R Graphics

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課前作業

上課前請先安裝套件 : RColorBrewer circlize tm SnowballC wordcloud survival plotrix rworldmap treemap

install.packages(c("RColorBrewer", "circlize", "tm", "SnowballC", "wordcloud", "survival", "plotrix", "rworldmap", "treemap"))

Topics

- R graphics (w/ graphics package) (w/o ggplot2)
- Examples
- Real examples
- Resources

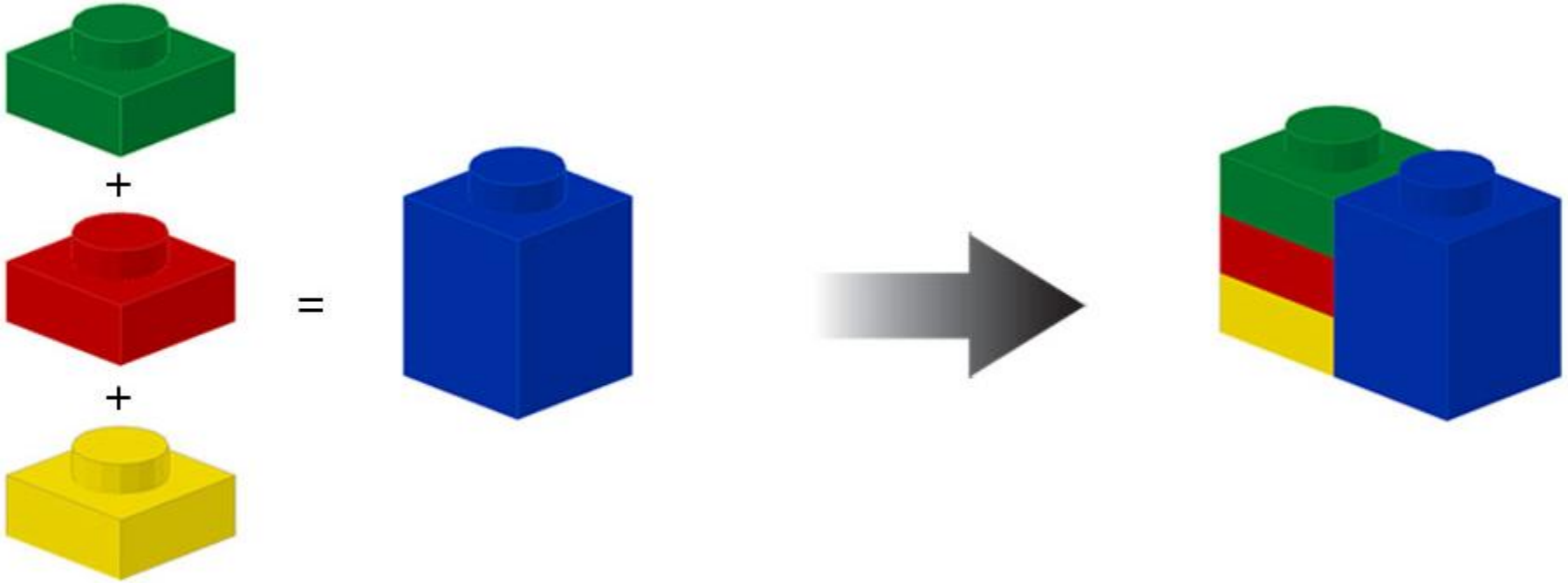
The simple graph has brought more information to the data analyst‘s mind than any other device. - John Tukey

SECTION I

R GRAPHICS

重要觀念

Modulariztion



https://commons.wikimedia.org/wiki/File:Lego-cube-heights.jpg

Graphics

- High-level graphics function（可獨立存在)
  - plot
  - boxplot
  - hist
  - curve
- Low-level graphics function（不能獨立存在)
  - points
  - lines
  - abline
  - segments
  - polygon

匯入示範資料

- 利用Import_tidyverse.r，匯入資料CD2009.DAT
- 將CD2009.DAT等資料檔複製於D槽SampleData子目錄下，如果欲放置於其他位置，請同時更改Import_tidyverse.r

資料與程式碼置於SampleData子目錄

如果資料檔都固定了， Import_tidyverse.r也改好了

```
source("D:/SampleData/Import_tidyverse.r")
# CHANGE HERE !!! 更動.r檔的位置
```

R Base Graphs (selected)

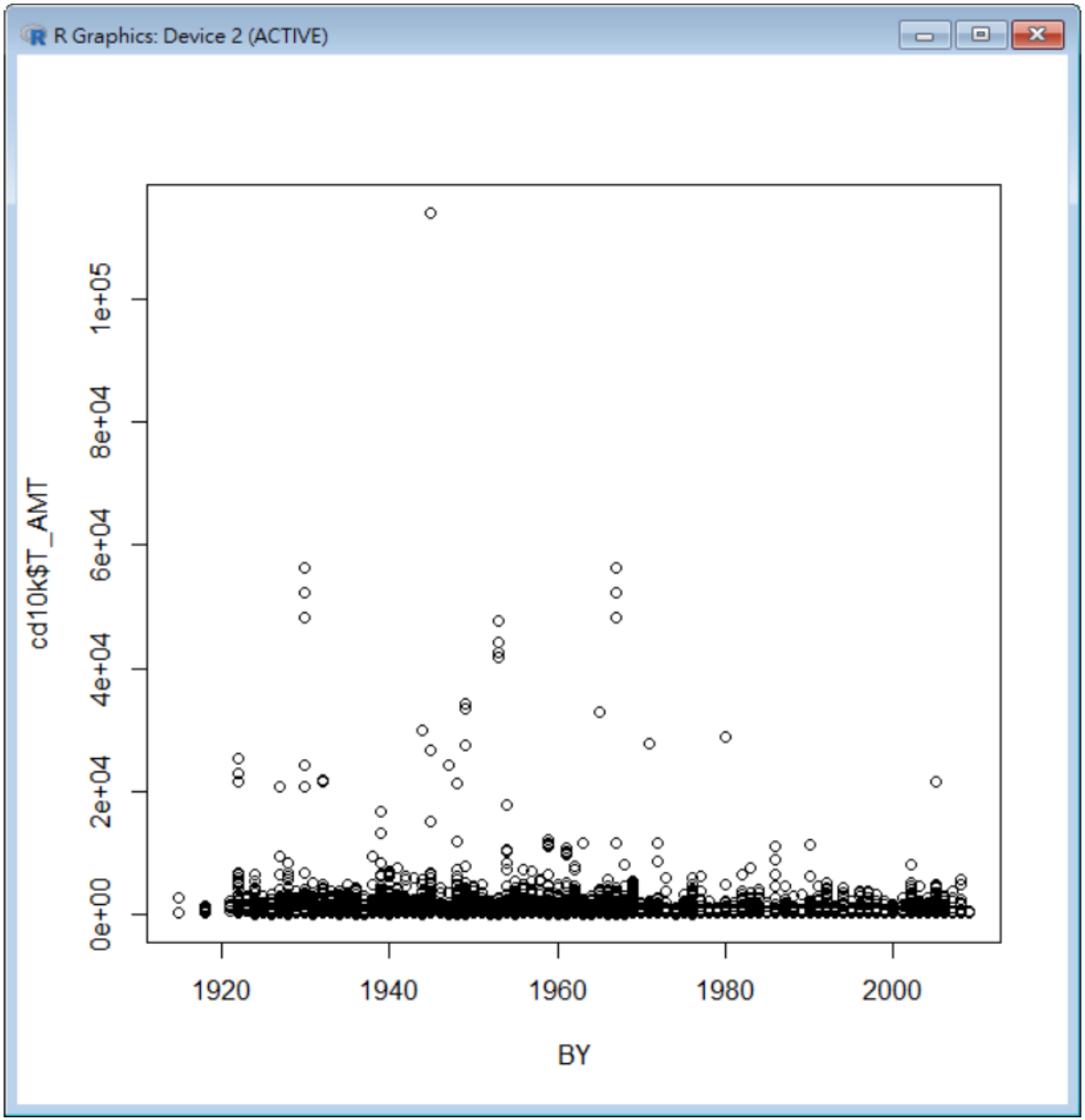
Plot Types	R base function
Scatter plot	plot()
Scatter plot matrix	pairs()
Box plot	boxplot()
Strip chart	stripchart()
Histogram plot	hist()
Density plot	density()
Bar plot	barplot()
Line plot	plot() and line()
Pie charts	pie()
Dot charts	dotchart()
Add text to a plot	text()

http://www.sthda.com/english/wiki/r-base-graphs
http://www.sthda.com/english/articles/32-r-graphics-essentials/134-r-basics-for-data-visualization/

Scatter Plot 散佈圖

```
cd10k <- head(cd, 10000)   # 取1萬筆 => 只畫1萬點
BY <- as.numeric(substr(cd10k$ID_BIRTHDAY, start = 1, stop = 4))   # 出生年(西元)
plot(BY, cd10k$T_AMT)    # 也可寫成 plot(cd10k$T_AMT ~ BY)
```

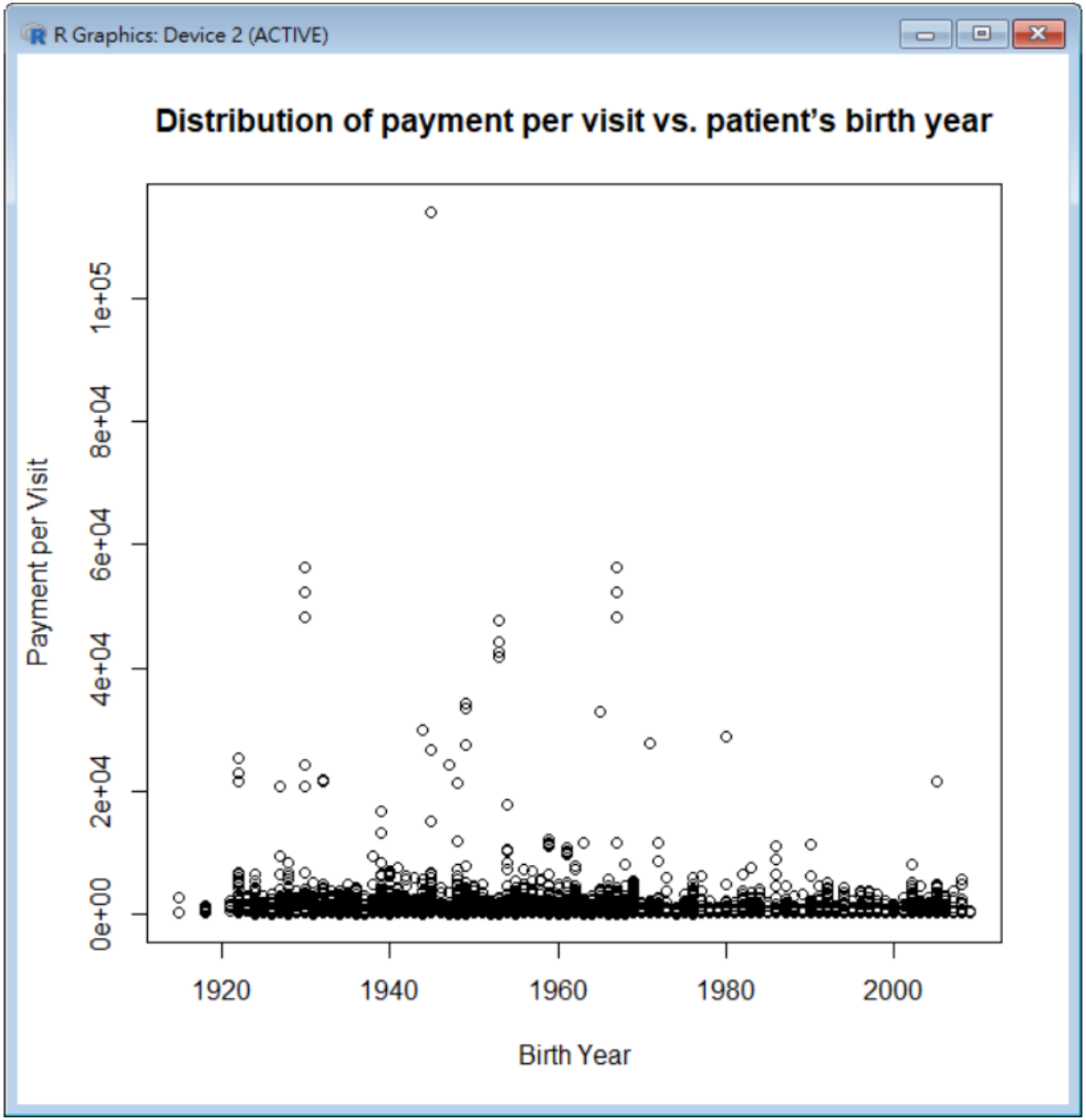
- plot(x, y) # x, y係兩個平行對應的向量
- plot(x, y) # x, y相當於X軸Y軸2D座標圖
- 請先利用Import_tidyverse.r，匯入資料
- Reference (fullrefman.pdf) => I => The graphics package => plot


R Graphics: Device 2 (ACTIVE)
cd10k$T_AMT
0e+00
2e+04
4e+04
6e+04
8e+04
1e+05
1920
1940
1960
1980
2000
BY

標題和標籤

plot(BY, cd10k$T_AMT, main = "Distribution of payment per visit vs. patient's birth year", xlab = "Birth Year", ylab = "Payment per Visit")

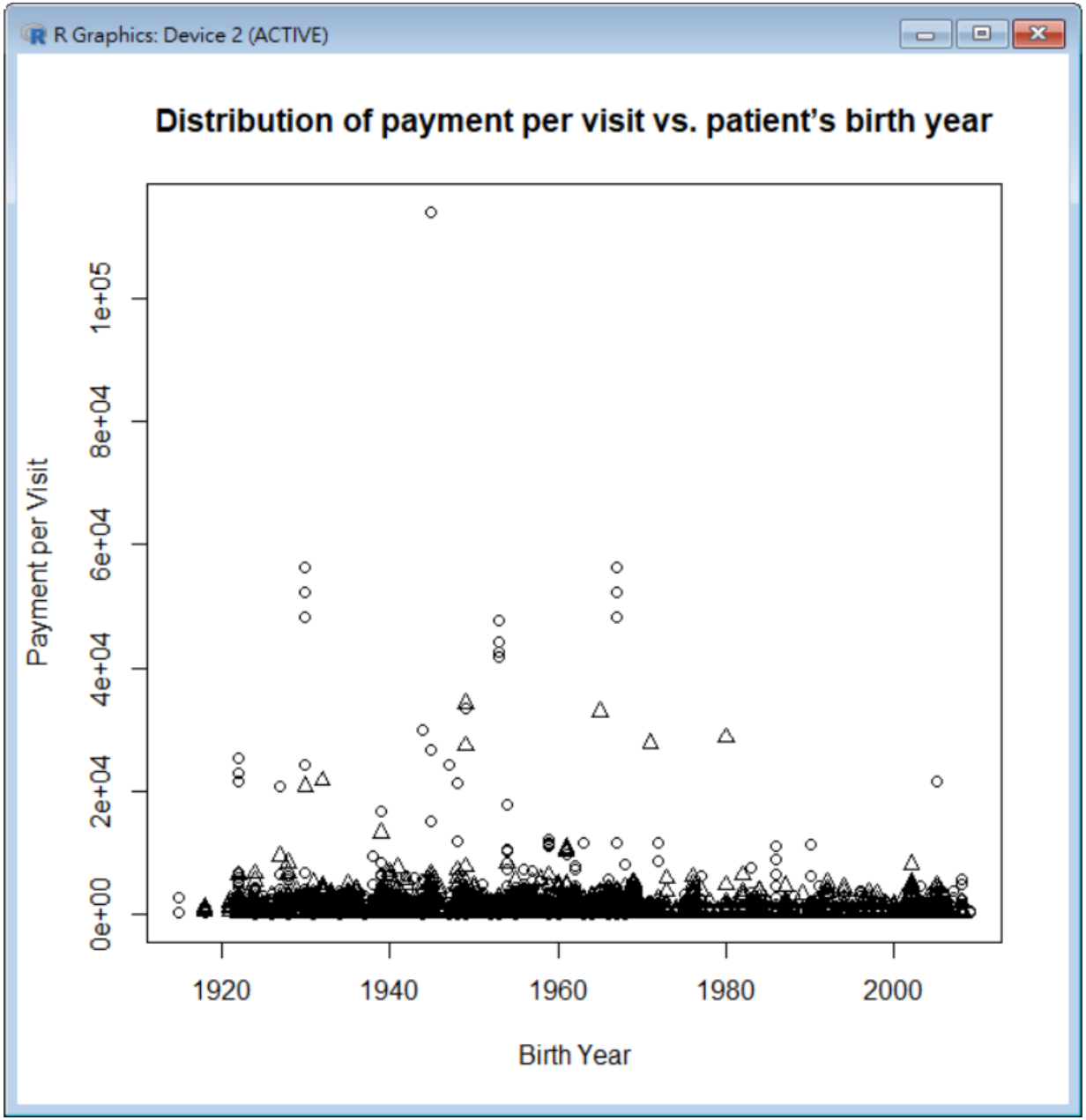
- main　# 標題
- xlab　# X軸標籤
- ylab　# Y軸標籤


R Graphics: Device 2 (ACTIVE)
Distribution of payment per visit vs. patient's birth year
Payment per Visit
0e+00
2e+04
4e+04
6e+04
8e+04
1e+05
1920
1940
1960
1980
2000
Birth Year

