Rough schedule for week #3 and week #4

(from 20201005 to 20201012)

前次上課應注意事項：用「[EMEDITOR](https://www.emeditor.com/download/)免費版」開大檔案，並編輯與調整相關格式。

##R 環境檢查

sessionInfo()

Sys.info()[1:5]

getOption("encoding")

Sys.getlocale("LC\_ALL")

R核心套件的基本繪圖函數之一 (低階，提共初步的資料視覺化)

**# plot {base}**

**# Generic function for plotting of R objects**

**# Examples from htlm Help**

require(stats) # for lowess, rpois, rnorm

require(graphics) # for plot methods

plot(cars)

lines(lowess(cars))

plot(sin, -pi, 2\*pi) # see ?plot.function

## Discrete Distribution Plot:

plot(table(rpois(100, 5)), type = "h", col = "red", lwd = 10,

main = "rpois(100, lambda = 5)")

## Simple quantiles/ECDF, see ecdf() {library(stats)} for a better one:

plot(x <- sort(rnorm(47)), type = "s", main = "plot(x, type = \"s\")")

points(x, cex = .5, col = "dark red")

R核心套件的基本繪圖函數之一

**# plot.default {graphics}: Draw a scatter plot with decorations such as**

**# axes and #titles in the active graphics window.**

**# Examples from html Help**

Speed <- cars$speed

Distance <- cars$dist

plot(Speed, Distance, panel.first = grid(8, 8),

pch = 0, cex = 1.2, col = "blue")

plot(Speed, Distance,

panel.first = lines(stats::lowess(Speed, Distance), lty = "dashed"),

pch = 0, cex = 1.2, col = "blue")

## Show the different plot types

x <- 0:12

y <- sin(pi/5 \* x)

op <- par(mfrow = c(3,3), mar = .1+ c(2,2,3,1))

for (tp in c("p","l","b", "c","o","h", "s","S","n")) {

plot(y ~ x, type = tp, main = paste0("plot(\*, type = \"", tp, "\")"))

if(tp == "S") {

lines(x, y, type = "s", col = "red", lty = 2)

mtext("lines(\*, type = \"s\", ...)", col = "red", cex = 0.8)

}

}

par(op)

##--- Log-Log Plot with custom axes

lx <- seq(1, 5, length = 41)

yl <- expression(e^{-frac(1,2) \* {log[10](x)}^2})

y <- exp(-.5\*lx^2)

op <- par(mfrow = c(2,1), mar = par("mar")-c(1,0,2,0), mgp = c(2, .7, 0))

plot(10^lx, y, log = "xy", type = "l", col = "purple",

main = "Log-Log plot", ylab = yl, xlab = "x")

plot(10^lx, y, log = "xy", type = "o", pch = ".", col = "forestgreen",

main = "Log-Log plot with custom axes", ylab = yl, xlab = "x",

axes = FALSE, frame.plot = TRUE)

my.at <- 10^(1:5)

axis(1, at = my.at, labels = formatC(my.at, format = "fg"))

e.y <- -5:-1 ; at.y <- 10^e.y

axis(2, at = at.y, col.axis = "red", las = 1,

labels = as.expression(lapply(e.y, function(E) bquote(10^.(E)))))

par(op)

除此之外，還有功能超強的三個重要R繪圖套件ggplot2, plotly, leaflet，詳細使用說明要參考在R cran的相關user manual:

<https://cran.r-project.org/web/packages/ggplot2/index.html>

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

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

或在R console下，直接使用html Help

**關於繪圖主題的概略題綱如下：**

1 檢視package ggplot2 有多少dataset範例。

> ?data()

data() # list all available data sets

try(data(package = "rpart") ) # list the data sets in the rpart package

data(USArrests, "VADeaths") # load the data sets 'USArrests' and 'VADeaths'

> data(package = "ggplot2")

## mpg, economics, seals等資料檔常被拿來舉例式範

> ?economics

########################################################

2 閱讀與練習線上[r4ds](https://r4ds.had.co.nz/data-visualisation.html) 的「3 Data visualization」，或電子書的「1. Data Visualization with ggplot2」，上課實作。

