3, 4) above it:

- Start** (1)
  - Your first Shiny app
  - Help
- Build** (2)
  - Structure
  - Standalone apps
  - Interactive documents
  - Dashboards
  - Gadgets
  - Backend
  - Reactivity
  - Data
  - Frontend
  - User interface
  - Graphics & visualization
  - Shiny extensions
  - Customizing Shiny
- Improve** (3)
  - Refactor
  - Code quality
  - Testing
  - Modules
  - Scale
  - Measure usage
  - Performance and scalability
  - Tuning
- Share** (4)
  - Deployment
  - Distribution
  - Bookmarking

# 自動安裝套件

```
# 自動安裝套件 -----
usedpackages <- c("shiny", "ggplot2")

verifyPackages <- function(need.packages) {
  for (x in need.packages) {
    if (!x %in% installed.packages()[, "Package"])
      install.packages(x)
  }
}
verifyPackages(usedpackages)
```

# shiny 內建範例資料

- shiny 安裝目錄

```
> .libPaths()  
[1] "C:/Users/user/AppData/Local/R/win-library/4.2"  
[2] "C:/Program Files/R/R-4.2.0/library"
```

```
> # 顯示內建11個範例  
> dir(paste0(.libPaths(), "/shiny/examples"))  
[1] "01_hello"          "02_text"           "03_reactivity"  "04_mpg"  
[5] "05_sliders"        "06_tabssets"       "07_widgets"     "08_html1"  
[9] "09_upload"         "10_download"      "11_timer"  
>
```

內建11個shiny範例

# shiny 範例 - 01\_hello

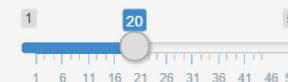
```
> # shiny example - 01_hello  
> library(shiny)  
> runExample("01_hello")
```

- 左側: user-interface

- runExample("範例名稱")
- 區分ui.R, server.R
- 亦可合併為 app.R

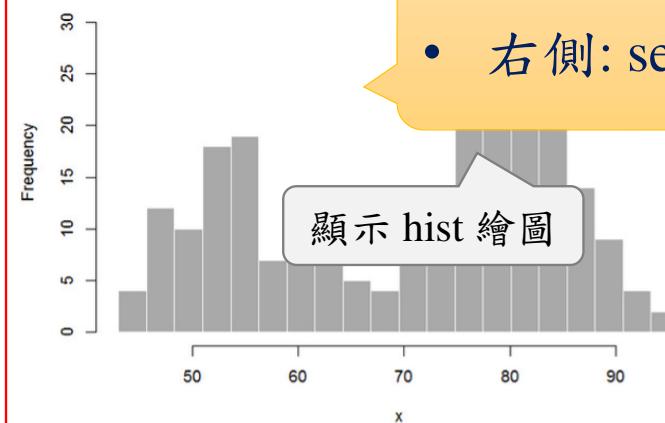
Hello Shiny!

Number of bins:



slider: 可調整樣本大小

Histogram of x



- 右側: server-interface

# 方法1-app.R

The screenshot shows a Shiny application running in a browser window. The title bar says 'Hello Shiny!'. On the left, there's a sidebar with a slider input labeled 'Number of bins' set to 30. The main area contains a histogram titled 'Histogram of waiting times' with the x-axis labeled 'Waiting time to next eruption' and the y-axis labeled 'Frequency'. The histogram has several bars, with the highest frequency around 50-55 minutes. A yellow callout bubble points to the 'app.R' file in the code editor at the bottom.

This small Shiny application demonstrates Shiny's automatic UI updates.

Move the `Number of bins` slider and notice how the `renderPlot` expression is automatically re-evaluated when its dependant, `input$bins`, changes, causing a histogram with a new number of bins to be rendered.

```
library(shiny)

# Define UI for app that draws a histogram ----
ui <- fluidPage(
  # App title ----
  titlePanel("Hello Shiny!"),

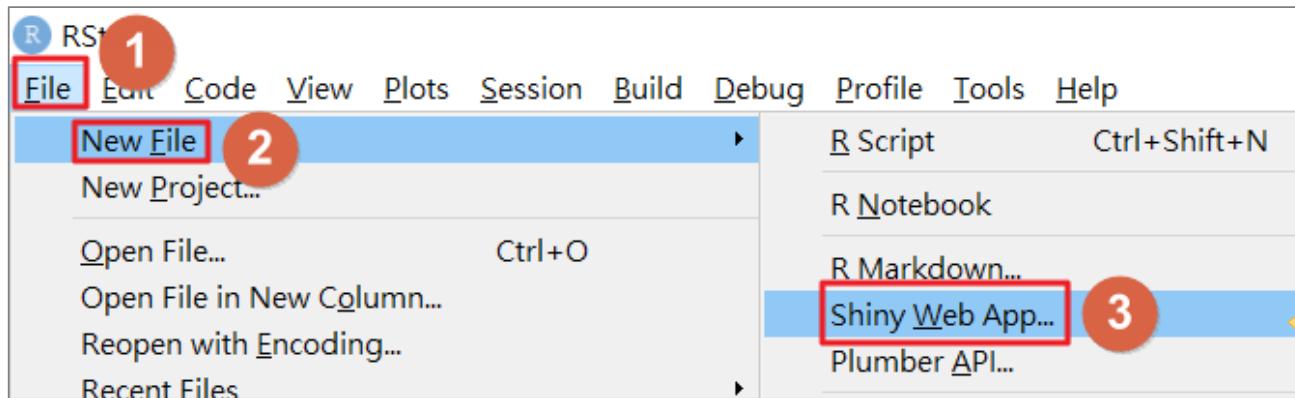
  # Sidebar Layout with input and output definitions ----
  sidebarLayout(
    # Sidebar panel for inputs ----
    sidebarPanel(
      # Input: Slider for the number of bins ----
      sliderInput("bins", "Number of bins:", min = 1, max = 50, value = 30)
    ),
    # Main panel for displaying outputs ----
    mainPanel(
      # Output: Histogram ----
      renderPlot(histogram(~eruptions ~waiting_time, data = faithful))
    )
  )
)
```

> runExample("01\_hello")

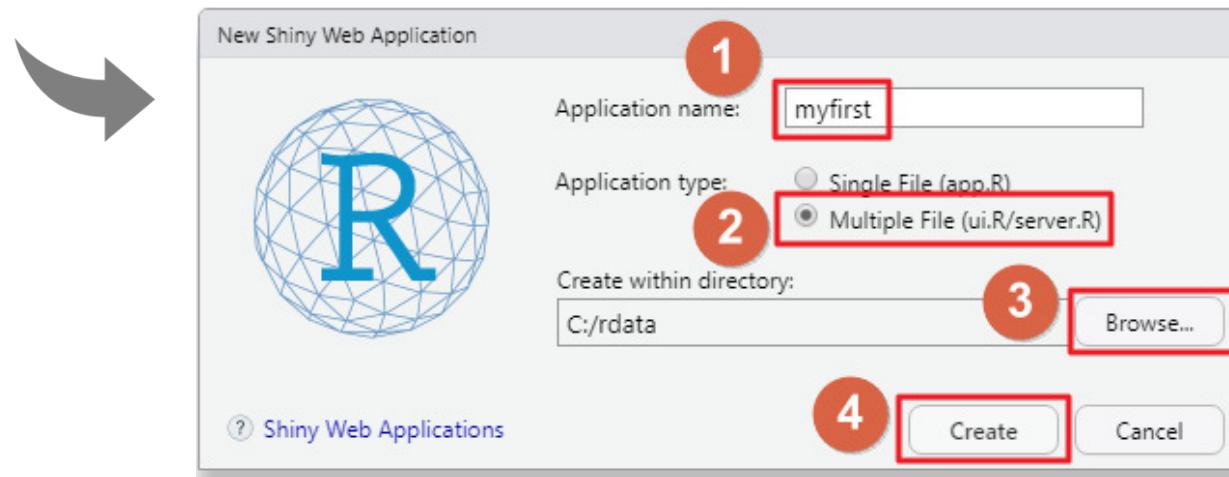
Listening on http://127.0.0.1:6148

- ui.R, server.R 檔名不可更換
- app.R 檔名可以更換
- app.R 適用於小程序方便測試

# 方法2-Multiple File(ui.R/server.R)



- ui.R, server.R 檔名不可更換
- myfirst 檔名可以更換
- C:/rdata 資料夾名稱可更換



ui.R

```
10 library(shiny)          fluidPage( )  
11  
12 # Define UI for application that draws a histogram  
13 shinyUI(fluidPage(  
14  
15   # Application title  
16   titlePanel("old Faithful Geyser Data"),  
17  
18   # sidebar with a slider input for number of bins  
19   sidebarLayout(  
20     sidebarPanel(  
21       sliderInput("bins",  
22         "Number of bins:",  
23         min = 1,  
24         max = 50,  
25         value = 30)  
26     ),  
27  
28   # Show a plot of the generated distribution  
29   mainPanel(  
30     plotOutput("distPlot")  
31   )  
32 )  
33 ))
```

fluidPage( )

1

titlePanel: 標題

2

sidebarInput: 滑桿(輸入功能)

輸入參數 bins

value 預設值

輸出採用 distPlot 參數

## server.R

```
10 library(shiny)
11
12 # Define server logic required to draw a histogram
13 shinyServer(function(input, output) {
14
15   output$distPlot <- renderPlot({ • distPlot 繪圖參數
16
17     # generate bins based on input$bins from ui.R
18     x      <- faithful[, 2]
19     bins <- seq(min(x), max(x), length.out = input$bins + 1)
20
21     # draw the histogram with the specified number of bins
22     hist(x, breaks = bins, col = 'darkgray', border = 'white')
23
24   })
25
26 })
```