分組標示

```
sex <- as.factor(cd10k$ID_SEX)
plot(BY, cd10k$T_AMT, main = "Distribution of payment per visit vs. patient's birth year", xlab = "Birth Year", ylab = "Payment per Visit", pch = as.integer(sex))
```

- 根據因子(factor)分組 => sex先轉換為因子
- pch運作前須先將因子轉為整數
- 因子的class為factor，mode為numeric (integer)
- 因子在 R 內部係以整數形式儲存


R Graphics: Device 2 (ACTIVE)
Distribution of payment per visit vs. patient's birth year
Payment per Visit
0e+00
2e+04
4e+04
6e+04
8e+04
1e+05
1920
1940
1960
1980
2000
Birth Year

常見引數(arguments)

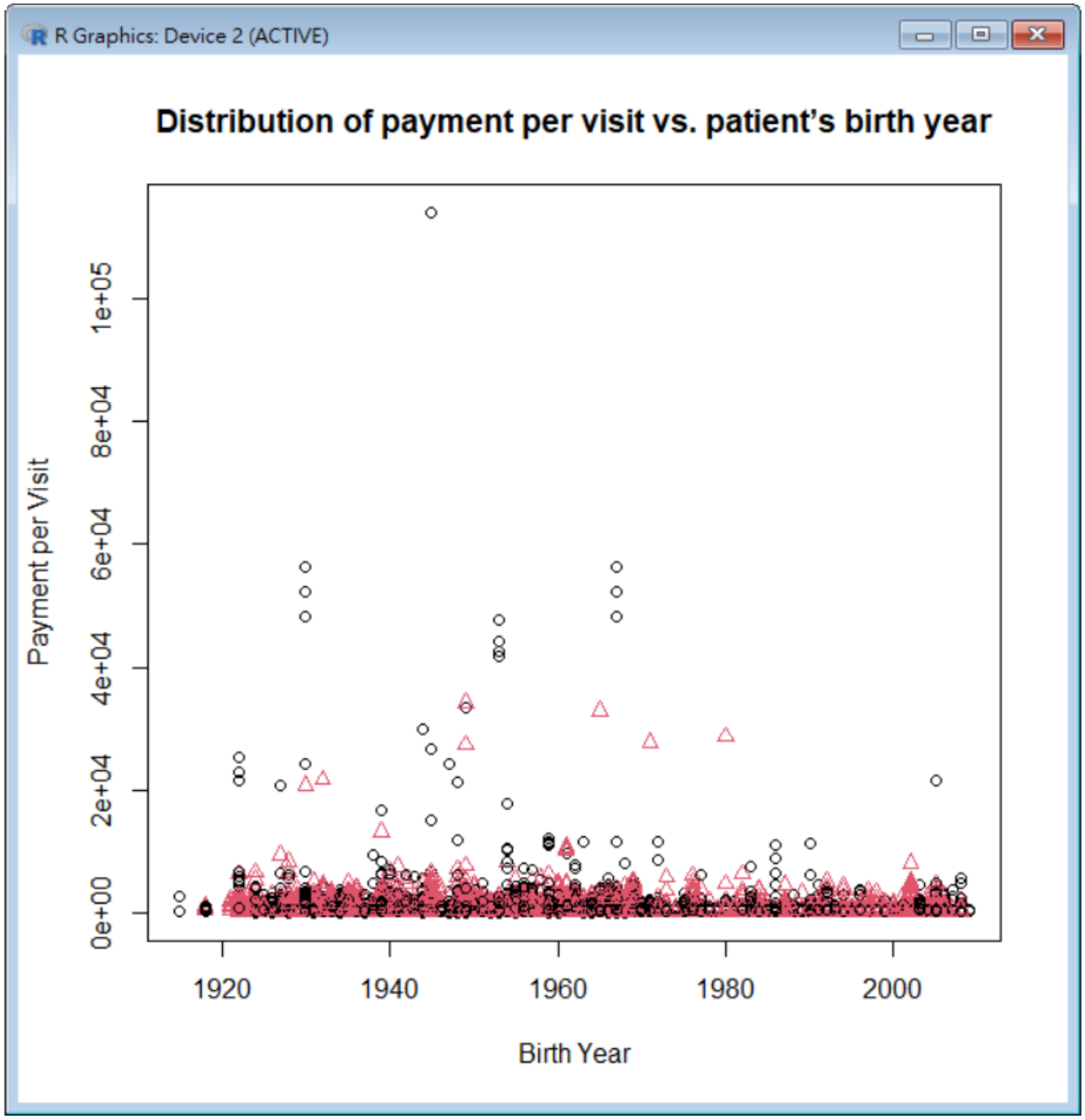
- main, sub : 主標題，次標題
- xlab, ylab : X軸標籤，Y軸標籤
- pch : 改變點的型(change point shapes) (代號 1至25)
- cex : 改點的大小(change point size) (例 cex = 0.8)
- col : 顏色
- frame : 邊框 (frame = FALSE 移除圖形的邊框)
- las : 軸標籤樣式 (代號 0, 1, 2, 3)
- …… (多數套用 par 函數內引數)

http://www.sthda.com/english/wiki/graphical-parameters
https://www.statmethods.net/advgraphs/parameters.html
https://www.rdocumentation.org/packages/graphics/versions/3.6.2/topics/plot
https://www.rdocumentation.org/packages/graphics/versions/3.6.2/topics/par

分組標示(區分顏色)

plot(BY, cd10k$T_AMT, main = "Distribution of payment per visit vs. patient's birth year", xlab = "Birth Year", ylab = "Payment per Visit", pch = as.integer(sex), col = sex)

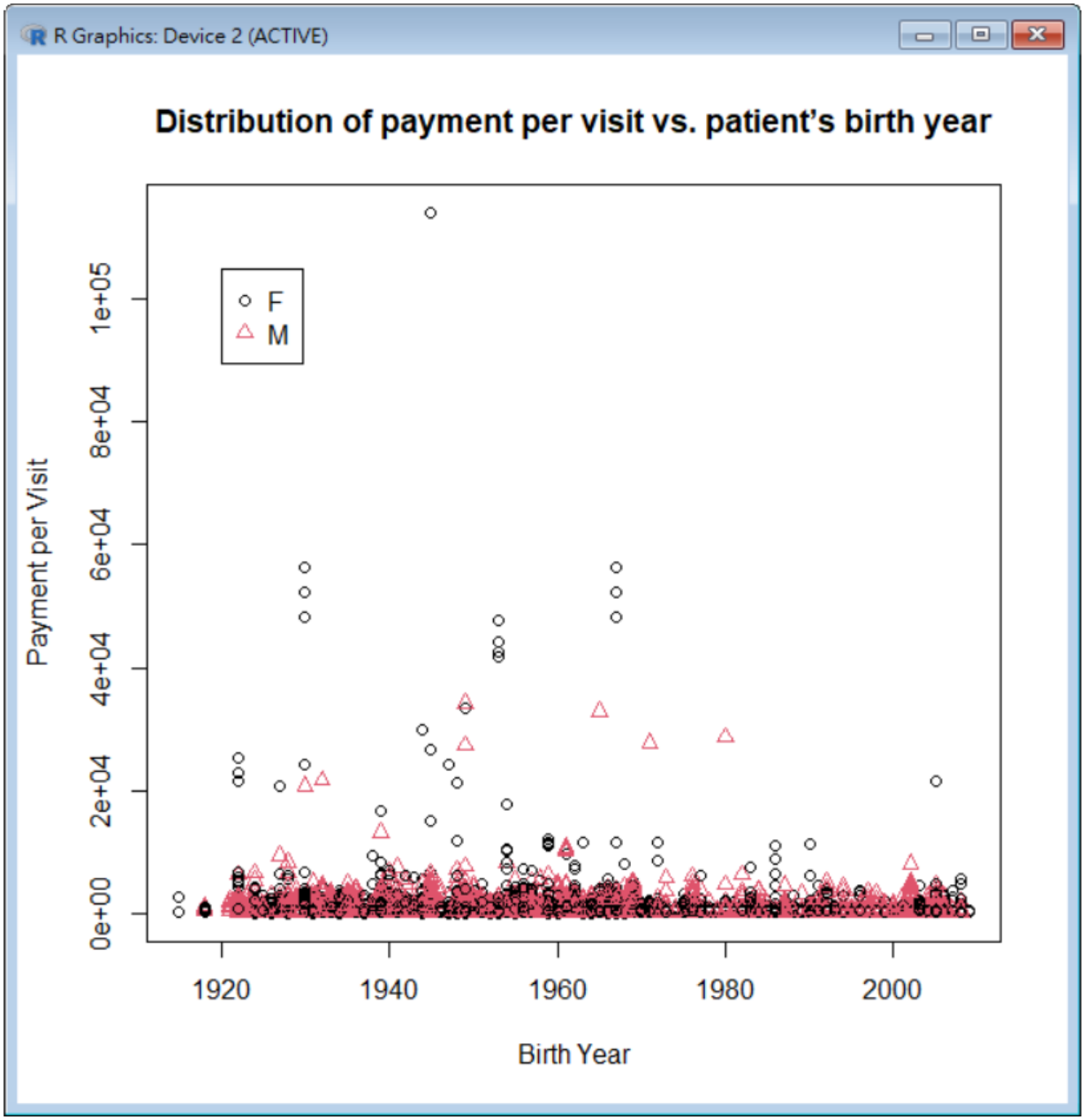
- Reference (fullrefman.pdf) => I => The graphics package => plot / plot.default / par


R Graphics: Device 2 (ACTIVE)
Distribution of payment per visit vs. patient's birth year
Payment per Visit
0e+00
2e+04
4e+04
6e+04
8e+04
1e+05
1920
1940
1960
1980
2000
Birth Year

加上圖例

legend(1920, 105000, levels(sex), pch = 1:length(levels(sex)), col = 1:length(levels(sex)))

- 第1參數：圖例位置 - 左上角X軸座標(數值依X軸)
- 第2參數：圖例位置 - 左上角Y軸座標(數值依Y軸)
- 第3參數：圖例文字
- pch：圖例的圖示
- col：圖例的顏色，也可一一標記 c("red", "blue")
- legend係在既有的圖形上面添加圖例
- Reference (fullrefman.pdf) => I => The graphics package => legend

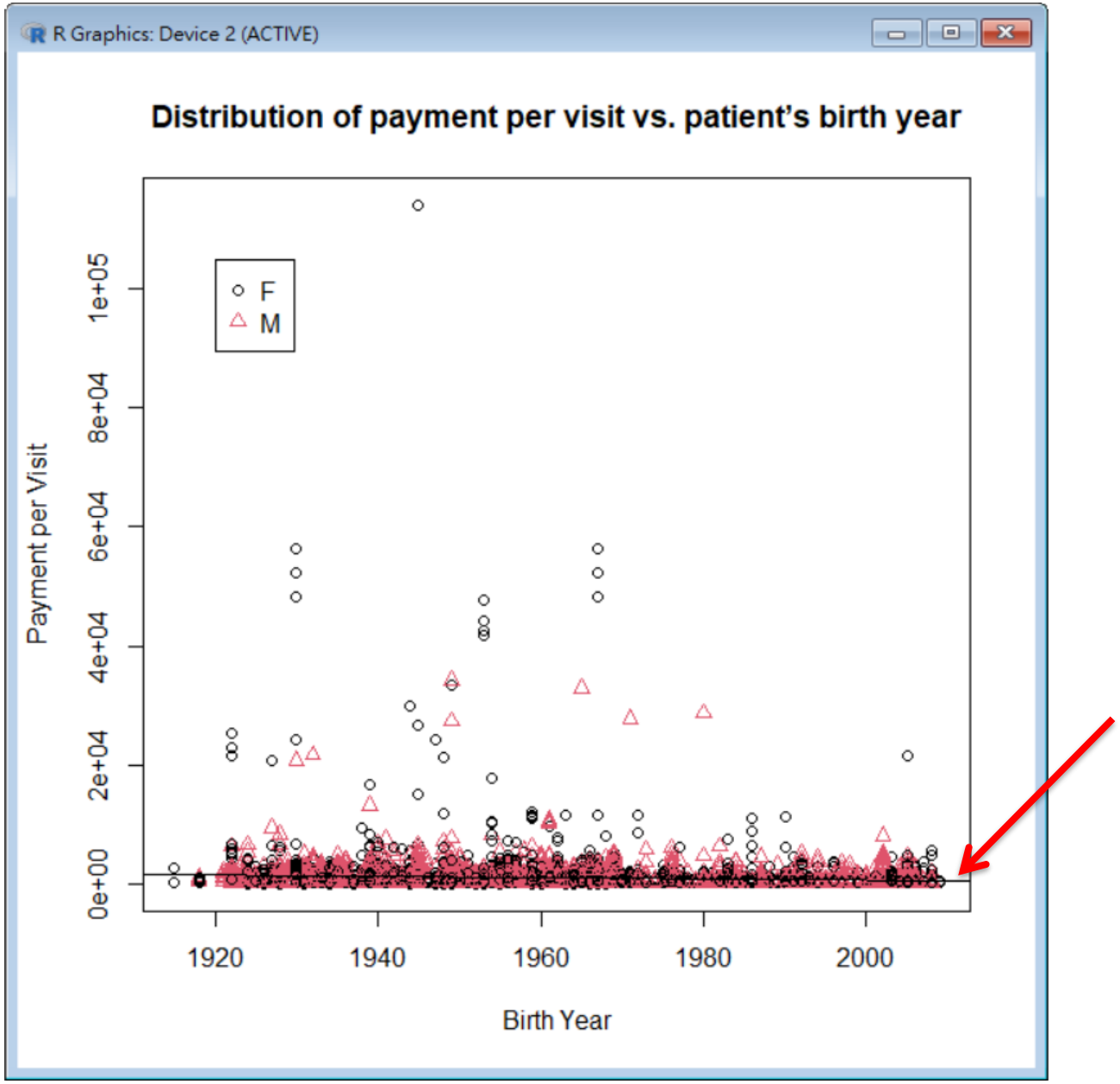

R Graphics: Device 2 (ACTIVE)
Distribution of payment per visit vs. patient's birth year
F
M
Payment per Visit
0e+00
2e+04
4e+04
6e+04
8e+04
1e+05
1920
1940
1960
1980
2000
Birth Year

加上回歸線

```
m <- lm(cd10k$T_AMT ~ BY)
abline(m)
```

- lm : linear model
- abline 係在既有的圖形上面添加直線

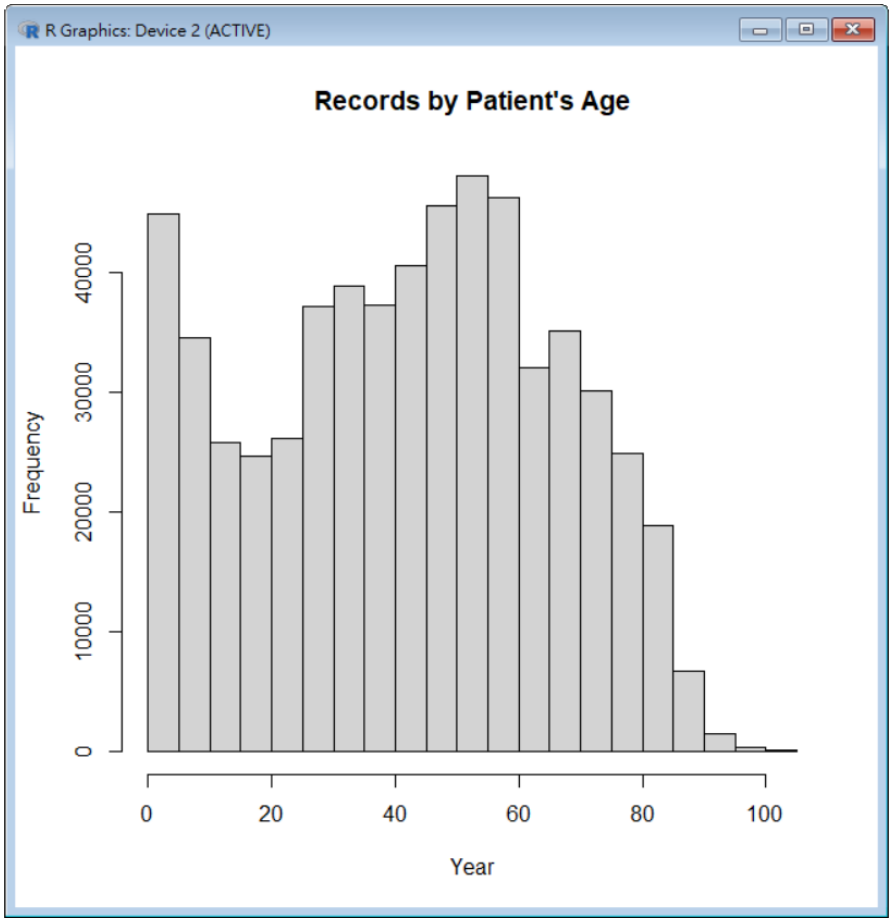
https://www.rdocumentation.org/packages/stats/versions/3.6.2/topics/lm
https://www.rdocumentation.org/packages/graphics/versions/3.6.2/topics/abline