## renderPlot

- 輸入參數: **x** 內建資料集 faithful
- 輸入參數: 使用者輸入 **bins**

# shiny 範例 - 02\_text

## Shiny Text

Choose a dataset:

rock

Number of observations to view:

10

| area          | peri           | shape           | perm            |
|---------------|----------------|-----------------|-----------------|
| Min. : 1016   | Min. : 308.6   | Min. :0.09033   | Min. : 6.30     |
| 1st Qu.: 5305 | 1st Qu.:1414.9 | 1st Qu.:0.16226 | 1st Qu.: 76.45  |
| Median : 7487 | Median :2536.2 | Median :0.19886 | Median : 130.50 |
| Mean : 7188   | Mean :2682.2   | Mean :0.21811   | Mean : 415.45   |
| 3rd Qu.: 8870 | 3rd Qu.:3989.5 | 3rd Qu.:0.26267 | 3rd Qu.: 777.50 |
| Max. :12212   | Max. :4864.2   | Max. :0.46413   | Max. :1300.00   |

| area | peri    | shape | perm   |
|------|---------|-------|--------|
| 4990 | 2791.90 | 0.09  | 6.30   |
| 7002 | 3892.60 | 0.15  | 6.30   |
| 7558 | 3930.66 | 0.18  | 6.30   |
| 7352 | 3869.32 | 0.12  | 6.30   |
| 7943 | 3948.54 | 0.12  | 17.10  |
| 7979 | 4010.15 | 0.17  | 17.10  |
| 9333 | 4345.75 | 0.19  | 17.10  |
| 8209 | 4344.75 | 0.16  | 17.10  |
| 8393 | 3682.04 | 0.20  | 119.00 |
| 6425 | 3098.65 | 0.16  | 119.00 |

# shiny 範例 - 03\_reactivity

## Reactivity

The diagram illustrates the concept of reactivity in shiny. A red arrow points from the 'Caption' input field in the left panel to the 'Data Summary-RWEPA網站2021' output table in the right panel, indicating that changes in the input field trigger an update in the output.

**Caption:**  
Data Summary-RWEPA網站2021

**Choose a dataset:**  
rock

**Number of observations to view:**  
5

**Data Summary-RWEPA網站2021**

| area          | peri            | shape            | perm            |
|---------------|-----------------|------------------|-----------------|
| Min. : 1016   | Min. : 308.6    | Min. : 0.09033   | Min. : 6.30     |
| 1st Qu.: 5305 | 1st Qu.: 1414.9 | 1st Qu.: 0.16226 | 1st Qu.: 76.45  |
| Median : 7487 | Median : 2536.2 | Median : 0.19886 | Median : 130.50 |
| Mean : 7188   | Mean : 2682.2   | Mean : 0.21811   | Mean : 415.45   |
| 3rd Qu.: 8870 | 3rd Qu.: 3989.5 | 3rd Qu.: 0.26267 | 3rd Qu.: 777.50 |
| Max. :12212   | Max. : 4864.2   | Max. : 0.46413   | Max. : 1300.00  |

| area | peri    | shape | perm  |
|------|---------|-------|-------|
| 4990 | 2791.90 | 0.09  | 6.30  |
| 7002 | 3892.60 | 0.15  | 6.30  |
| 7558 | 3930.66 | 0.18  | 6.30  |
| 7352 | 3869.32 | 0.12  | 6.30  |
| 7943 | 3948.54 | 0.12  | 17.10 |

# 建立第一個shiny網頁程式

---

# myFirstShiny

- 以「02\_text」為基礎，複製到「C:\rdata\myFirstShiny」資料夾，完成以下功能：
  1. 修改標題為 myFirstShiny
  2. 整合「01\_hello」: sidebarInput
  3. 整合「01\_hello」: renderPlot  
(繪製第1個變數之直方圖)
  4. 將直方圖標題改為選取之資料集名稱



練習

1

## myFirstShiny-完成畫面

myFirstShiny

Choose a dataset:

rock

Number of observations to view:

7

Number of bins:

1

| area          | peri           | shape           | perm            |
|---------------|----------------|-----------------|-----------------|
| Min. : 1016   | Min. : 308.6   | Min. : 0.09033  | Min. : 6.30     |
| 1st Qu.: 5305 | 1st Qu.:1414.9 | 1st Qu.:0.16226 | 1st Qu.: 76.45  |
| Median : 7487 | Median :2536.2 | Median :0.19886 | Median : 130.50 |
| Mean : 7188   | Mean :2682.2   | Mean :0.21811   | Mean : 415.45   |
| 3rd Qu.: 8870 | 3rd Qu.:3989.5 | 3rd Qu.:0.26267 | 3rd Qu.: 777.50 |
| Max. :12212   | Max. :4864.2   | Max. :0.46413   | Max. :1300.00   |

2

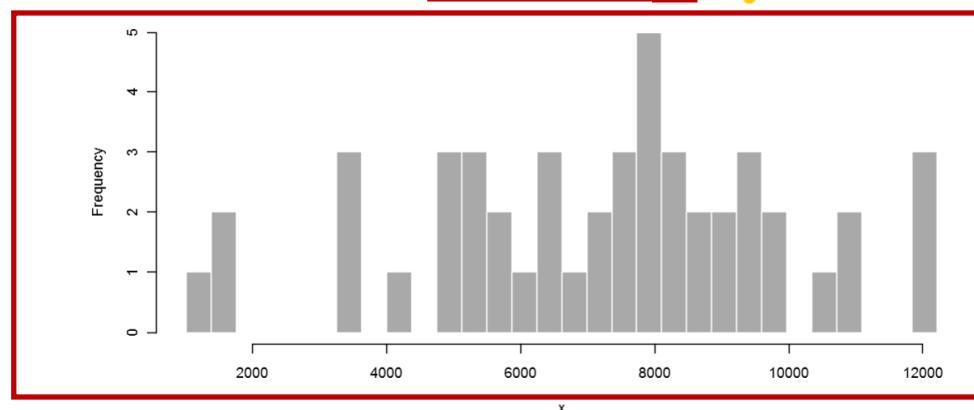
Number of bins:

1 6 11 16 21 26 31 36 41 46 50

| area | peri    | shape | perm  |
|------|---------|-------|-------|
| 4990 | 2791.90 | 0.09  | 6.30  |
| 7002 | 3892.60 | 0.15  | 6.30  |
| 7558 | 3930.66 | 0.18  | 6.30  |
| 7352 | 3869.32 | 0.12  | 6.30  |
| 7943 | 3948.54 | 0.12  | 17.10 |
| 7979 | 4010.15 | 0.17  | 17.10 |
| 9333 | 4345.75 | 0.19  | 17.10 |

3



4

上課練習1  
^ ^

rock

## 完成圖

RWEPA - myFirstShiny, alan9956@gmail.com, 網站: <http://rwepa.blogspot.com/>

Choose a dataset:  
rock

Number of observations to view:  
10

Number of bins:  
1 6 11 16 21 26 30 36 41 46 50

| area          | peri           | shape           | perm            |
|---------------|----------------|-----------------|-----------------|
| Min. : 1016   | Min. : 308.6   | Min. :0.0933    | Min. : 6.30     |
| 1st Qu.: 5305 | 1st Qu.:1414.9 | 1st Qu.:0.16226 | 1st Qu.: 76.45  |
| Median : 7487 | Median :2536.2 | Median :0.19886 | Median : 130.50 |
| Mean : 7188   | Mean :2682.2   | Mean :0.21811   | Mean : 415.45   |
| 3rd Qu.: 8870 | 3rd Qu.:3989.5 | 3rd Qu.:0.26267 | 3rd Qu.: 777.50 |
| Max. : 12212  | Max. :4864.2   | Max. :0.46413   | Max. :1300.00   |

| area | peri    | shape | perm   |
|------|---------|-------|--------|
| 4990 | 2791.90 | 0.09  | 6.30   |
| 7002 | 3892.60 | 0.15  | 6.30   |
| 7558 | 3930.66 | 0.18  | 6.30   |
| 7352 | 3869.32 | 0.12  | 6.30   |
| 7943 | 3948.54 | 0.12  | 17.10  |
| 7979 | 4010.15 | 0.17  | 17.10  |
| 9333 | 4345.75 | 0.19  | 17.10  |
| 8209 | 4344.75 | 0.16  | 17.10  |
| 8393 | 3682.04 | 0.20  | 119.00 |
| 6425 | 3098.65 | 0.16  | 119.00 |

rock

Frequency

Waiting time to next eruption (in mins)

## 程式碼

[https://github.com/rwepa/DataDemo/blob/master/ai\\_using\\_python\\_and\\_r/myFirstShiny.R](https://github.com/rwepa/DataDemo/blob/master/ai_using_python_and_r/myFirstShiny.R)

The screenshot shows a GitHub repository page for 'rwepa / DataDemo'. The repository is public and has 13 starred contributions. The 'Code' tab is selected, showing the file 'myFirstShiny.R' in the 'master' branch. The file was created by 'rwepa' on 17 Feb. It has 1 contributor. The code content is as follows:

```
92 lines (69 sloc) | 2.51 KB
Raw Blame ⌂ ⌄ ⌅ ⌆
1 # title      : myFirstShiny
2 # date       : 2022.02.18
3 # author     : Ming-Chang Lee
4 # email      : alan9956@gmail.com
5 # RWEPA      : http://rwepa.blogspot.tw/
6 # Encoding:  UTF-8
7
8 library(shiny)
```

# 6.shiny元件應用

# 輸入控制項

---

# 輸入控制項

| 函數                 | 功能              |
|--------------------|-----------------|
| actionButton       | 每次按鈕+1          |
| checkboxGroupInput | 核取方塊-群組         |
| checkboxInput      | 核取方塊 (用於YES/NO) |
| dateInput          | 選取單一日期          |
| dateRangeInput     | 選取日期範圍 (開始-結束)  |
| fileInput          | 上傳檔案            |
| helpText           | 輔助說明            |
| numericInput       | 數值輸入            |
| radioButtons       | 選取按鈕 (單選題)      |
| selectInput        | 下拉式選單           |
| sliderInput        | 左右滑桿            |
| submitButton       | 送出按鈕            |
| textInput          | 文字方塊            |

# selectInput 下拉式選單

selectInput {shiny}

R Documentation

Create a select list input control

## Description

Create a select list that can be used to choose a single or multiple items from a list of values.

## Usage

①    ②    ③

```
selectInput(inputId, label, choices, selected = NULL, multiple = FALSE,  
           selectize = TRUE, width = NULL, size = NULL)  
  
selectizeInput(inputId, ..., options = NULL, width = NULL)
```

## Arguments

inputId

The input slot that will be used to access the value.

label

Display label for the control, or `NULL` for no label.

choices

List of values to select from. If elements of the list are named then that name rather than the value is displayed to the user.

輸入資料須為list

# selectInput 下拉式選單(續)

```
1 ## selectInput example
2 library(shiny)
3 if (interactive()) {
4
5   ui <- fluidPage(
6     selectInput("variable", "variable:",
7                 c("cylinders" = "cy1",
8                   "Transmission" = "am",
9                   "Gears" = "gear")),
10    tableOutput("data")
11  )
12
13  server <- function(input, output) {
14    output$data <- renderTable({
15      mtcars[, c("mpg", input$variable), drop = FALSE]
16    }, rownames = TRUE)
17  }
18
19 shinyApp(ui, server)
20 }
```



萬一資料  
筆數很多!@#

# 檔案上傳

---

# shiny 範例 – 09\_upload

## Uploading Files

Choose CSV File ④

gfc.csv

Upload complete

①  Header

②  Comma

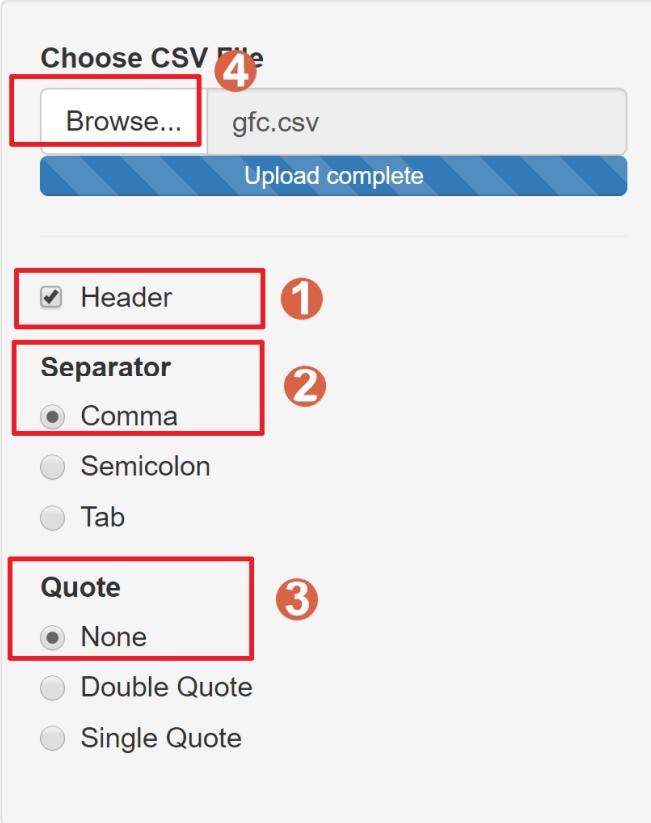
Semicolon

Tab

③  None

Double Quote

Single Quote



| orderdate | supplier | amount |
|-----------|----------|--------|
| 2009/1/3  | 日亞       | 266    |
| 2009/1/4  | 廣達       | 123    |
| 2009/1/5  | 廣達       | 66     |
| 2009/1/6  |          |        |
| 2009/1/7  |          |        |
| 2009/1/8  |          |        |
| 2009/1/9  | 廣達       | 75     |
| 2009/1/10 | 科銳       | 50     |
| 2009/1/10 | 科銳       | 48     |
| 2009/1/12 | 科銳       | 52     |
| 2009/1/13 | 廣達       | 88     |
| 2009/1/14 | 日亞       | 240    |
| 2009/1/15 | 科銳       | 46     |

• R-程式解說

# 09\_upload - ui.R

```
1 library(shiny)
2
3 fluidPage(
4   titlePanel("Uploading Files"),
5   sidebarLayout(
6     sidebarPanel(
7       fileInput('file1', 'Choose CSV File',
8                 accept=c('text/csv',
9                           'text/comma-separated-values,text/plain',
10                          '.csv')),
11      tags$hr(),
12      checkboxInput('header', 'Header', TRUE),
13      radioButtons('sep', 'Separator',
14                    c(Comma=',',
15                      Semicolon=';',
16                      Tab='\t'),
17                    ','),
18      radioButtons('quote', 'Quote',
19                    c(None='',
20                      'Double Quote'="\"",
21                      'single Quote'="'")),
22                    ""))
23    ),
24    mainPanel(
25      tableOutput('contents')
26    )
27  )
28 )
```

**fileInput( )**

# 09\_upload - server.R

```
library(shiny)

function(input, output) {
  output$contents <- renderTable({  
  
  # input$file1 will be NULL initially. After the user selects  
  # and uploads a file, it will be a data frame with 'name',  
  # 'size', 'type', and 'datapath' columns. The 'datapath'  
  # column will contain the local filenames where the data can  
  # be found.  
  
  inFile <- input$file1  
  if (is.null(inFile))  
    return(NULL)  
  
  read.csv(inFile$datapath, header=input$header, sep=input$sep,  
           quote=input$quote)
})  
}
```

技巧:  
**return(NULL)**

# 輸出控制項-文字/表報

---



# render函數對照表

| 使用時機     | ui.R (依字母排序)       | server.R        |
|----------|--------------------|-----------------|
| table    | dataTableOutput    | renderDataTable |
| raw HTML | htmlOutput         | renderUI        |
| image    | imageOutput        | renderImage     |
| plot     | plotOutput         | renderPlot      |
| table    | tableOutput        | renderTable     |
| text     | textOutput         | renderText      |
| raw HTML | uiOutput           | renderUI        |
| text     | verbatimTextOutput | renderPrint     |

# 文字/報表

- 參考 `runExample("02_text")` 比對以下表格

| ui.R (mainPanel)                                   | server.R  |
|--|---|
| <pre># 文字<br/>verbatimTextOutput("summary"),</pre> | <pre>output\$summary &lt;- renderPrint({<br/>  ...<br/>})</pre> |
| <pre># 報表<br/>tableOutput("view")</pre>            | <pre>output\$view &lt;- renderTable({<br/>  ...<br/>})</pre>    |

# 版面配置

---

<http://shiny.rstudio.com/articles/layout-guide.html>

# 側邊佈局 Sidebar Layout

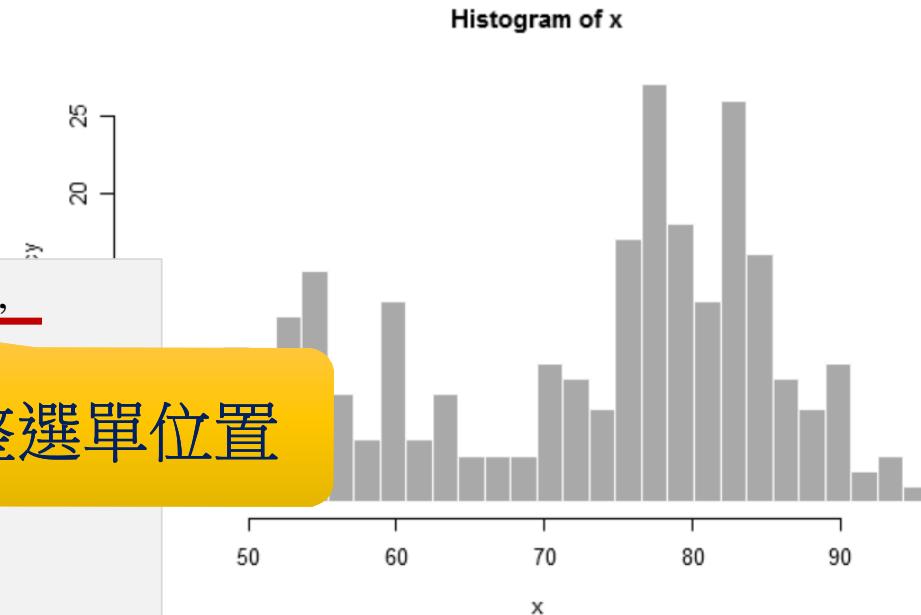
Hello Shiny!

Number of bins:

```
sidebarLayout(position = "right",
```

```
  sidebarPanel(  
    # Inputs  
  ),  
  mainPanel(  
    # Outputs  
  )  
)
```

調整選單位置



# 網格佈局 Grid Layout

Hello Shiny - Grid Layout!