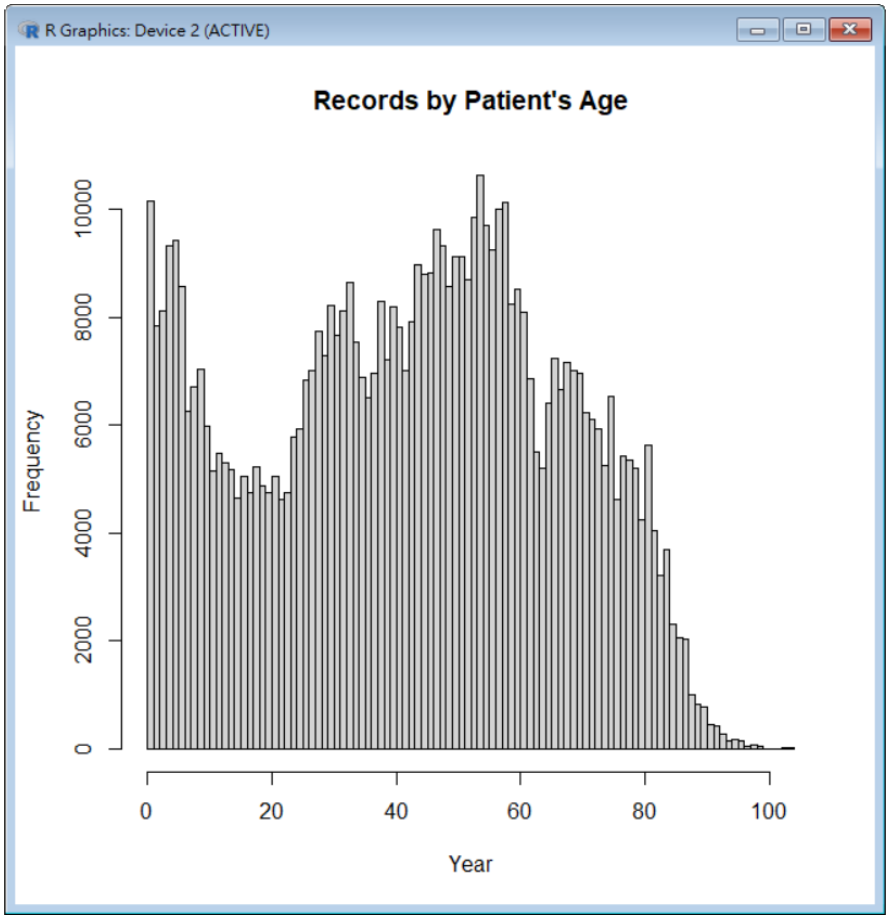

R Graphics: Device 2 (ACTIVE)
Distribution of payment per visit vs. patient's birth year
F
M
Payment per Visit
0e+00
2e+04
4e+04
6e+04
8e+04
1e+05
1920
1940
1960
1980
2000
Birth Year

Histogram

```
Age <- 2009 - as.numeric(substr(cd$ID_BIRTHDAY, 1, 4))

hist(Age, main = "Records by Patient's Age", xlab =
"Year")

hist(Age, 100, main = "Records by Patient's Age", xlab =
"Year")    # breaks = 100
```

- 請先利用Import_tidyverse.r匯入資料
- histogram的x軸必須是numeric
- Reference (fullrefman.pdf) => I => The graphics package => hist

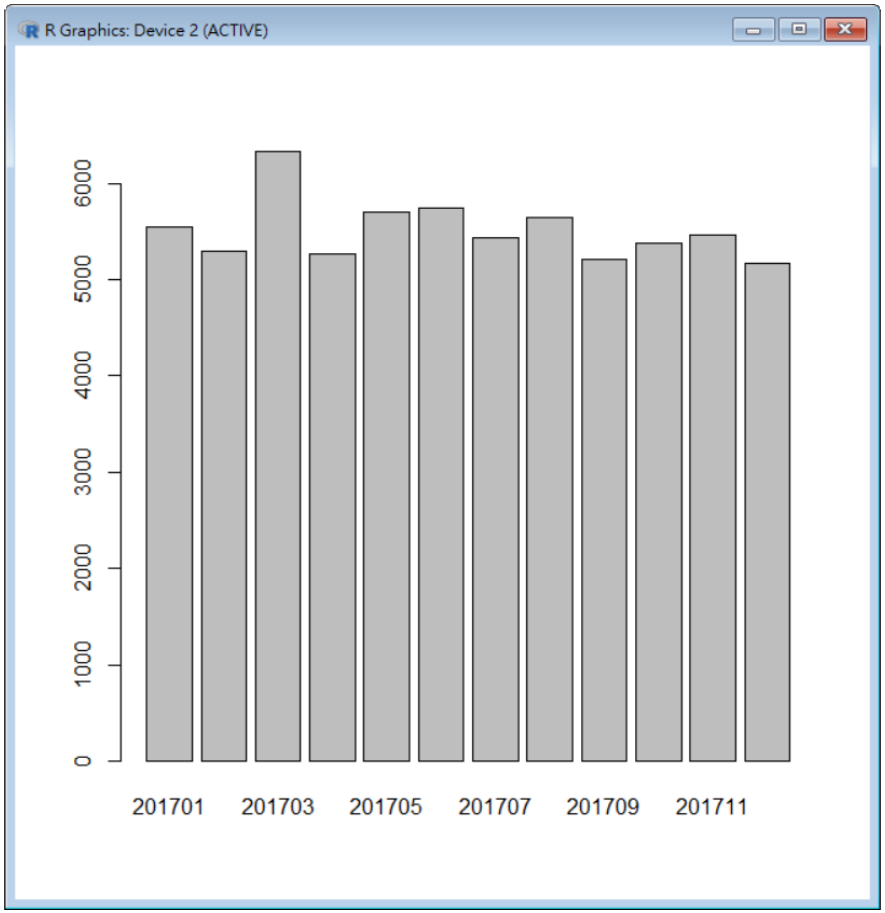

R Graphics: Device 2 (ACTIVE)
Records by Patient's Age
Frequency
0
10000
20000
30000
40000
0
20
40
60
80
100
Year

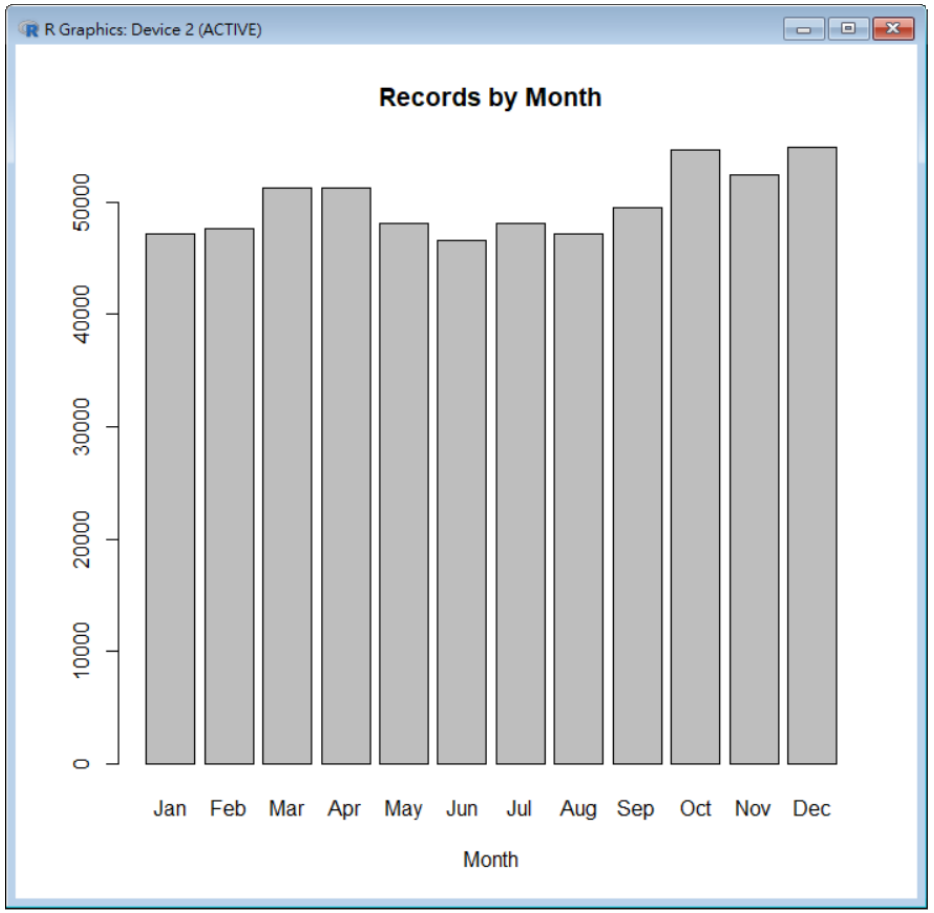

R Graphics: Device 2 (ACTIVE)
Records by Patient's Age
Frequency
0
2000
4000
6000
8000
10000
0
20
40
60
80
100
Year

Bar Chart

```
reccount <- table(cd$FEE_YM)
barplot(reccount)

barplot(reccount, main = "Records by Month", xlab = "Month", names.arg = c("Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"))
```

- 請先利用Import_tidyverse.r匯入資料
- Reference (fullrefman.pdf) => I => The graphics package => barplot

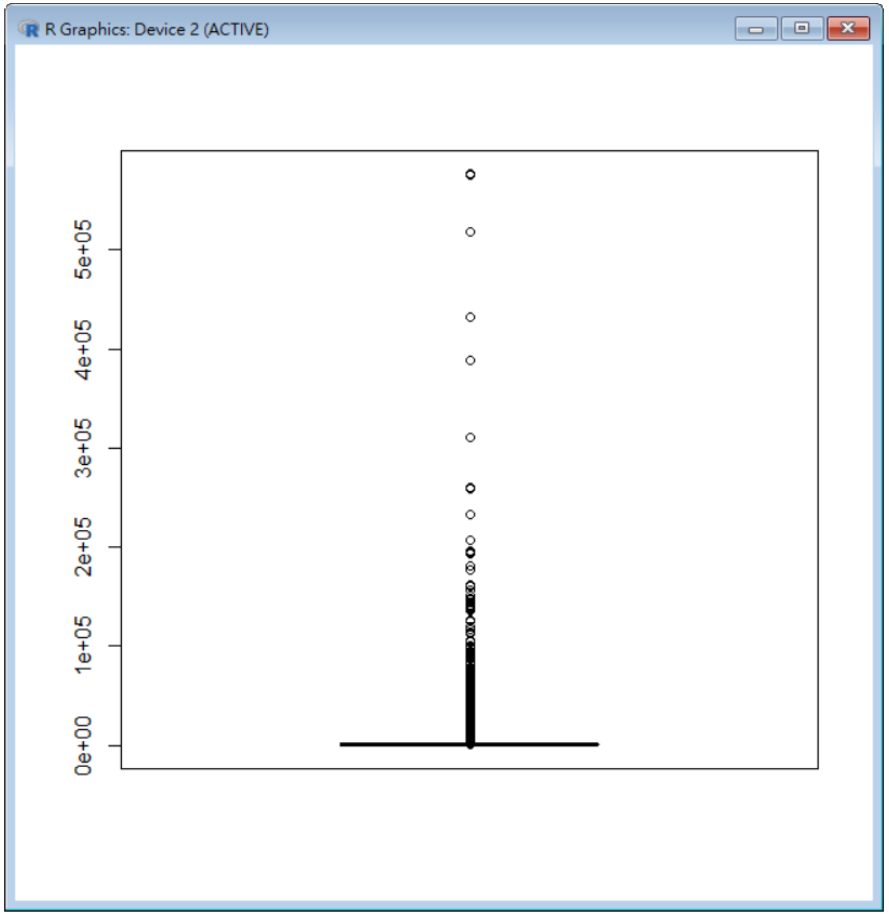

R Graphics: Device 2 (ACTIVE)
0
1000
2000
3000
4000
5000
6000
201701
201703
201705
201707
201709
201711

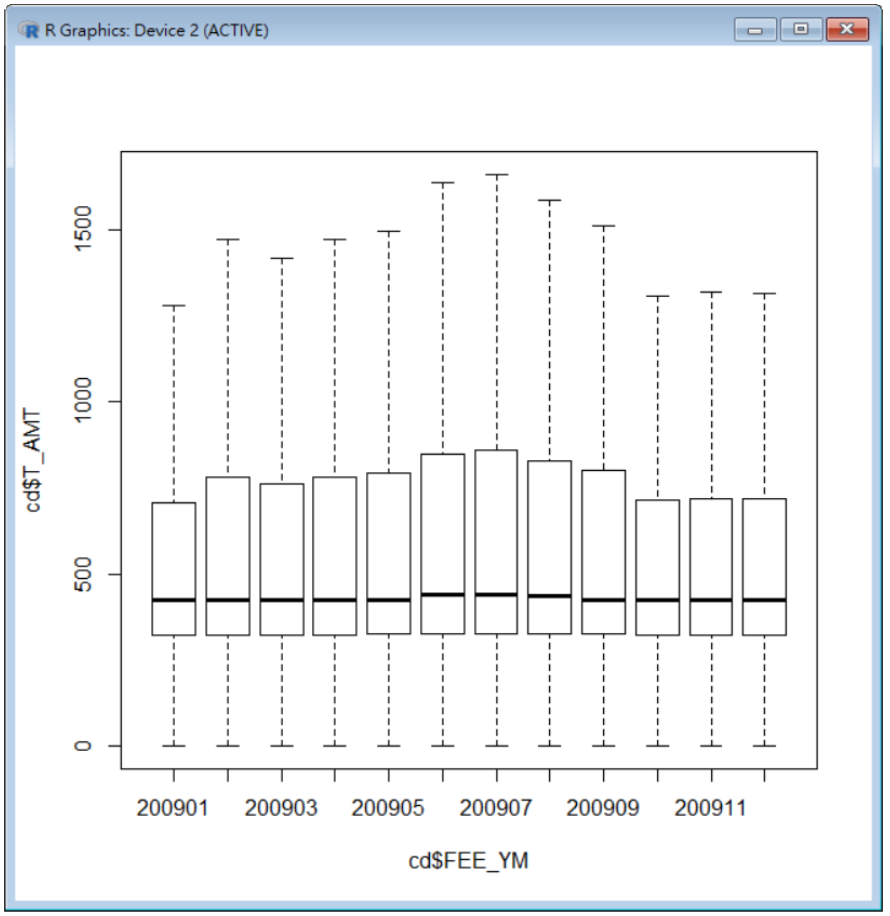

R Graphics: Device 2 (ACTIVE)
Records by Month
0
10000
20000
30000
40000
50000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

Box Plot

```
boxplot(cd$T_AMT)
boxplot(cd$T_AMT ~ cd$FEE_YM, outline = FALSE)
boxplot(T_AMT ~ ID_SEX, data = cd, outline = FALSE)
```

- 請先利用Import_tidyverse.r匯入資料
- 由於極端值相當極端，所以讓其不顯示(加上參數outline = FALSE)
- Reference (fullrefman.pdf) => I => The graphics package => boxplot

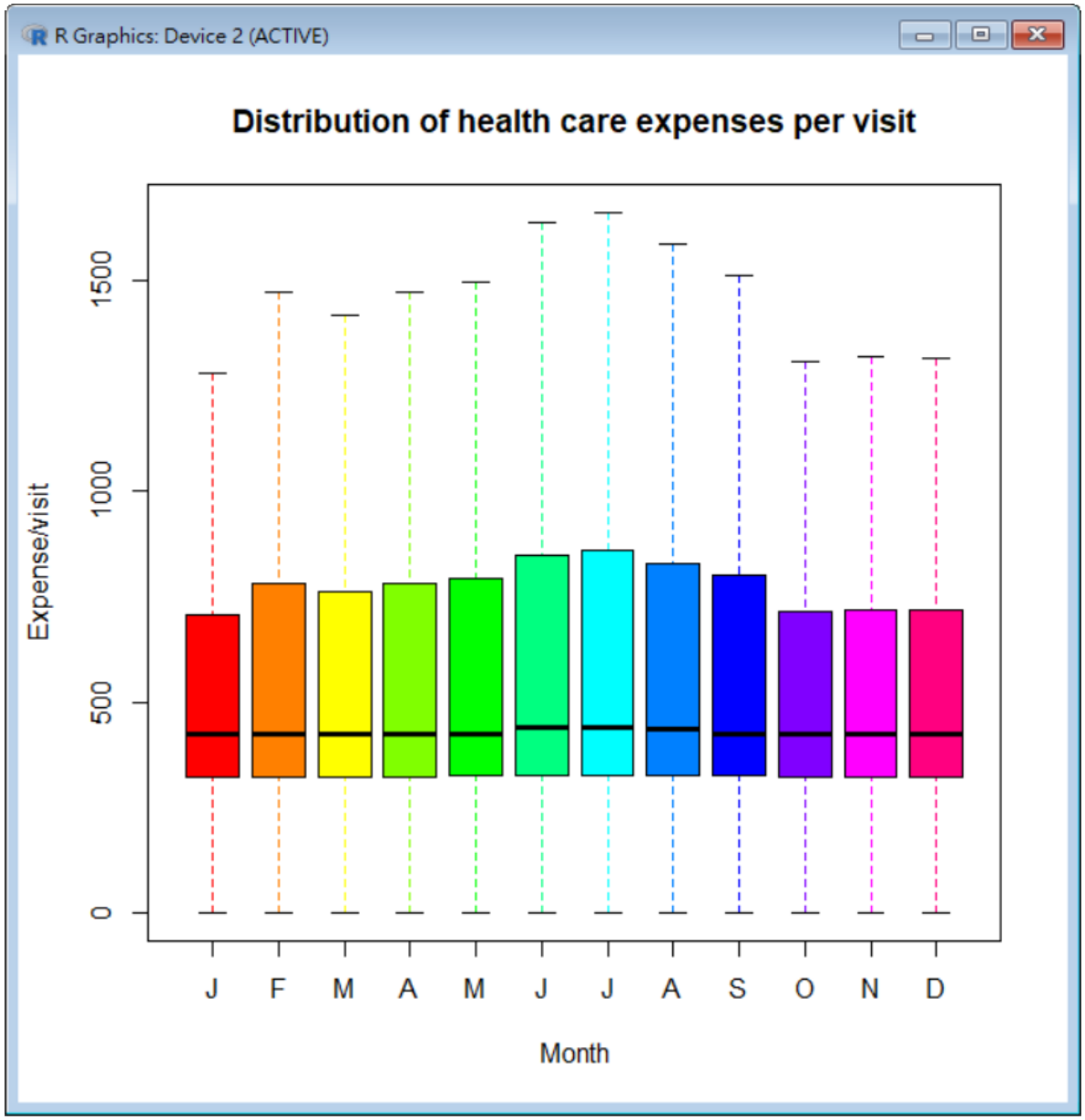

R Graphics: Device 2 (ACTIVE)
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05


R Graphics: Device 2 (ACTIVE)
cd$T_AMT
0
500
1000
1500
200901
200903
200905
200907
200909
200911
cd$FEE_YM

加上 顏色

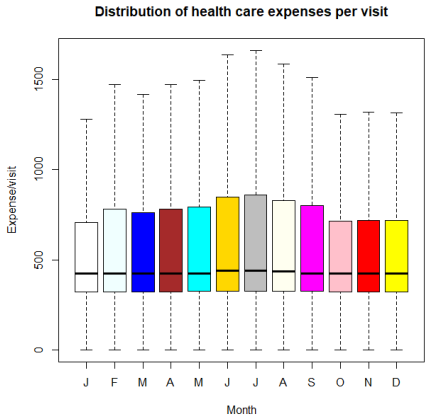
```
boxplot(cd$T_AMT ~ cd$FEE_YM, outline = FALSE, col = rainbow(12), whiskcol = rainbow(12), main = "Distribution of health care expenses per visit", ylab = "Expense/visit", xlab = "Month", names = c("J","F","M","A","M","J","J","A","S","O","N","D"))
```

https://www.rdocumentation.org/packages/grDevices/versions/3.6.2/topics/Palettes


R Graphics: Device 2 (ACTIVE)
Distribution of health care expenses per visit
Expense/visit
0
500
1000
1500
J
F
M
A
M
J
J
A
S
O
N
D
Month

插播

色彩調整 - 1



- 使用內建色彩名稱

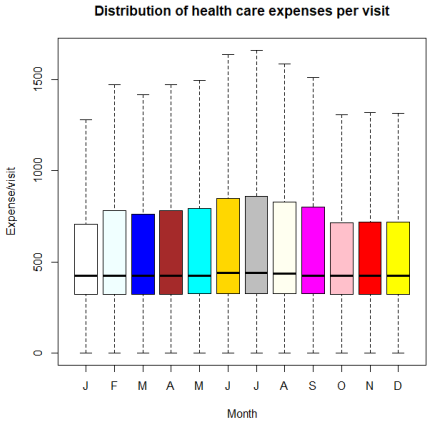
colors()　# 共657個名字

```
FARBEN <- c('white', 'azure', 'blue', 'brown', 'cyan', 'gold', 'gray',
'ivory', 'magenta', 'pink', 'red', 'yellow')

boxplot(cd$T_AMT ~ cd$FEE_YM, outline = FALSE, col = FARBEN,
main = "Distribution of health care expenses per visit", ylab =
"Expense/visit", xlab = "Month", names =
c("J","F","M","A","M","J","J","A","S","O","N","D"))
```

https://www.rdocumentation.org/packages/grDevices/versions/3.6.2/topics/colors

插播

色彩調整 - 2



- 使用內建色彩序號

FARBEN <- colors()[c(1, 13, 26, 32, 68, 142, 152, 377, 450, 536, 552, 652)]

boxplot(cd$T_AMT ~ cd$FEE_YM, outline = FALSE, col = FARBEN, main = "Distribution of health care expenses per visit", ylab = "Expense/visit", xlab = "Month", names = c("J","F","M","A","M","J","J","A","S","O","N","D"))

white : colors()[1]; azure : colors()[13]; blue : colors()[26]; ……

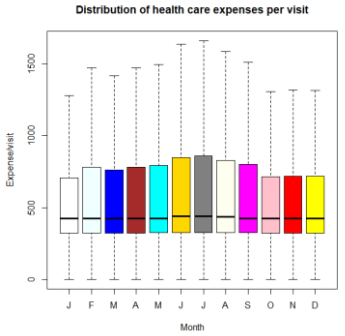
插播

色彩調整 - 3

- 使用十六進位的色彩碼 (共16,777,216種組合)

```
FARBEN <- c('#FFFFFF', '#F0FFFF', '#0000FF', '#A52A2A',
'#00FFFF', '#FFD700', '#808080', '#FFFFF0', '#FF00FF', '#FFC0CB',
'#FF0000', '#FFFF00')
```

```
boxplot(cd$T_AMT ~ cd$FEE_YM, outline = FALSE, col = FARBEN,
main = "Distribution of health care expenses per visit", ylab =
"Expense/visit", xlab = "Month", names =
c("J","F","M","A","M","J","J","A","S","O","N","D"))
```



https://www.color-hex.com/
https://htmlcolorcodes.com/

https://www.color-hex.com/color/ffd700

插播

color-hex | color hex, name, rgb, hsl or | Get Info | Blog | Latest Palettes | Palettes | Colors | Login

Color Hex » Color Names » *Gold*

#ffd700 Color Hex Gold

#FFD700
(255,215,0)

★ 238 Favorites 4 Comments

Color spaces of #ffd700 Gold

RGB	255	215	0
HSL	0.14	1.00	0.50
HSV	51°	100°	100°
CMYK	0.00	0.16	1.00 0.00
XYZ	65.5404	69.8609	10.0301
Yxy	69.8609	0.4507	0.4804
Hunter Lab	83.5828	-6.3015	51.3931
CIE-Lab	86.9286	-1.9243	87.1373

#ffd700 Color | Shades Tints | Rgb Cmyk %s | Color Schemes | Color Preview | CSS Codes | Color Palettes | Related Colors

Facebook Twitter

#ffd700 color RGB value is (255,215,0). #ffd700 color name is **Gold color**.

#ffd700 hex color red value is 255, green value is 215 and the blue value of its RGB is 0. Cylindrical-coordinate representations (also known as HSL) of *color #ffd700* hue: 0.14 , saturation: 1.00 and the lightness value of ffd700 is 0.50.

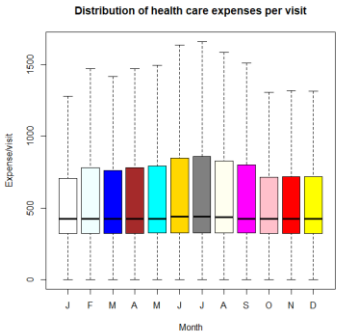
The process color (four color CMYK) of **#ffd700 color hex** is 0.00, 0.16, 1.00, 0.00. *Web safe color* of #ffd700 is #ffcc00. Color #ffd700 **contains mainly RED** color.

Base Numbers

Base	Red	Green	Blue
Binary	11111111	11010111	00000000
Octal	377	327	0
Decimal	255	215	0
Hex	FF	D7	0

插播

色彩調整 - 4



- 使用內建rgb函數 : rgb(red, green, blue, alpha, max)
- alpha : 表示透明度 (optional)
- max (maxColorValue) : 分母 (optional)，預設為 1

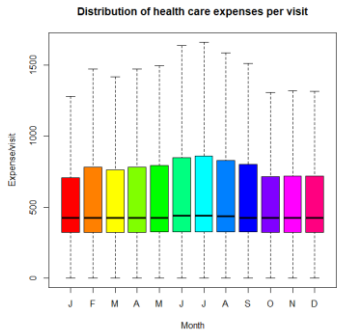
```
FARBEN <- c(rgb(255, 255, 255, max = 255), rgb(240, 255, 255, max = 255),
rgb(0, 0, 255, max = 255), rgb(165, 42, 42, max = 255), rgb(0, 255, 255, max =
255), rgb(255, 215, 0, max = 255), rgb(128, 128, 128, max = 255), rgb(255, 255,
240, max = 255), rgb(255, 0, 255, max = 255), rgb(255, 192, 203, max = 255),
rgb(255, 0, 0, max = 255), rgb(255, 255, 0, max = 255))
```

```
boxplot(cd$T_AMT ~ cd$FEE_YM, outline = FALSE, col = FARBEN, main =
"Distribution of health care expenses per visit", ylab = "Expense/visit", xlab =
"Month", names = c("J","F","M","A","M","J","J","A","S","O","N","D"))
```

https://www.rdocumentation.org/packages/grDevices/versions/3.6.2/topics/rgb

插播

色彩調整 - 5



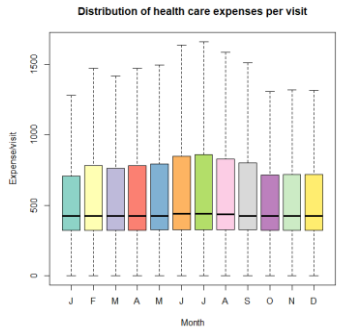
- 使用內建調色盤(7 palettes) (屬於grDevices套件) : hcl.colors(); hcl.pals(); rainbow(); heat.colors(); terrain.colors(); topo.colors(); cm.colors()

```
boxplot(cd$T_AMT ~ cd$FEE_YM, outline = FALSE, col = rainbow(12), main = "Distribution of health care expenses per visit", ylab = "Expense/visit", xlab = "Month", names = c("J","F","M","A","M","J","J","A","S","O","N","D"))
```

https://www.rdocumentation.org/packages/grDevices/versions/3.6.2/topics/Palettes

插播

色彩調整 - 6



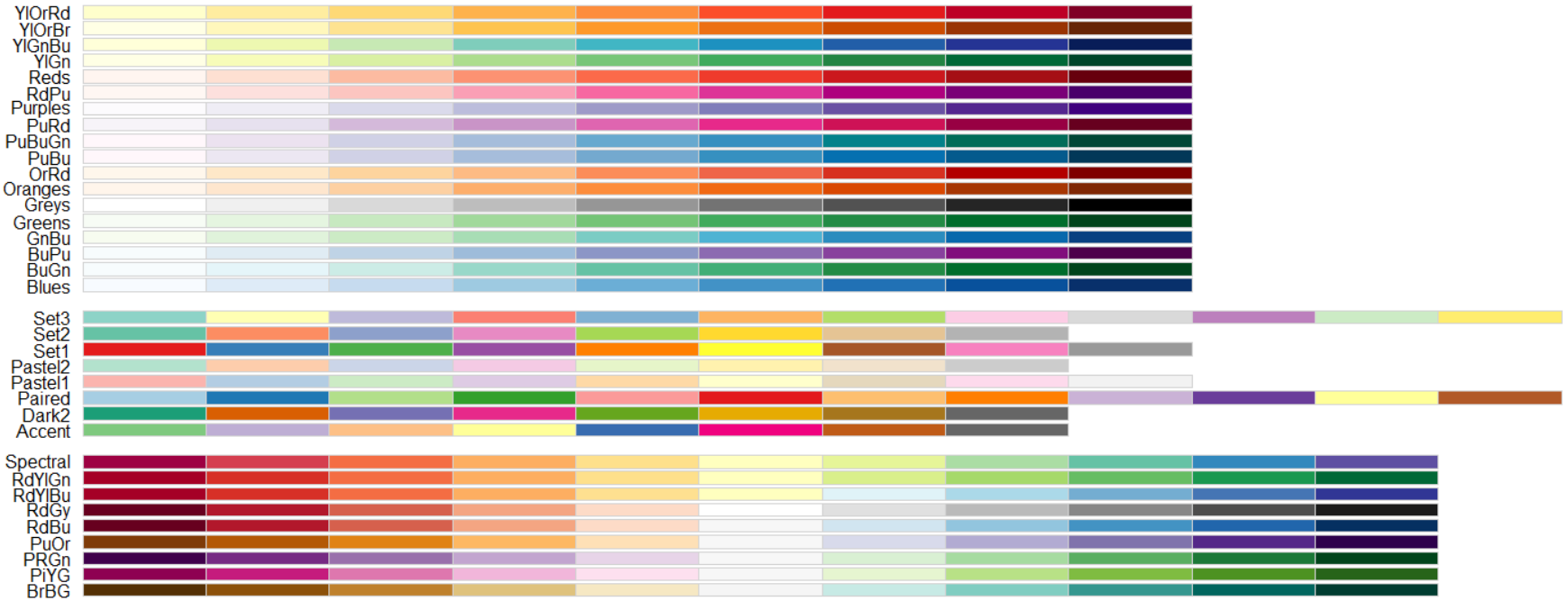
- 使用 RColorBrewer 套件的35個調色盤，係利用 https://colorbrewer2.org/ 網站提供的顏色

```
if (!require('RColorBrewer')) { install.packages('RColorBrewer');
library(RColorBrewer) }
display.brewer.all()

boxplot(cd$T_AMT ~ cd$FEE_YM, outline = FALSE, col =
brewer.pal(12, 'Set3'), main = "Distribution of health care
expenses per visit", ylab = "Expense/visit", xlab = "Month",
names = c("J","F","M","A","M","J","J","A","S","O","N","D"))
```

https://www.rdocumentation.org/packages/RColorBrewer/versions/1.1-2/topics/RColorBrewer