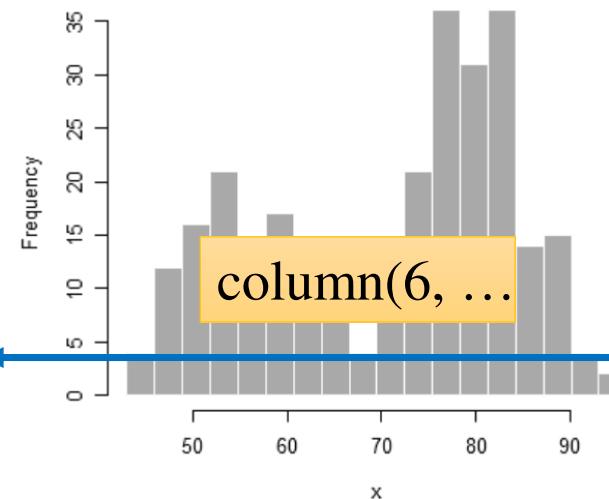
Number of bins:

1      18      50



column(6, ...)

Histogram of x



# Grid Layout – ui.R

```
library(shiny)

# Define UI for application that draws a histogram
shinyUI(fluidPage(
  titlePanel("Hello shiny - Grid Layout!"),
  fluidRow(
    column(6,
      wellPanel(
        sliderInput("bins", "Number of bins:",
                   min = 1, max = 50, value = 30)
      )
    ),
    column(6,
      plotOutput("distPlot")
    )
  )))

```

- **6+6=12**
- **try: 4+8=12**

# 分頁佈局 Tabssets Layout

**Tabssets**

Distribution type:

- Normal
- Uniform
- Log-normal
- Exponential

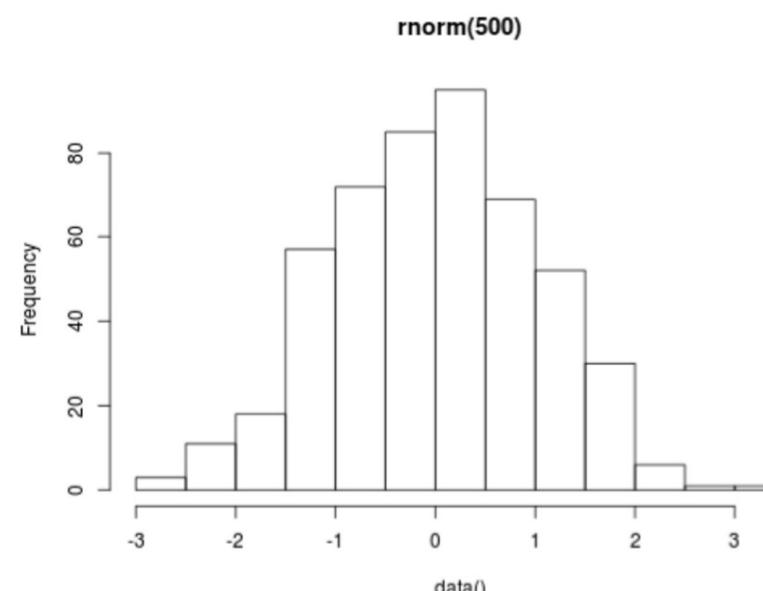
Number of observations:

1      500  1,000

1    2    3

Plot    Summary    Table

**rnorm(500)**



A histogram titled "rnorm(500)" showing the frequency distribution of 500 random numbers generated from a standard normal distribution. The x-axis is labeled "data()" and ranges from -3 to 3 with major ticks every 1 unit. The y-axis is labeled "Frequency" and ranges from 0 to 80 with major ticks every 20 units. The distribution is approximately symmetric and bell-shaped, peaking at 0 with a frequency of about 80.

| Bin Range (data()) | Frequency |
|--------------------|-----------|
| -3.00 to -2.80     | 2         |
| -2.80 to -2.60     | 12        |
| -2.60 to -2.40     | 20        |
| -2.40 to -2.20     | 58        |
| -2.20 to -2.00     | 68        |
| -2.00 to -1.80     | 78        |
| -1.80 to -1.60     | 82        |
| -1.60 to -1.40     | 72        |
| -1.40 to -1.20     | 68        |
| -1.20 to -1.00     | 60        |
| -1.00 to -0.80     | 55        |
| -0.80 to -0.60     | 50        |
| -0.60 to -0.40     | 45        |
| -0.40 to -0.20     | 35        |
| -0.20 to 0.00      | 30        |
| 0.00 to 0.20       | 80        |
| 0.20 to 0.40       | 75        |
| 0.40 to 0.60       | 70        |
| 0.60 to 0.80       | 65        |
| 0.80 to 1.00       | 58        |
| 1.00 to 1.20       | 55        |
| 1.20 to 1.40       | 50        |
| 1.40 to 1.60       | 35        |
| 1.60 to 1.80       | 10        |
| 1.80 to 2.00       | 5         |
| 2.00 to 2.20       | 2         |
| 2.20 to 2.40       | 1         |
| 2.40 to 2.60       | 1         |
| 2.60 to 2.80       | 1         |
| 2.80 to 3.00       | 1         |

# Tabssets Layout – ui.R

```
shinyUI(fluidPage(  
  titlePanel("Tabssets"),  
  sidebarLayout(  
    sidebarPanel(  
      # Inputs excluded for brevity  
    ),  
    mainPanel(  
      tabsetPanel(  
        tabPanel("Plot", plotOutput("plot")),  
        tabPanel("Summary", verbatimTextOutput("summary")),  
        tabPanel("Table", tableOutput("table"))  
      )  
    )  
  ))
```

**tabsetPanel( )**

**3個分頁 tabPanel**

# 瀏覽選單佈局 Navbar Pages

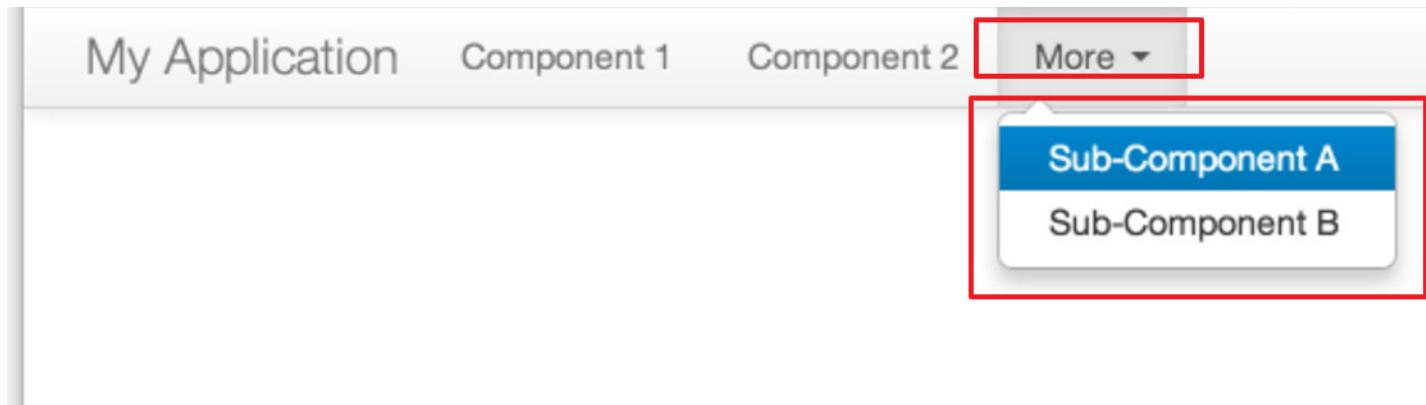


My Application Component 1 Component 2 Component 3

與分頁佈局有何不同?

```
shinyUI(navbarPage("My Application",
  tabPanel("Component 1"),
  tabPanel("Component 2"),
  tabPanel("Component 3")
))
```