插播

ColorBrewer Palettes



青
- 綠色，「青山綠水」
- 藍色，「青天白日」
- 黑色，「朝如青絲暮成雪」

插播

色彩調整 - 7

- 可利用其他套件的調色盤，當然也可自己設計
- colorspace (https://cran.r-project.org/web/packages/colorspace/vignettes/colorspace.html)
- paletteer (https://github.com/EmilHvitfeldt/paletteer)
- colorRamps (https://cran.r-project.org/web/packages/colorRamps/index.html)
- wesanderson (https://github.com/karthik/wesanderson)
- https://r-charts.com/color-palettes/

https://github.com/EmilHvitfeldt/r-color-palettes

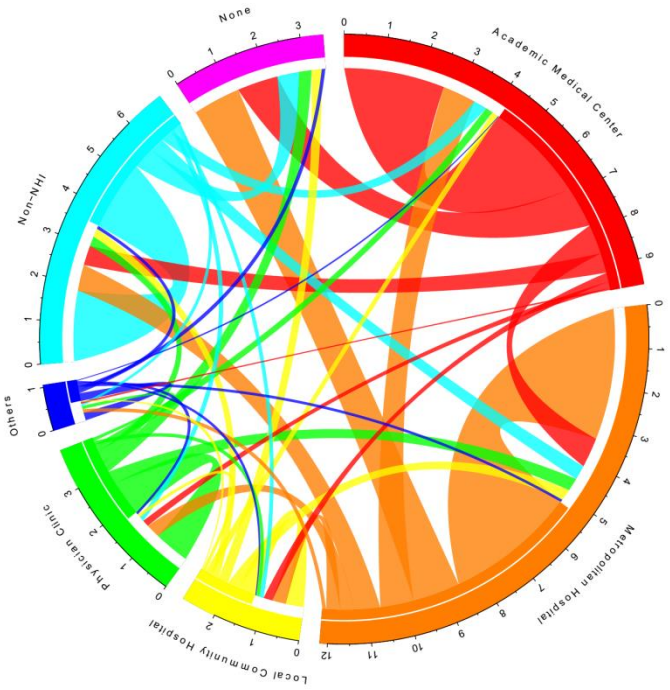
SECTION II

EXAMPLES

SECTION II-A

MIGRATION FLOW CHART

Migration Flow

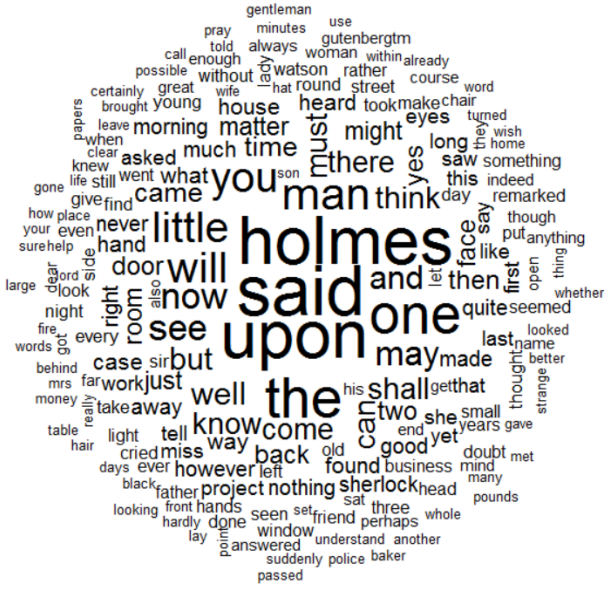


- 利用circlize套件: 需先安裝 install.packages("circlize")
- 需利用一個文字檔 (Flow_Nurse.txt)
- 參見MigrationFlow.r
- # 資料與程式碼置於MigrationFlow子目錄

SECTION II-B

WORD CLOUDS

Word Clouds



- 利用tm、SnowballC 、 wordcloud套件: 需先安裝
  install.packages("tm")
  install.packages("SnowballC")
  install.packages("wordcloud")
- 需利用一個文字檔 (pg1661.txt)
- 參見WordClouds.r
- # 資料與程式碼置於WordClouds子目錄

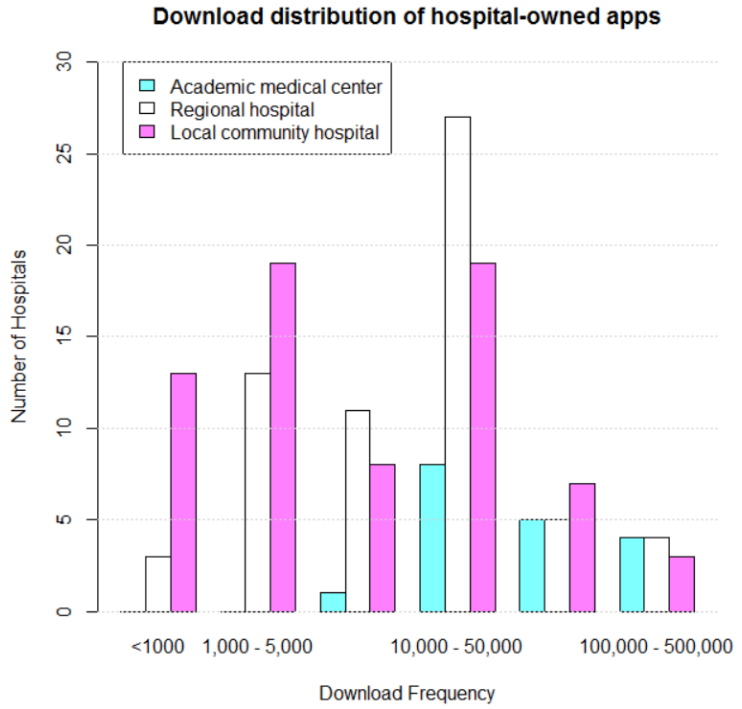
SECTION III

REAL EXAMPLES

SECTION III-A

HOSPITAL-OWNED APPS IN TAIWAN: NATIONWIDE SURVEY

醫院Apps下載次數分布

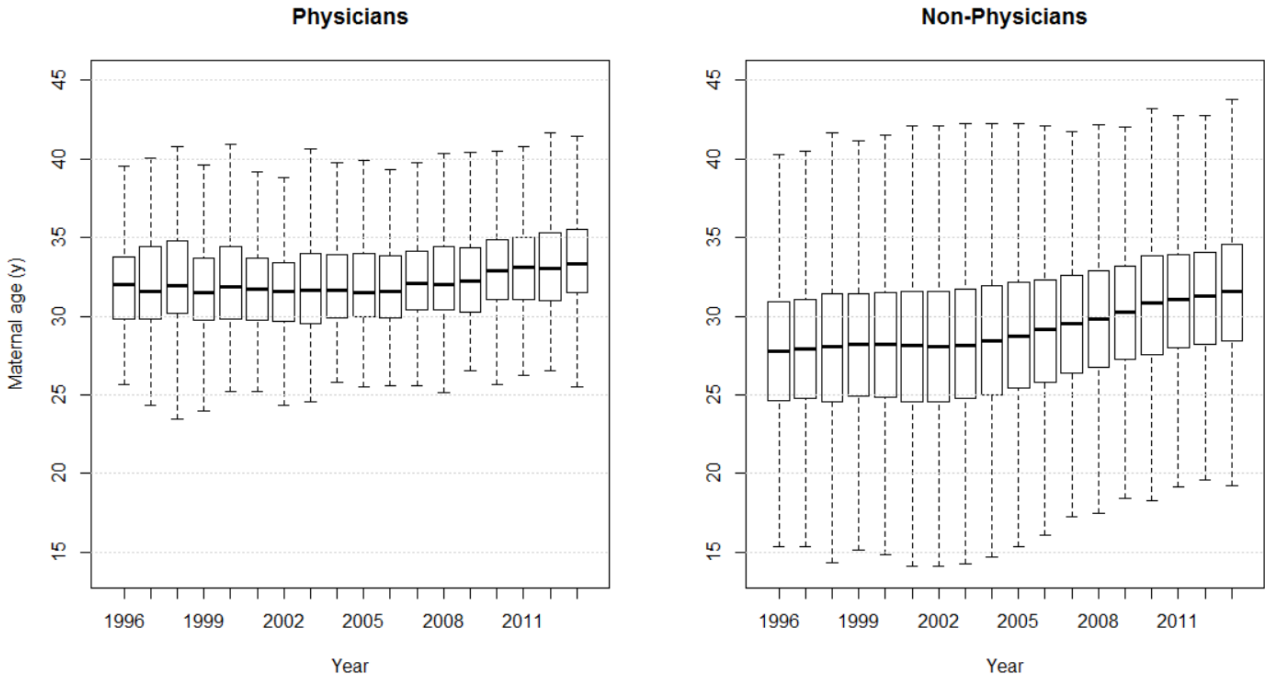


- 發表於 JMIR Mhealth Uhealth 2018;6:e22 (doi: 10.2196/mhealth.8636) [PMID: 29339347]
- # 資料與程式碼置於Apps子目錄
- 用RStudio與RGui顯示的圖不太相同，此圖以RGui較佳

SECTION III-B

BIRTH TRENDS AMONG FEMALE PHYSICIANS IN TAIWAN

女醫師與非醫師生產年齡差異

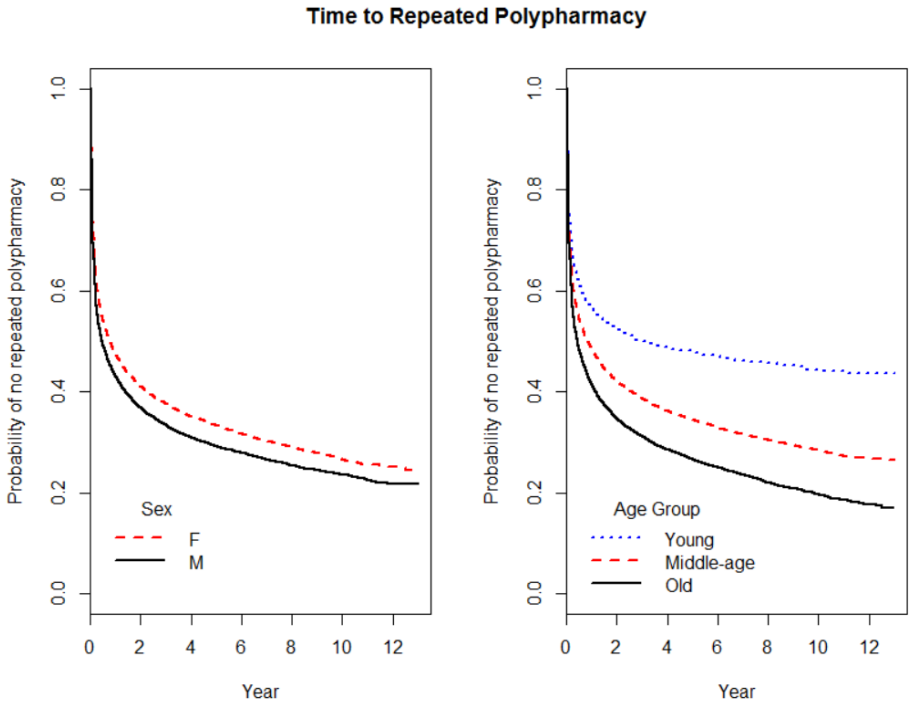


- 發表於 Int J Environ Res Public Health 2017;14:746 (doi: 10.3390/ijerph14070746) [PMID: 28698490]
- # 資料與程式碼置於WomanDocPregnancy子目錄

SECTION III-C

IS EXCESSIVE POLYPHARMACY A TRANSIENT OR PERSISTENT PHENOMENON?

多重用藥是否持續出現

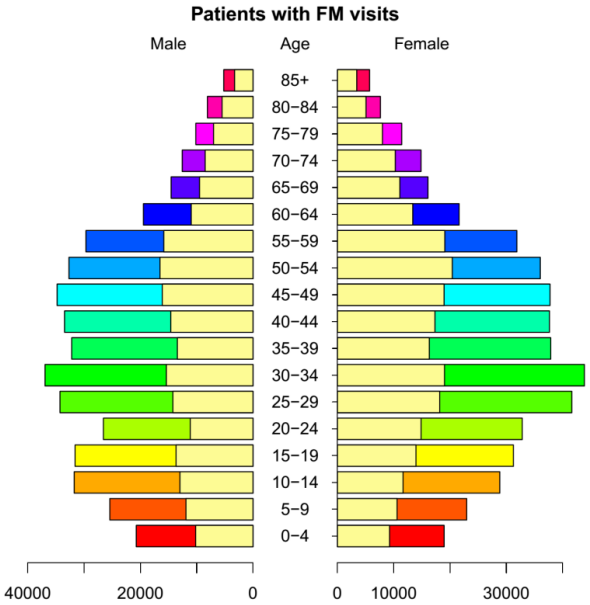


- 發表於 Front Pharmacol 2018;9:120 (doi: 10.3389/fphar.2018.00120) [PMID: 29515446]
- # 資料與程式碼置於Deprescribing子目錄

SECTION III-D

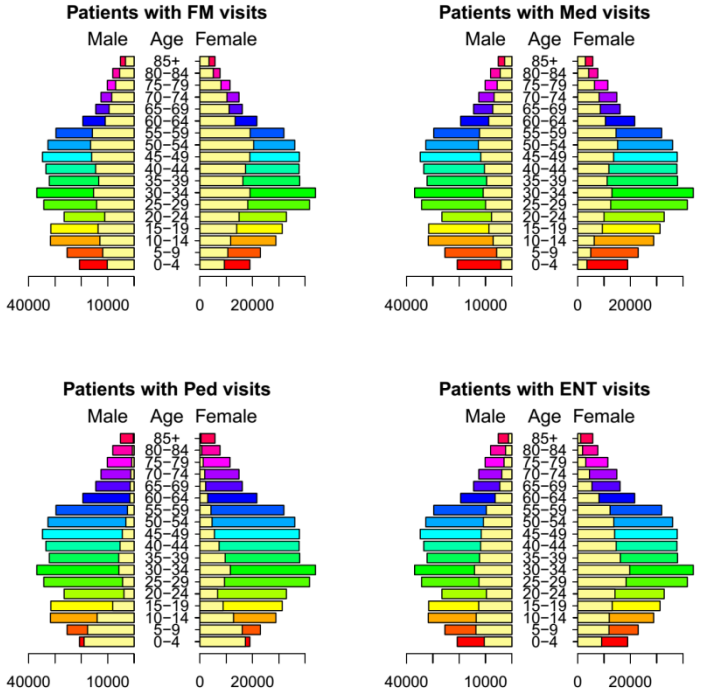
POPULATION PYRAMID CHART

Population Pyramid



- 發表於 Inquiry 2019;56:46958019834830 (doi: 10.1177/0046958019834830) [PMID: 30947595]
- 需先安裝plotrix套件 : install.packages("plotrix")
- 參見PopulationPyramid.r
- # 資料與程式碼置於PopulationPyramid子目錄

Population Pyramid



- 整個頁面將放置 2 x 2 個圖案: par(mfrow = c(2, 2))
- 參見PopulationPyramidX4.r

SECTION III-E

NATIVES AS INTERNATIONAL MEDICAL GRADUATES: A NATIONWIDE ANALYSIS IN TAIWAN

外國醫學生

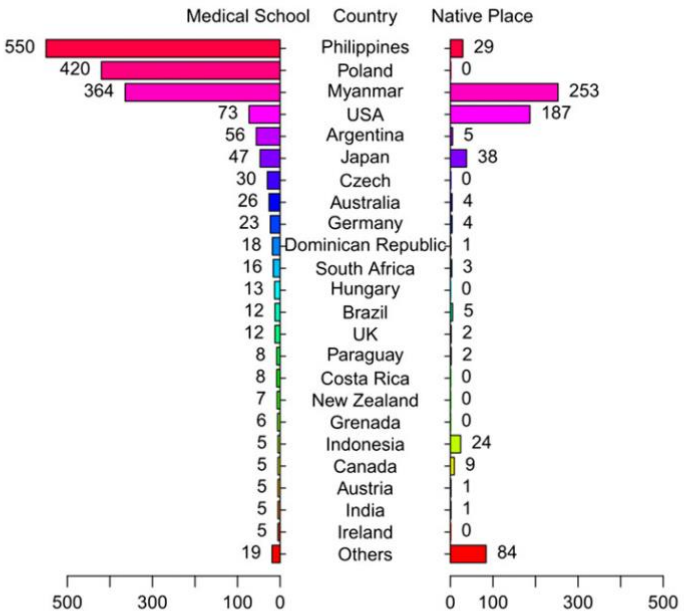


FIGURE 4 Numbers of practicing physicians in Taiwan who studied medicine abroad and who were born abroad, as stratified by country, 2017

- 發表於 Int J Health Plann Manage 2019;34:e291 (doi: 10.1002/hpm.2647) [PMID: 30204262]
- # 資料與程式碼置於IMG子目錄
- PopulationPyramid_2017Short_New.r

外國醫學生

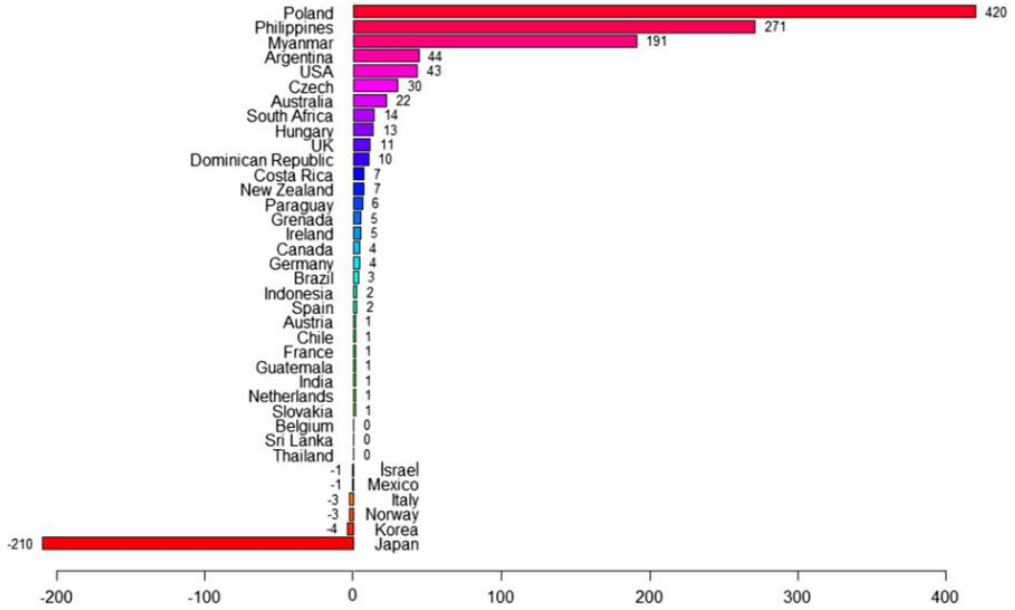


FIGURE 3 Differences in the numbers of practicing IMGs in Taiwan between 1998 and 2017, as stratified by the countries in which the medical schools they graduated from are located

- 發表於 Int J Health Plann Manage 2019;34:e291 (doi: 10.1002/hpm.2647) [PMID: 30204262]
- # 資料與程式碼置於IMG子目錄
- Barplot_Diff2017-1998_NegativeValues.r

外國醫學生

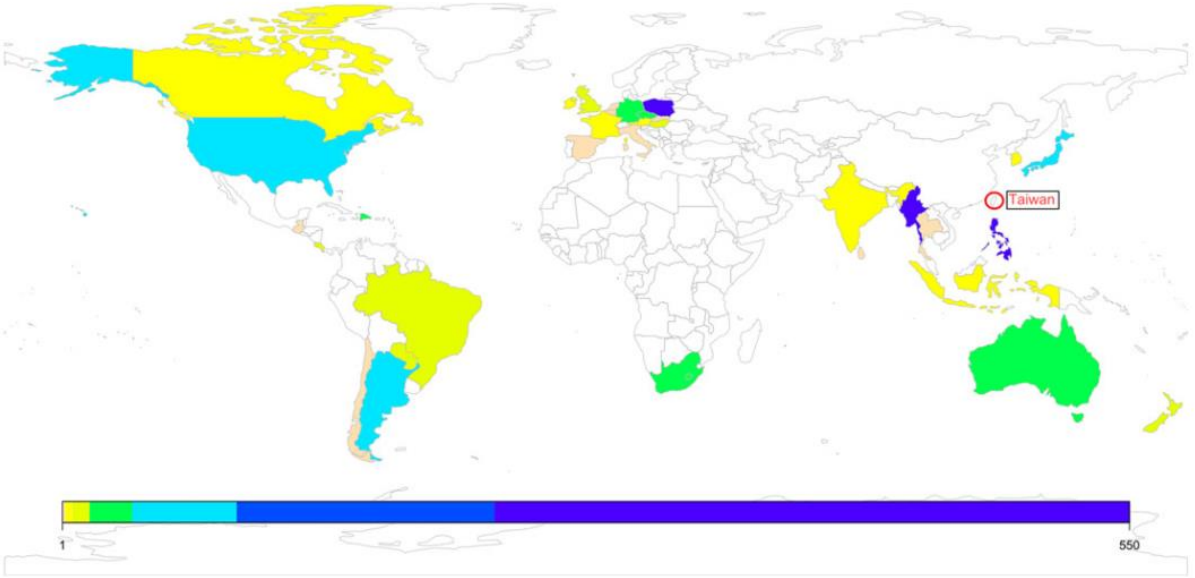


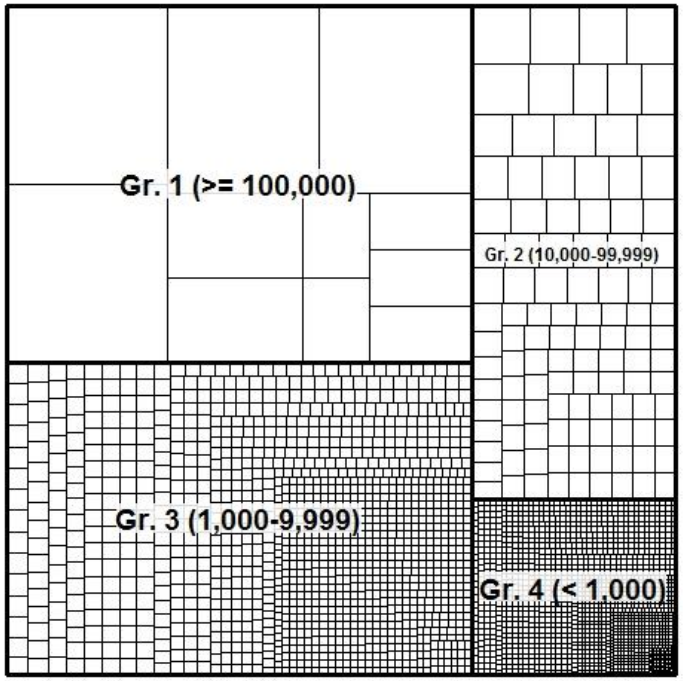
FIGURE 1 Distribution of countries where IMGs practicing in Taiwan in 2017 had studied medicine. The number of IMGs in each country is displayed with a log scale

- 發表於 Int J Health Plann Manage 2019;34:e291 (doi: 10.1002/hpm.2647) [PMID: 30204262]
- # 資料與程式碼置於IMG子目錄
- WorldMap.r

SECTION III-F

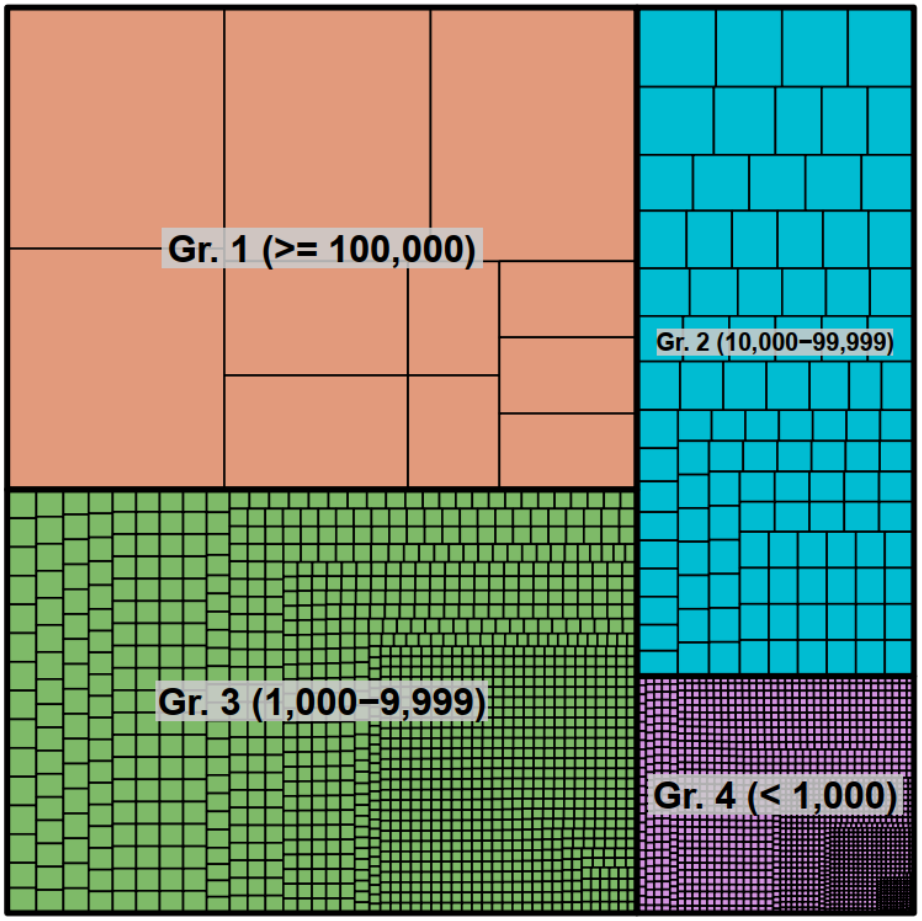
LOTS OF LITTLE ONES: ANALYSIS OF CHARITABLE DONATIONS TO A HOSPICE AND PALLIATIVE CARE UNIT

大德基金會捐款

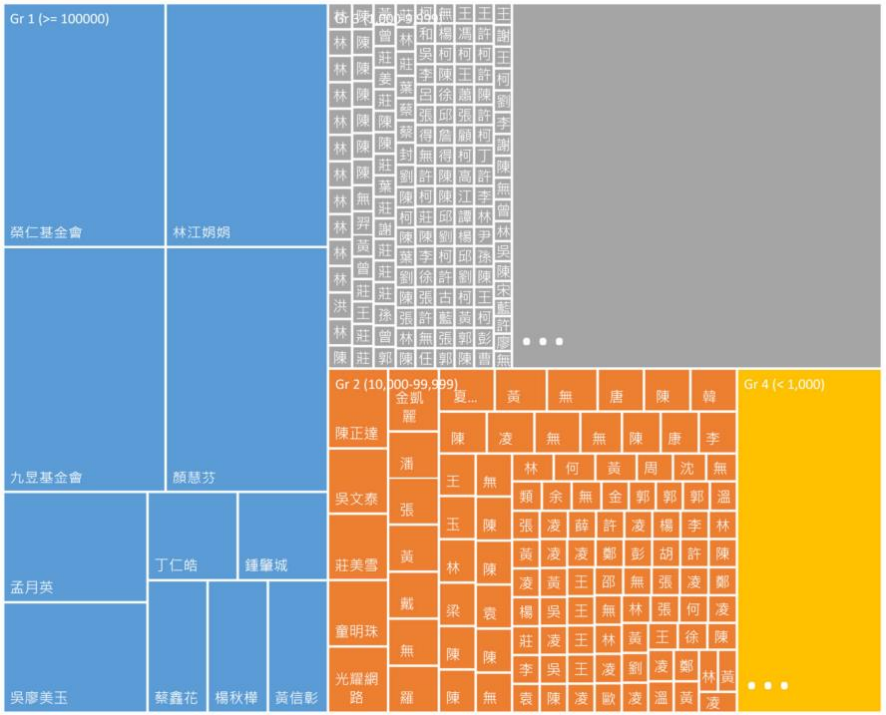


- 發表於 Int J Health Plann Manage 2019;34:e1810-e1819 (doi: 10.1002/hpm.2897) [PMID: 31436892]
- # 資料與程式碼置於Treemap子目錄
- Treemap.r

R


Gr. 1 (>= 100,000)
Gr. 2 (10,000−99,999)
Gr. 3 (1,000−9,999)
Gr. 4 (< 1,000)

Excel

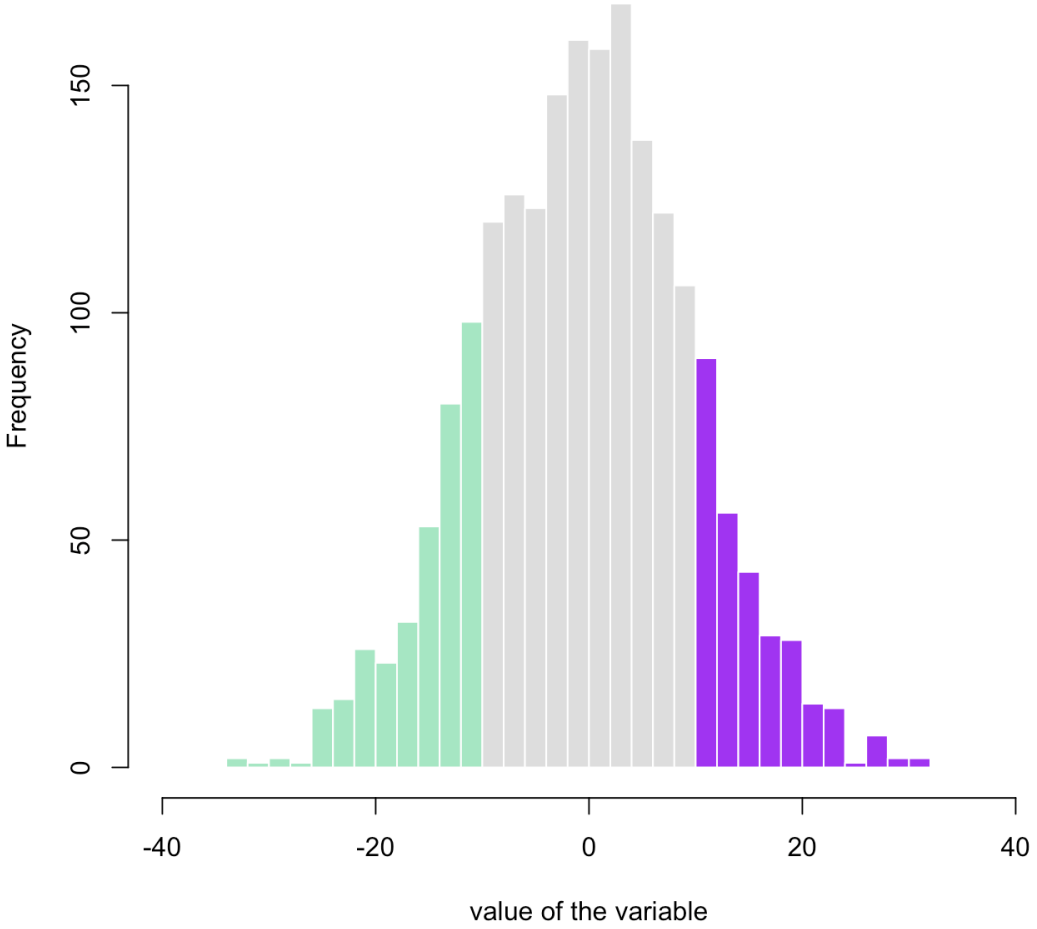

Gr 1 (>= 100000)
榮仁基金會
林江娟娟
九昱基金會
顏慧芬
孟月英
丁仁皓
鍾肇城
吳廖美玉
蔡鑫花
楊秋樺
黃信彰
Gr 2 (10,000-99,999)
陳正達
吳文泰
莊美雪
童明珠
光耀網路
Gr 4 (< 1,000)

SECTION IV

ACCEPTANCE TESTING

https://www.r-graph-gallery.com/83-histogram-with-colored-tail.html

Histogram with colored tail



隨機選例 => copy => analyze => modify

original codes

```
 # Create data
my_variable=rnorm(2000, 0 , 10)

# Calculate histogram, but do not draw it
my_hist=hist(my_variable , breaks=40  , plot=F)

# Color vector
my_color= ifelse(my_hist$breaks < -10, rgb(0.2,0.8,0.5,0.5) , ifelse (my_hist$breaks >=10, "purple", rgb(0.2,0.2,0.2,0.2) ))

# Final plot
plot(my_hist, col=my_color , border=F , main="" , xlab="value of the variable", xlim=c(-40,40) )
```

拆解分析

```
# Create data
my_variable=rnorm(2000, 0 , 10)
```

隨機建立具常態分佈的數列
可改用自己的

```
# Calculate histogram, but do not draw it
my_hist=hist(my_variable , breaks=40  , plot=F)
```

先將圖形存成變數
圖形暫不畫出

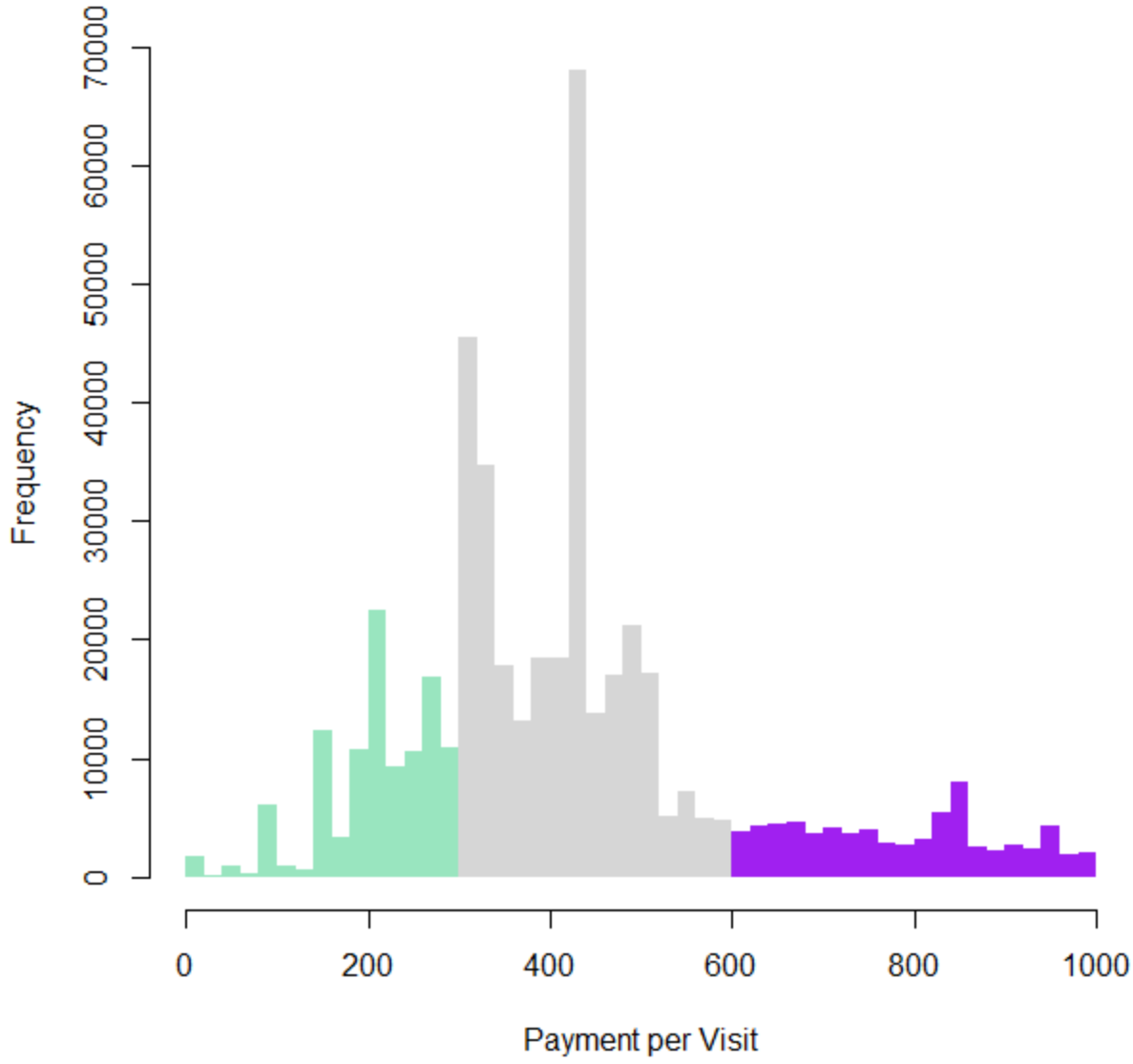
```
# Color vector
my_color= ifelse(my_hist$breaks < -10, rgb(0.2,0.8,0.5,0.5) ,
                 ifelse (my_hist$breaks >=10, "purple", rgb(0.2,0.2,0.2,0.2) ))
```