# 瀏覽下拉式選單佈局



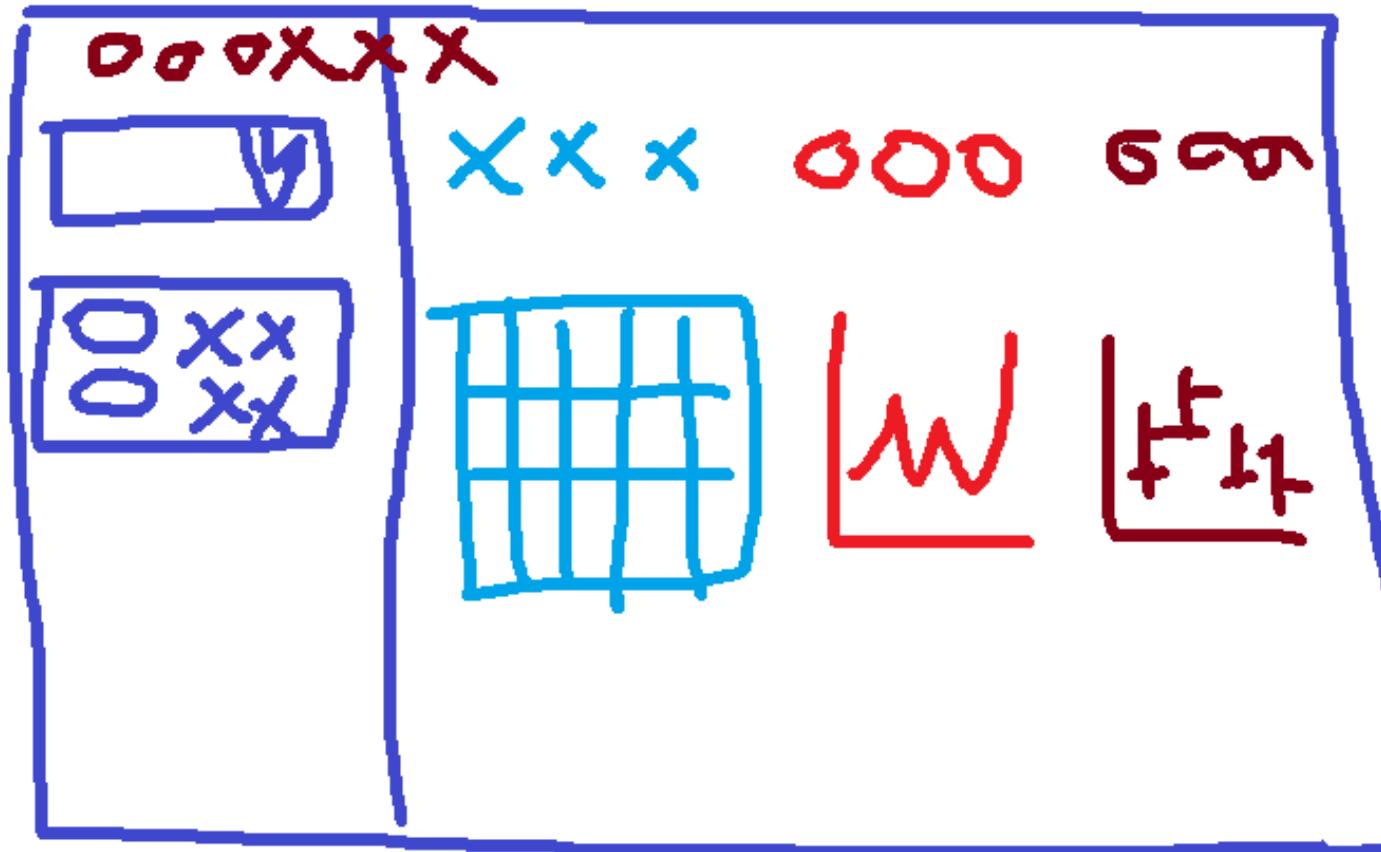
The screenshot shows a top navigation bar with tabs: "My Application", "Component 1", "Component 2", and "More". A red box highlights the "More" tab, which has a dropdown menu. The dropdown menu contains two items: "Sub-Component A" and "Sub-Component B", also enclosed in a red box.

```
shinyUI(navbarPage("My Application",
  tabPanel("Component 1"),
  tabPanel("Component 2"),
  navbarMenu("More",
    tabPanel("Sub-Component A"),
    tabPanel("Sub-Component B"))
))
```