以 nested if 方式
依據x值設定顏色

```
# Final plot
plot(my_hist, col=my_color , border=F , main="" ,
     xlab="value of the variable", xlim=c(-40,40) )
```

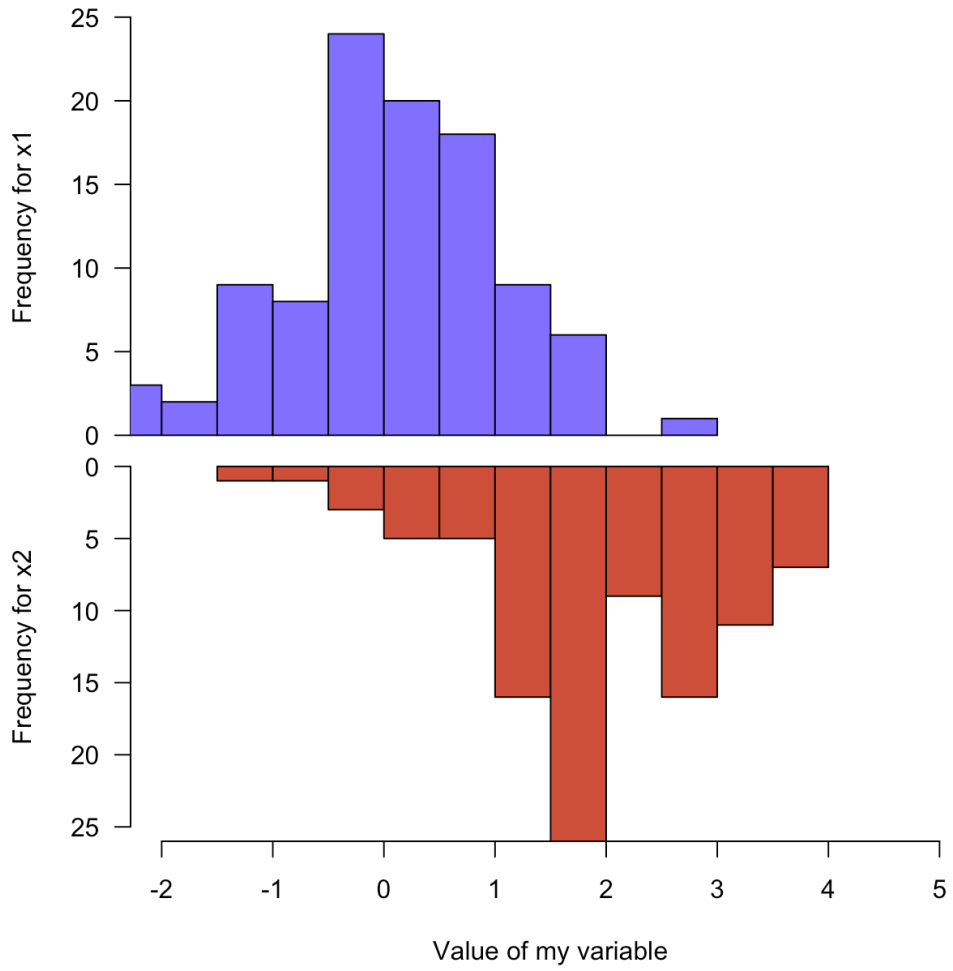
Modify

```
# Create data
my_variable <- cd$T_AMT     # 假設已利用Import_tidyverse.r匯入資料
my_variable <- my_variable[ my_variable <= 1000 ]     # 排除極端值
# xlim參數只會局部顯示圖形，原始(極端左偏)分布不變，圖形顯示會很奇怪

# Calculate histogram, but do not draw it
my_hist <- hist(my_variable, breaks = 40, plot = F)

# Color vector
my_color <- ifelse(my_hist$breaks < 300, rgb(0.2,0.8,0.5,0.5),
ifelse (my_hist$breaks >= 600, "purple", rgb(0.2,0.2,0.2,0.2)))

# Final plot
plot(my_hist, col = my_color, border = F, main = "", xlab =
"Payment per Visit")
```


Frequency
0
10000
20000
30000
40000
50000
60000
70000
0
200
400
600
800
1000
Payment per Visit

https://www.r-graph-gallery.com/190-mirrored-histogram.html

Mirrored histogram in base R



隨機選例 => copy => analyze => modify

original codes

```r
#Create Data
x1 = rnorm(100)
x2 = rnorm(100)+rep(2,100)
par(mfrow=c(2,1))

#Make the plot
par(mar=c(0,5,3,3))
hist(x1 , main="" , xlim=c(-2,5), ylab="Frequency for x1", xlab="", ylim=c(0,25) , xaxt="n", las=1 , col="slateblue1", breaks=10)
par(mar=c(5,5,0,3))
hist(x2 , main="" , xlim=c(-2,5), ylab="Frequency for x2", xlab="Value of my variable", ylim=c(25,0) , las=1 , col="tomato3"  , breaks=10)
```

拆解分析

```
#Create Data
x1 = rnorm(100)
x2 = rnorm(100)+rep(2,100)
par(mfrow=c(2,1))
```

隨機建立具常態分佈的數列
可改用自己的

par函數用來設定各種parameters
mfrow參數設另頁面分割為2橫列1直行

第一個圖

mar參數設定margins
圖形與頁面下緣 左緣 上緣 右緣的距離

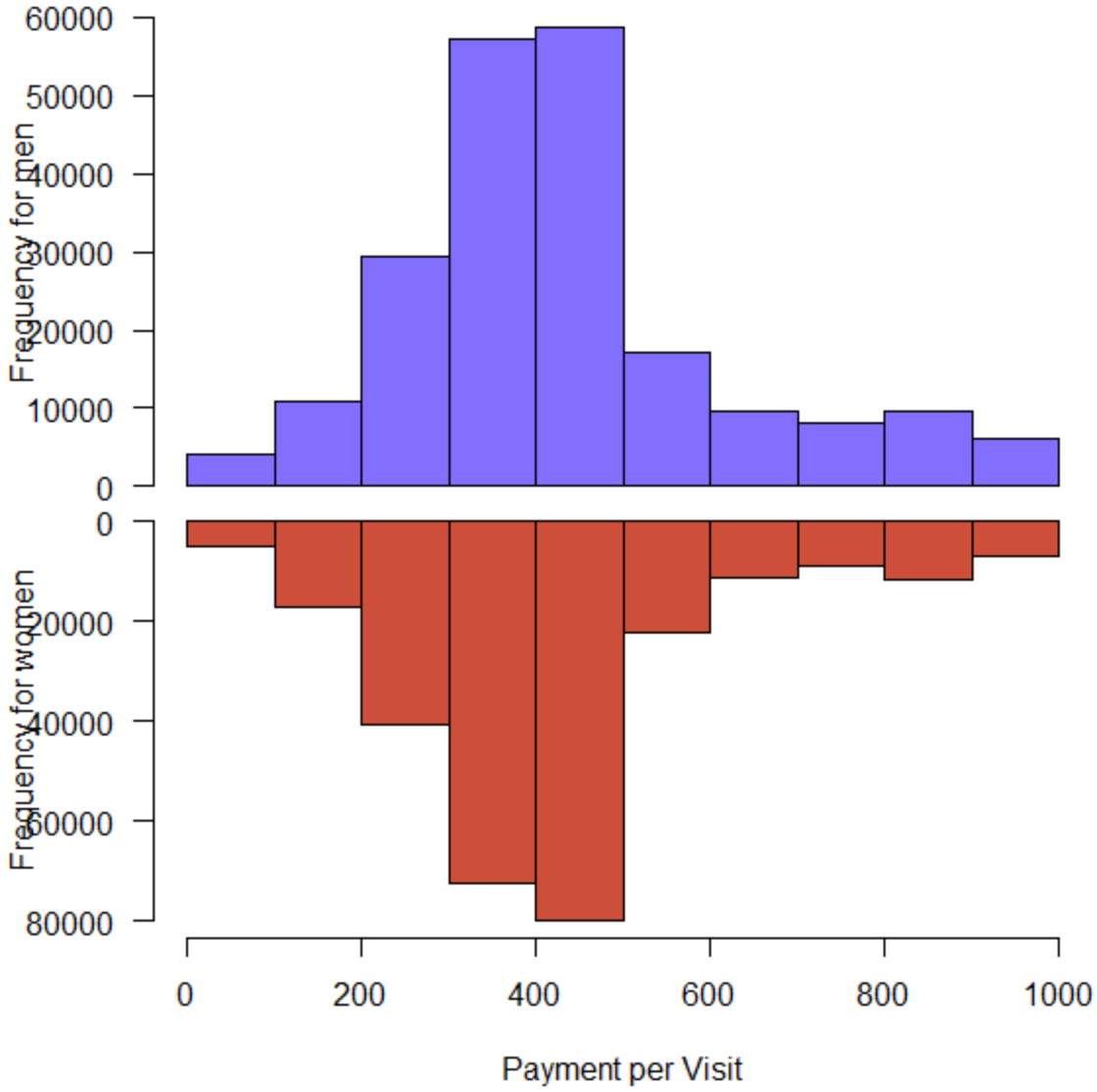
```
#Make the plot
par(mar=c(0,5,3,3))
hist(x1 , main="" , xlim=c(-2,5), ylab="Frequency for x1", xlab="",
     ylim=c(0,25) , xaxt="n", las=1 , col="slateblue1", breaks=10)
```

第二個圖

```
par(mar=c(5,5,0,3))
hist(x2 , main="" , xlim=c(-2,5), ylab="Frequency for x2",
     xlab="Value of my variable", ylim=c(25,0) ,
     las=1 , col="tomato3"  , breaks=10)
```

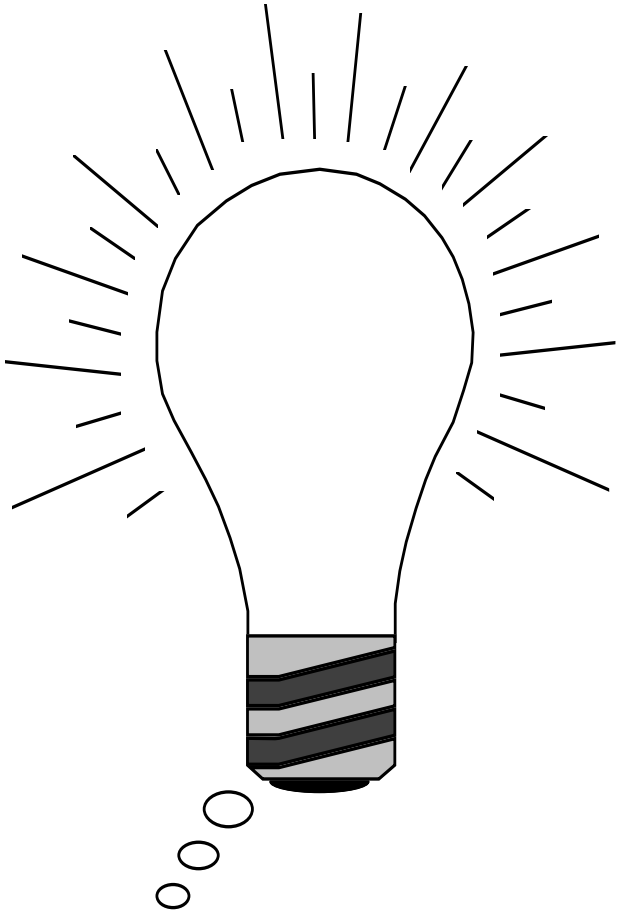
Modify

```
# Create Data
m <- subset(cd, T_AMT <= 1000 & ID_SEX == "M")
# 假設已利用Import_tidyverse.r匯入資料 排除極端值 限男生
x1 <- m$T_AMT
f <- subset(cd, T_AMT <= 1000 & ID_SEX == "F")    # 排除極端值 限女生
x2 <- f$T_AMT
par(mfrow = c(2, 1))

# Make the plot
par(mar = c(0, 5, 3, 3))
hist(x1, main = "", xlim = c(0, 1000), ylab = "Frequency for
men", xlab = "", ylim = c(0, 60000), xaxt = "n", las = 1, col =
"slateblue1", breaks = 10)
par(mar = c(5, 5, 0, 3))
hist(x2, main = "", xlim = c(0, 1000), ylab = "Frequency for
women", xlab = "Payment per Visit", ylim = c(80000, 0), las = 1,
col = "tomato3", breaks = 10)
# 請自行研究如何調整y軸label文字與y軸的距離
```



請自行研究如何調整y軸label文字與y軸的距離

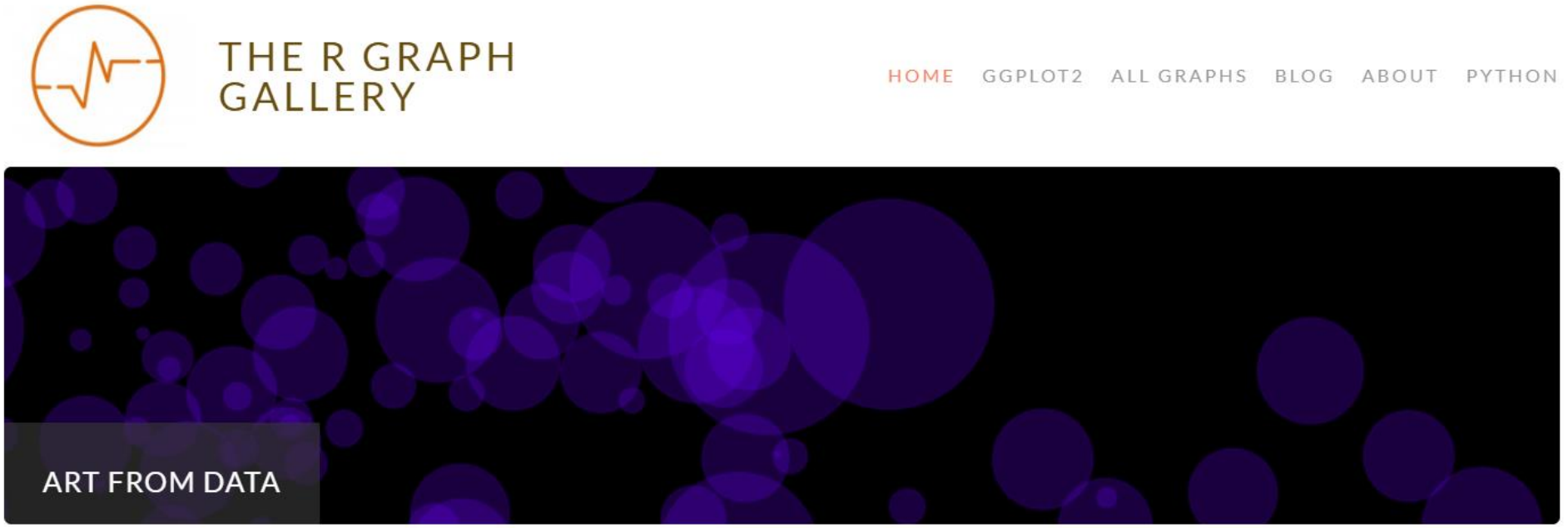
Thanks for Your Attention !



SECTION V

VALUABLE RESOURCES

https://www.r-graph-gallery.com/



Welcome to the R Graph Gallery. Looking for inspiration or help concerning data visualisation? Here, you will find hundreds of distinctive graphics made with the R programming language, always with the reproducible code snippet available. Charts are displayed in several sections represented by the icons below. The gallery dedicates a special section to tricks you can use with the ggplot2 library. If you are looking to browse for inspiration, the all graph page displays all the charts of the gallery in a row. Feel free to propose a chart or report a bug; any feedback is highly welcome. Stay in touch with the gallery by following it on Twitter or Facebook, or by subscribing to the blog.

http://rgraphgallery.blogspot.tw/

R graph gallery

The blog is a collection of script examples with example data and output plots. R produce excellent quality graphs for data analysis, science and business presentation, publications and other purposes. Self-help codes and examples are provided. Enjoy nice graphs !!

2d (1) 3 vartiable plots (5) 3D plots (8) arch (1) area (1) association plot (4) bar (1) barchart (13) bean plot (1) beeswarm (1) binormial (1) biplot (1) box-percentile (2) box-whisker plot (1) boxplot (10) bubble plot (5) calendar (1) categorical data (6) centepede plot (1) circle (2) circular (1) cluster (4) color (2) colour (1) combination plot (10) countur (1) cross bar (1) cumulative (1) curve (3) dendogram (3) density (13) diagram (2) distribution (9) ditribution (1) dot plot (1) double axis (1) ellipse (2) error bar (6) factor plot (3) fluctutation diagram (1) google (1) grid plot (1) heatmap (20) hexabin plot (1) histogram (11) hive (1) kernel density (4) ladder plot (2) large data points (4) level plot (1) line plot (3) line range (1) manhattan plot (1) map (13) mosaic plot (1) normal (2) notched (1) parallel plot (1) pedigree plot (1) phylogentic tree (1) piechart (3) points (2) polar (1) Q-Q plot (1) raster (2) regression line (3) ribbon plot (1) rootogram (1) rugs (2) scale plot (1) scenes (1) shaded (1) spatial plot (2) sphere (1) spike histogram (1) Spine plot (1) stacked bar (1) Sunflower (1) ternary plot (1) text only (1) timeseries (6) trellis plot (8) two axis (1) vinn diagram (1) voilin plot (2) wireframe plot (1) xy barplot (4) xy line (10) xy points (25)

http://www.datavisualisation-r.com/

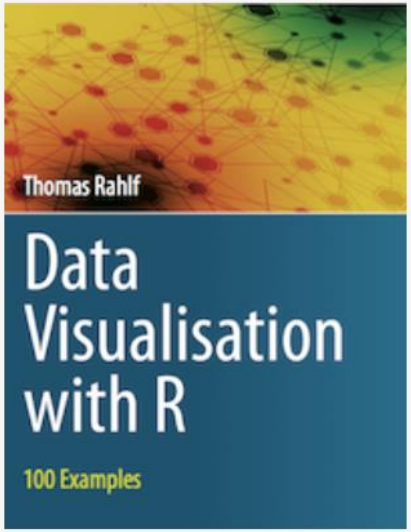
On this page, you can find all figures as PDF and PNG files of the book

---

Thomas Rahlf, **Data Visualisation with R – 100 Examples**, Cham: Springer 2017, XVI, 387 p., four-color print. 19 b/w illustrations, 162 illustrations in colour. eBook ISBN: 978-3-319-49751-8, Hardcover ISBN: 978-3-319-49750-1.

The book introduces the basics of designing presentation graphics with R by showing 100 full script examples: bar and column charts, population pyramids, Lorenz curves, scatter plots, time series representations, radial polygons, Gantt charts, profile charts, heatmaps, bumpcharts, mosaic and balloon plots, a number of different types of thematic maps. All examples use the Base Graphics system from R. For each example, real data will be used. Construction and programming is explained step by step.

You can download all scripts and freely available data from Springer's website extras.springer.com.



https://www.stat.auckland.ac.nz/~paul/RG3e/

R Graphics Third Edition
by Paul Murrell

A book on the core graphics facilities of the R language and environment for statistical computing and graphics (Chapman & Hall/CRC, November 2018).

A link to the publisher's web page for the book.

A list of Updates.

A list of Errata.

R code for figures:

- Chapter 1: An Introduction to R Graphics
- Chapter 2: Simple Usage of Traditional Graphics
- Chapter 3: Customising Traditional Graphics
- Chapter 4: Trellis Graphics: The lattice Package
- Chapter 5: The Grammar of Graphics: The ggplot2 Package
- Chapter 6: The Grid Graphics Model
- Chapter 7: The Grid Graphics Object Model
- Chapter 8: Developing New Graphics Functions and Objects
- Chapter 9: Graphics Formats
- Chapter 10: Graphical Parameters
- Chapter 11: Importing Graphics
- Chapter 12: Combining Graphics Systems
- Chapter 13: Advanced Graphics

https://mgimond.github.io/ES218/Week04a.html

- Loading the data
- Base plotting functions
- Customizing plots
- Exporting plots to image file formats

Base plotting environment

> This tutorial only uses the base R packages.

Loading the data

The data files used in this tutorial were created in an earlier exercise. Type the following command to download the objects:

```
load(url("http://mgimond.github.io/ES218/Data/dat1_2.RData"))
```

This should load several data frame objects into your R session (note that not all are used in this exercise). The `dat1l` dataframe is a long table version of the crop yield dataset.

```
head(dat1l, 3)
```

```
  Year    Crop    Yield
1 1961 Barley 16488.52
2 1962 Barley 18839.00
```

https://dcgerard.github.io/stat234/base_r_cheatsheet.html

Abstract:
General Considerations
One Variable
Two Variables
Color Coding and Legends
Faceting

Base R Graphics Cheat Sheet

David Gerard

August 8, 2017

Abstract:

I reproduce some of the plots from Rstudio's ggplot2 cheat sheet using Base R graphics. I didn't try to pretty up these plots, but **you should**.

I use this dataset

```
data(mpg, package = "ggplot2")
```

General Considerations

The main functions that I generally use for plotting are

- Plotting Functions

https://www.statmethods.net/graphs/index.html

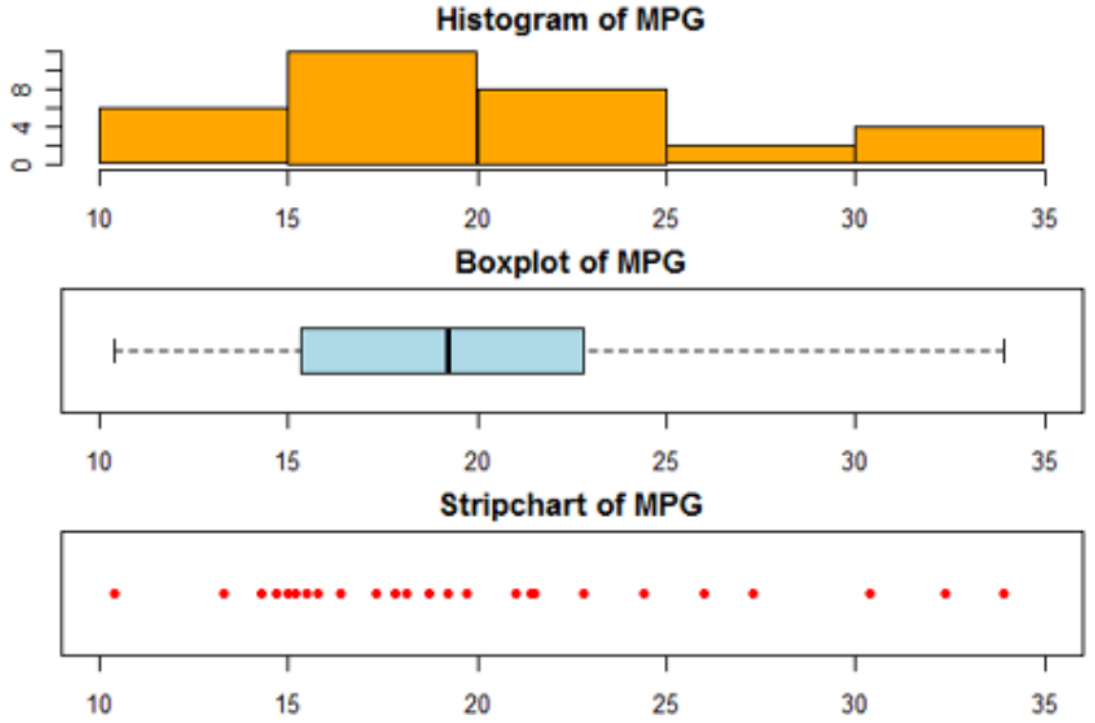
Quick-R by DataCamp

R Tutorial | R Interface | Data Input | Data Management | Advanced Statistics | Graphs | Advanced Graphs

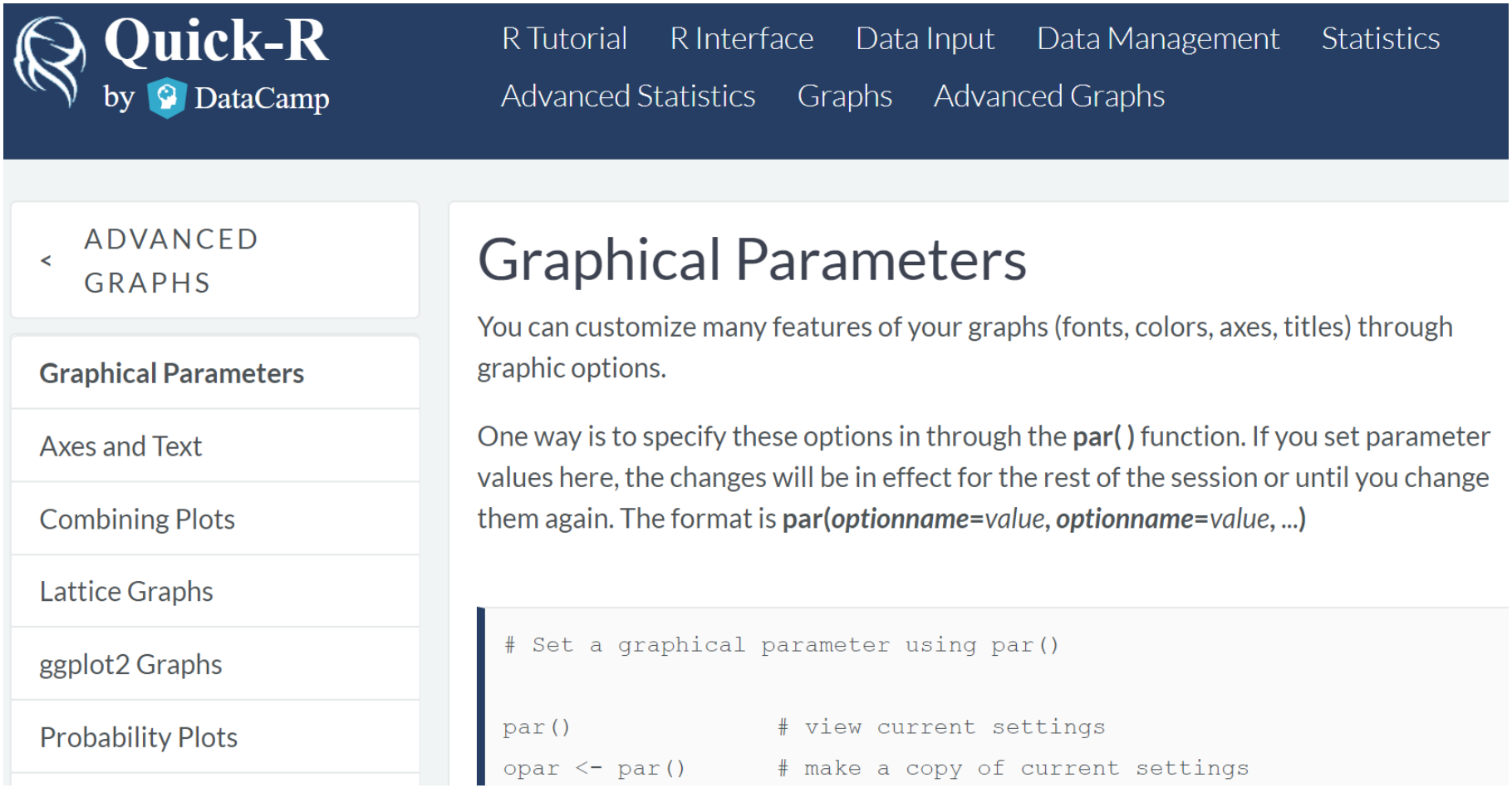
GRAPHS SECTION

- Creating a Graph
- Histograms and Density Plots
- Dot Plots
- Bar Plots
- Line Charts
- Pie Charts
- Boxplots
- Scatterplots

Graphs



https://www.statmethods.net/advgraphs/parameters.html

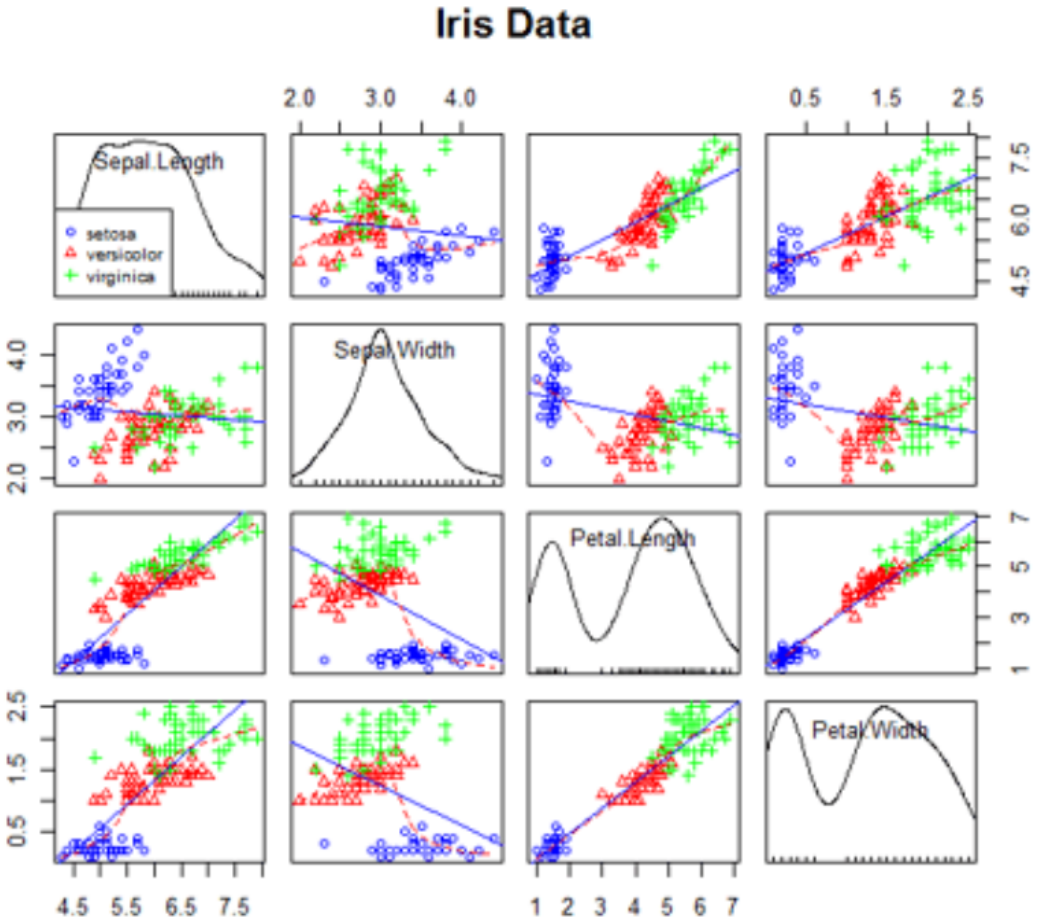


https://www.statmethods.net/advgraphs/index.html

ADVANCED GRAPHS

- Graphical Parameters
- Axes and Text
- Combining Plots
- Lattice Graphs
- ggplot2 Graphs
- Probability Plots
- Mosaic Plots
- Correlograms
- Interactive Graphs

Advanced Graphs



http://rpubs.com/SusanEJohnston/7953

R Base Graphics: An Idiot's Guide

One of the most powerful functions of R is it's ability to produce a wide range of graphics to quickly and easily visualise data. Plots can be replicated, modified and even publishable with just a handful of commands.

Making the leap from chiefly graphical programmes, such as Excel and Sigmaplot. may seem tricky. However, with a basic knowledge of R, just investing a few hours could completely revolutionise your data visualisation and workflow. Trust me - it's worth it.

Last year, I presented an informal course on the basics of R Graphics University of Turku. In this blog post, I am providing some of the slides and the full code from that practical, which shows how to build different plot types using the basic (i.e. pre-installed) graphics in R, including:

https://bookdown.org/xiangyun/msg/

https://www.datanovia.com/en/blog/

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Easy Image Processing in R using the Magick Package

kassambara | 0

This article describes how to perform image processing in R using the

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