**navbarMenu( )**

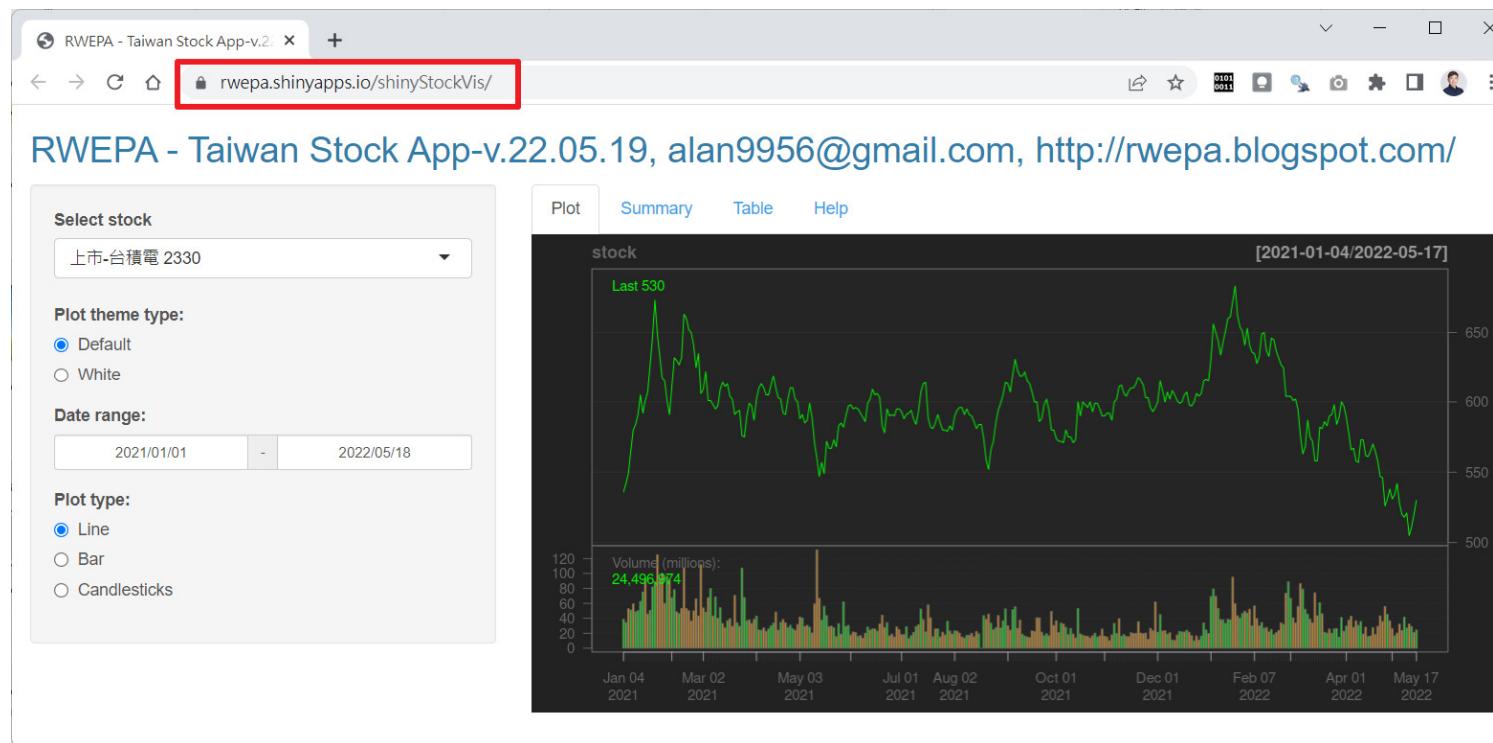
# 7.shiny佈署

# 雛型設計

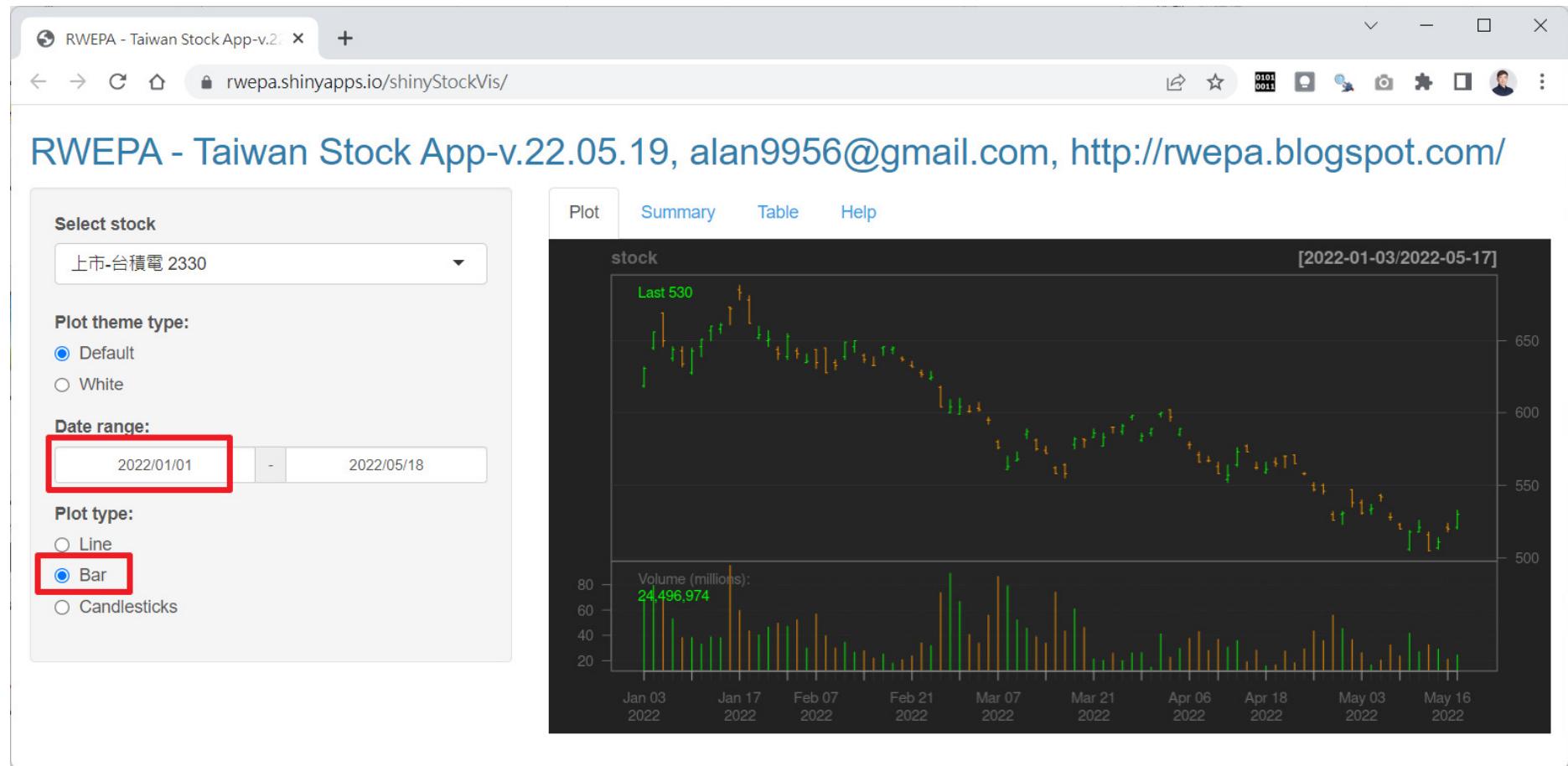


# Taiwan Stock App

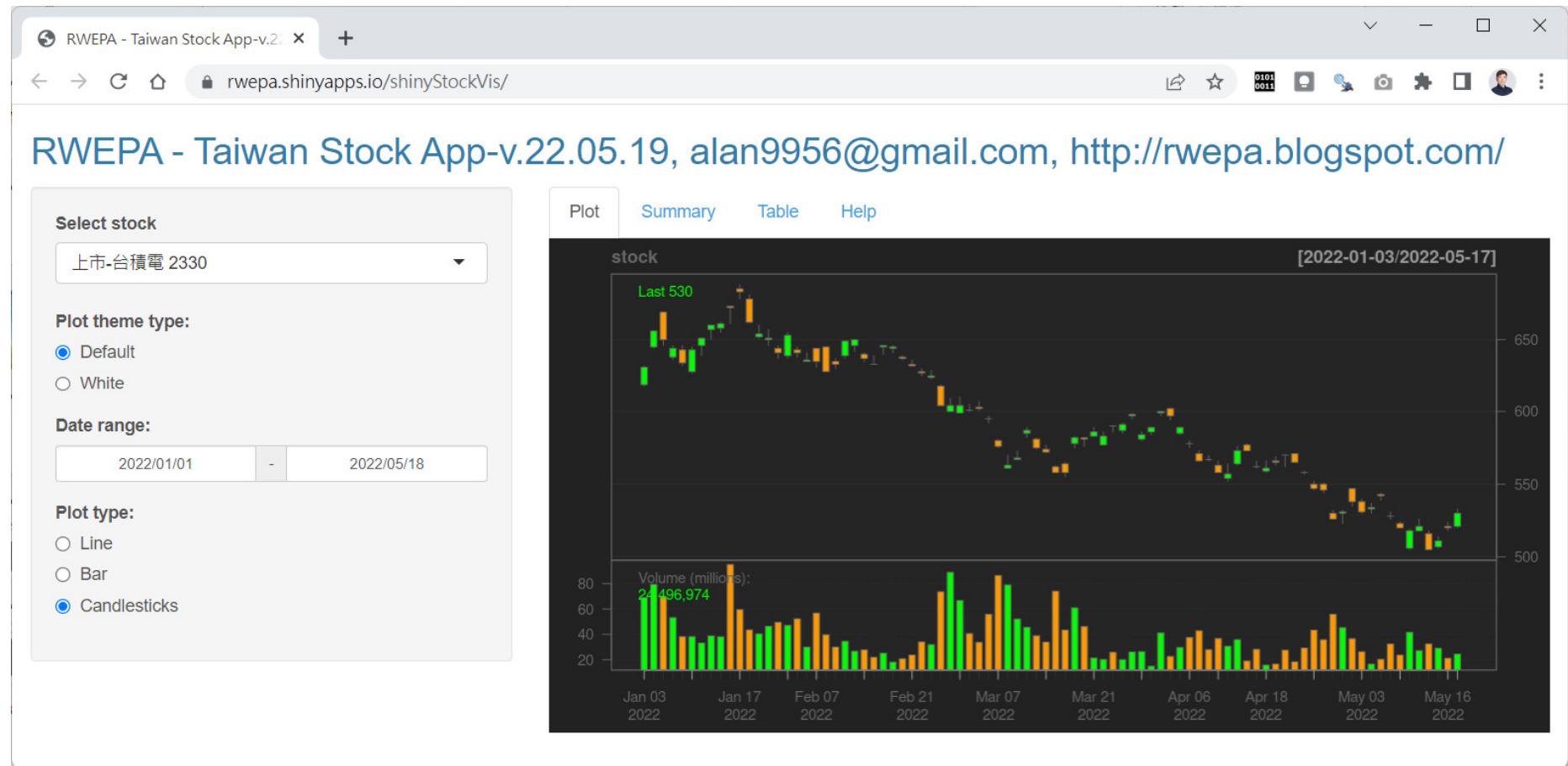
- shiny App: <https://rwepa.shinyapps.io/shinyStockVis/>
- 程式碼: <https://github.com/rwepa/DataDemo/blob/master/shinyStockVis.zip>



# Plot with Bar



# Plot with Candlesticks

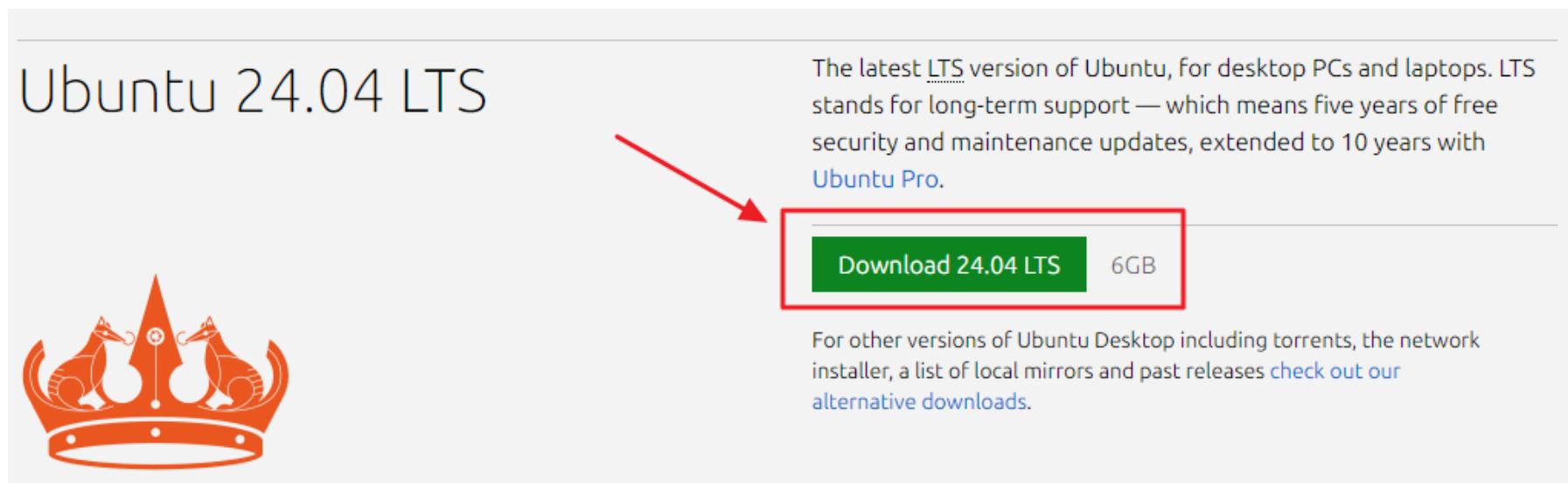


# shiny App 佈署

- 方法1: shinyapps.io 免費版/付費版
- 方法2: shiny server 免費版(安裝於住家/公司) + Linux
  - <https://www.rstudio.com/products/shiny/shiny-server/>
- 方法3: shiny Server Pro 付費版

# 下載 Ubuntu 24.04 LTS

- 下載 ubuntu-24.04-desktop-amd64.iso
- <https://ubuntu.com/download/desktop>



The screenshot shows the official Ubuntu website's download page for the 24.04 LTS release. At the top left, it says "Ubuntu 24.04 LTS". Below that is a large orange crown icon. To the right, there is a descriptive text block: "The latest LTS version of Ubuntu, for desktop PCs and laptops. LTS stands for long-term support — which means five years of free security and maintenance updates, extended to 10 years with Ubuntu Pro." A red arrow points from the text "LTS stands for long-term support" down to the "Download 24.04 LTS" button. The button is green with white text and has a red border. To the right of the button, it says "6GB". At the bottom, there is a link: "For other versions of Ubuntu Desktop including torrents, the network installer, a list of local mirrors and past releases [check out our alternative downloads](#).

Ubuntu 24.04 LTS

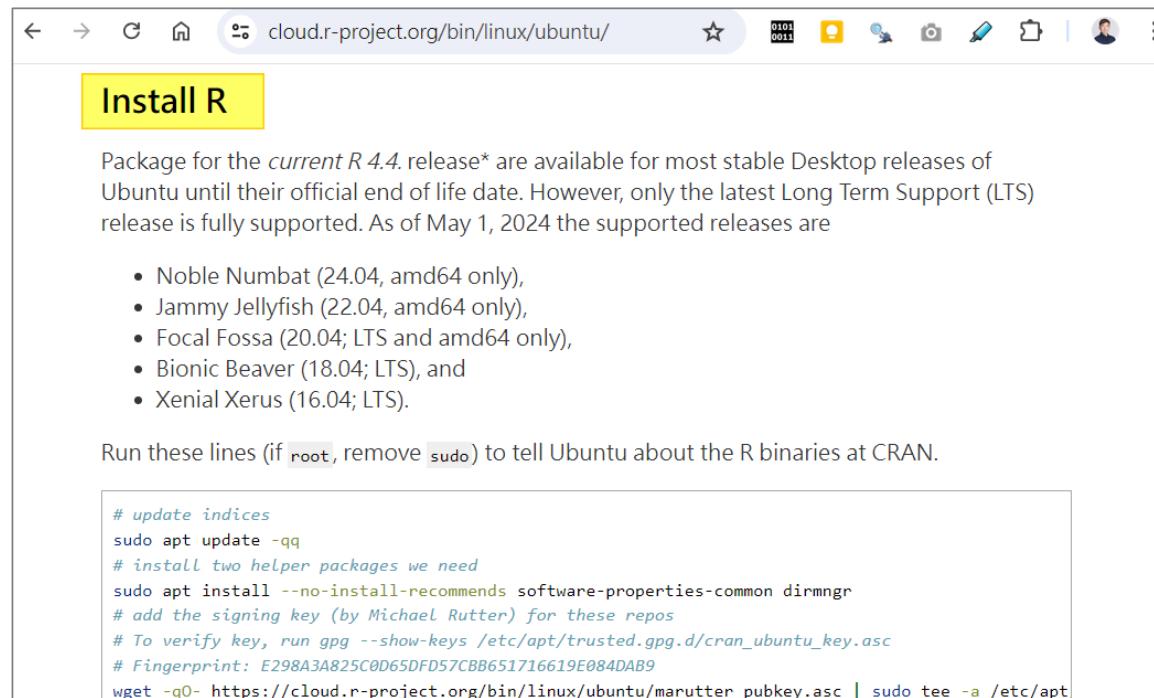
The latest LTS version of Ubuntu, for desktop PCs and laptops. LTS stands for long-term support — which means five years of free security and maintenance updates, extended to 10 years with Ubuntu Pro.

Download 24.04 LTS 6GB

For other versions of Ubuntu Desktop including torrents, the network installer, a list of local mirrors and past releases [check out our alternative downloads](#).

# Ubuntu Install R

- <https://rwepa.blogspot.com/2013/05/ubuntu-r.html>
- <https://cloud.r-project.org/bin/linux/ubuntu/>



The screenshot shows a web browser window with the URL <https://cloud.r-project.org/bin/linux/ubuntu/>. The page has a yellow header bar with the text "Install R". Below it, there is a paragraph of text and a bulleted list of supported Ubuntu releases. At the bottom, there is a code block with a series of commands.

Package for the *current R 4.4. release\** are available for most stable Desktop releases of Ubuntu until their official end of life date. However, only the latest Long Term Support (LTS) release is fully supported. As of May 1, 2024 the supported releases are

- Noble Numbat (24.04, amd64 only),
- Jammy Jellyfish (22.04, amd64 only),
- Focal Fossa (20.04; LTS and amd64 only),
- Bionic Beaver (18.04; LTS), and
- Xenial Xerus (16.04; LTS).

Run these lines (if `root`, remove `sudo`) to tell Ubuntu about the R binaries at CRAN.

```
# update indices
sudo apt update -qq
# install two helper packages we need
sudo apt install --no-install-recommends software-properties-common dirmngr
# add the signing key (by Michael Rutter) for these repos
# To verify key, run gpg --show-keys /etc/apt/trusted.gpg.d/cran_ubuntu_key.asc
# Fingerprint: E298A3A825C0D65DFD57CB8651716619E084DAB
wget -qO- https://cloud.r-project.org/bin/linux/ubuntu/marutter_pubkey.asc | sudo tee -a /etc/apt
```

# shiny server 免費版



Download RStudio Shiny Server v1.5.9.923

Ubuntu 14.04 or later

RedHat/CentOS 6 & 7

SLES 12

Other Platforms

Ubuntu 14.04 or later

We currently only provide a pre-built binary for the 64-bit architecture. Running on other architectures will require [building from source](#).

Before installing Shiny Server, you'll need to install R and the Shiny package. To install the latest version of R you should first add the CRAN repository to your system as described here:

- [Ubuntu Packages for R](#)

You can then install R using the following command:

```
$ sudo apt-get install r-base
```

# 使用 [www.shinyapps.io](https://www.shinyapps.io/)

- <https://www.shinyapps.io/>

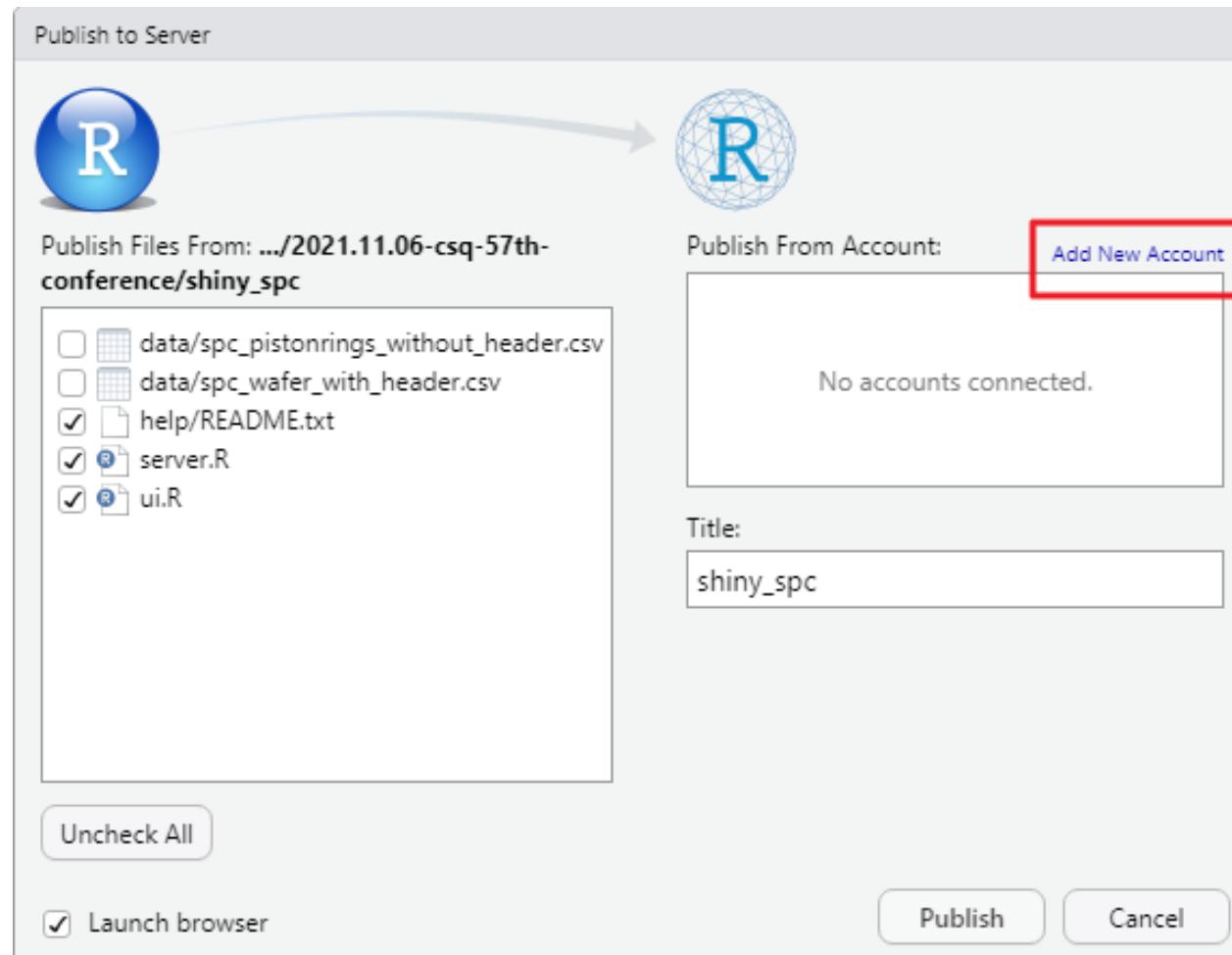
The screenshot shows the shinyapps.io pricing page with five plans:

- FREE**: \$0/month. Includes 5 Applications, 25 Active Hours, Community Support, and RStudio/Browsing.
- STARTER**: \$9/month (or \$100/year). Includes More applications, More active hours, 25 Applications, 100 Active Hours, Premium Support, and Performance Boost.
- BASIC**: \$39/month (or \$440/year). Includes Take your users to the next level!, Unlimited Applications, 500 Active Hours, Premium Support, and Performance Boost.
- STANDARD**: \$99/month (or \$1,100/year). Includes Password protection!, Authenticate your users!, Unlimited Applications, 2,000 Active Hours, Premium Support, and Authentication.
- PROFESSIONAL**: \$299/month (or \$3,300/year). Includes Professional has it all!, Personalize your domain, Unlimited Applications, 10,000 Active Hours, Premium Support, and Custom Domains.

A yellow speech bubble on the left says "免費". Another yellow speech bubble at the bottom left says "線上說明" and lists "rsconnect 套件" and "devtools 套件". Red arrows point from the "FREE" plan price and the "rsconnect user guide" link to the "rsconnect 套件" and "devtools 套件" text respectively.

<https://docs.rstudio.com/shinyapps.io/getting-started.html>

# 發佈至 rwepa.shinyapp.io\shiny\_spc



# Connect Account

Connect Account

## Connect Publishing Account

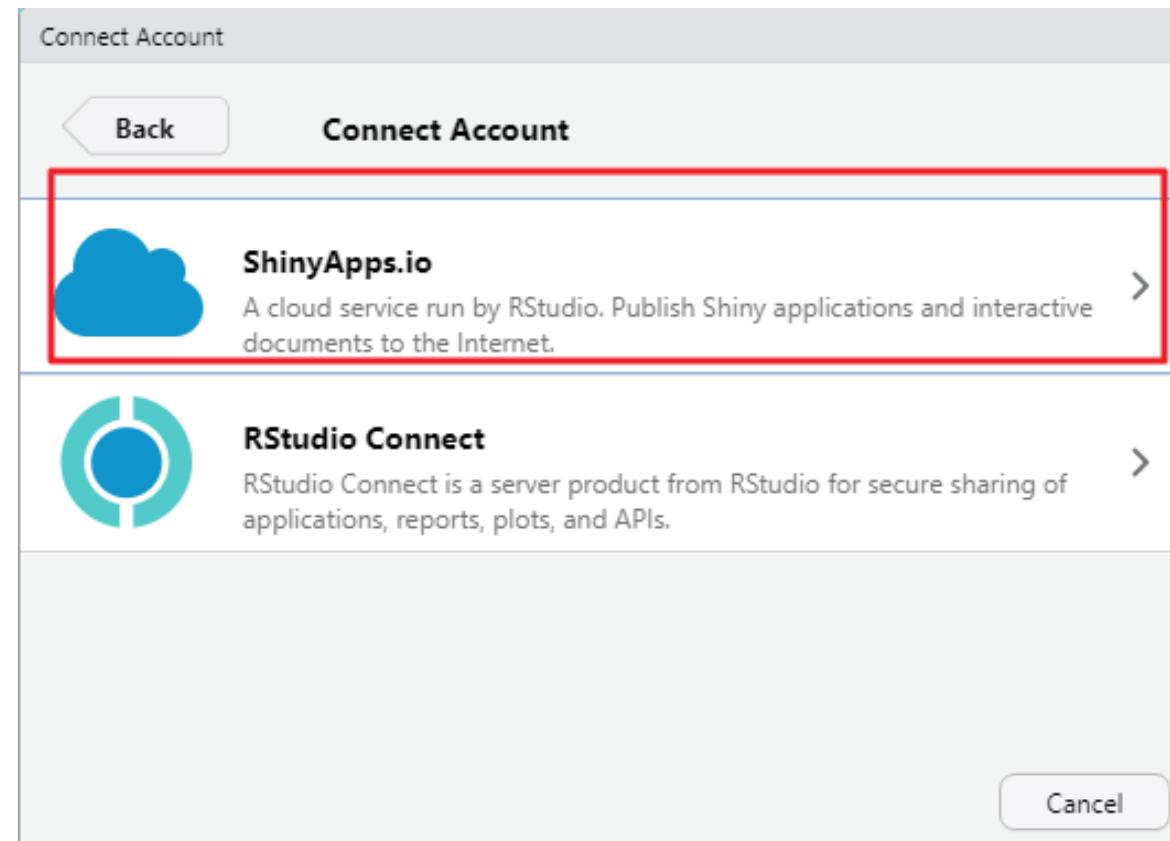


To publish content, you first need to connect RStudio to an account on the service you want to publish to.

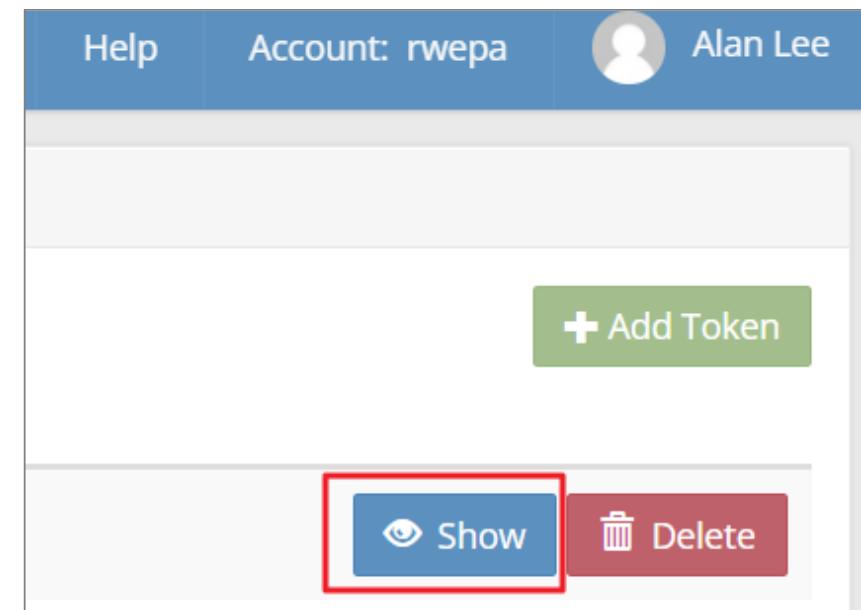
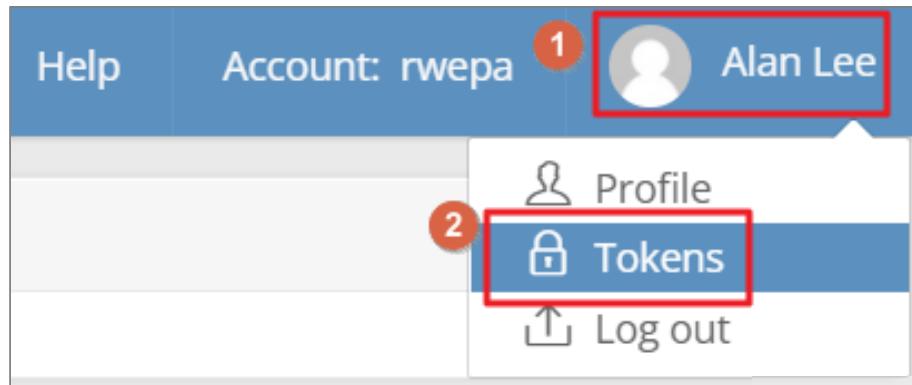
Once you've authorized this computer to publish content to an account, you can publish any time without re-entering your credentials.

[Next](#)[Cancel](#)

# ShinyApps.io



# 複製 Tokens



按 CTRL + C

# 貼上 Tokens

Connect Account

Back Connect ShinyApps.io Account



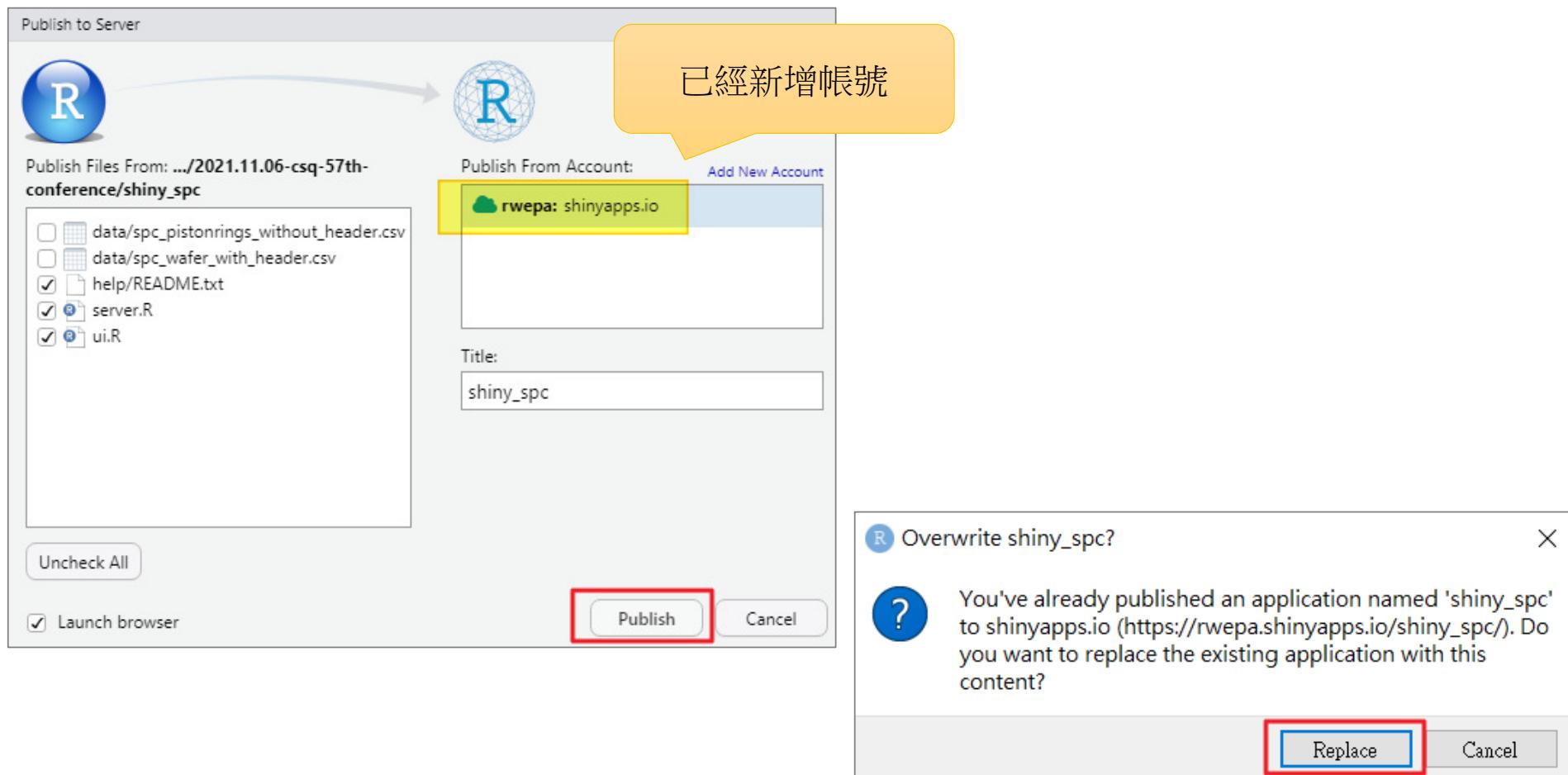
Go to [your account on ShinyApps](#) and log in.  
Click your name, then choose **Tokens** from your account menu.  
Click **Show** on the token you want to use, then **Show Secret** and **Copy to Clipboard**. Paste the result here:

按 CTRL + V

Need a ShinyApps.io account? [Get started here.](#)

Connect Account Cancel

# 按 Publish



# 謝謝您的聆聽

## Q & A



李明昌

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<http://rwepa.blogspot.tw/>