3 可配合「ggplot2-cheatsheet」(已上傳教學平台)來協助記憶R在ggplot2的相關指令，上課實作。

4 用rdm(r4ds-master.zip)來練習「Data visualization」，上課實作。

5 Get a tutorial of ggplot2 from [r-statistics.co](http://r-statistics.co/) by Selva Prabhakaran

6 Here are 2,374 public repositories matching this topic 「[Book](https://github.com/topics/book)」 in GitHub.

7 加入新元素：package plotly，產生能「互動」的圖形，上課實作。

data(iris)

library(ggplot2)

#qplot(x = Sepal.Length, y = Sepal.Width, data = iris,

# xlab="Sepal Length", ylab="Sepal Width",

# main="Sepal Length-Width", color=Species, shape=Species)

scatter <- ggplot(data=iris, aes(x = Sepal.Length, y = Sepal.Width))

a <- scatter + geom\_point(aes(color=Species, shape=Species)) +

xlab("Sepal Length") + ylab("Sepal Width") +

ggtitle("Sepal Length-Width")

a

# install.packages(plotly) # if you haven't installed the package

library(plotly)

ggplotly(a) #試比較gplot()與ggplotly()所產生的圖之間的差異

<https://plotly.com/r/>

<https://plotly-r.com/overview.html>

<https://github.com/ropensci/plotly> (此網的demo為高階的應用，供精進參考)

8 再加入新元素：package leaflet，產生能「互動」的地圖，範例如下：

library(leaflet)

dat <- read.csv("CD\_basedata.csv")

str(dat)

# Show first 20 rows from the dataset

leaflet(data = dat[1:20,]) %>% addTiles() %>%

addMarkers(~lng, ~lat, popup = ~popup)

基本功能與用法請參閱<https://rstudio.github.io/leaflet/>

9 網搜些「調教」初階者如何使用ggplot2的教材

# [Re-create The Economist graph using ggplot2](http://rstudio-pubs-static.s3.amazonaws.com/284329_c7e660636fec4a42a09eed968dc47f32.html)

# [tikiatua](https://github.com/tikiatua)/[ggplot2-tutorial](https://github.com/tikiatua/ggplot2-tutorial)

A comprehensive tutorial on using the amazing ggplot2-package with R

The tutorial was written in R-markdown in RStudio and can easily be compiled to a ioslide-html-presentation with knitr.

[An Introduction to ggplot2](https://uc-r.github.io/ggplot_intro)

[Some ggplot tutorials available online:](https://gist.github.com/Pakillo/c2c7ea11c528cc2ee20f)

[Tutorial on basic visualizations in R](https://gist.github.com/sckott/1254174)

[Be Awesome in ggplot2: A Practical Guide to be Highly Effective - R software and data visualization](http://www.sthda.com/english/wiki/be-awesome-in-ggplot2-a-practical-guide-to-be-highly-effective-r-software-and-data-visualization)

**10 備忘用的R碼**

# 3張ggplotly的比較 (加註其他資訊)

library(ggplot2)

library(plotly)

str(mpg)

View(mpg)

a <- ggplot(data = mpg) +

geom\_point(mapping = aes(x = displ, y = hwy));a

ggplotly(a)

p <- ggplot(mpg, aes(displ, hwy)) +

geom\_point(aes(text=manufacturer, class=model))

ggplotly(p)

中文介紹 <- plot\_ly(

mpg, x = ~displ, y = ~hwy,

# Hover text:

text = ~paste("製造商: ",manufacturer , '<br>型號:', model)

)

中文介紹

# 再看ggplot被ggplotly「加持」後的效果

## R code from the manual of r package ggplot2

library(ggplot2)

library(plotly)

# Some geoms only use the colour aesthetic but not the fill

# aesthetic (e.g. geom\_point() or geom\_line()).

p <- ggplot(economics, aes(x = date, y = unemploy))

p + geom\_line()

p + geom\_line(colour = "green")

p + geom\_point()

ggplotly(p + geom\_point(colour = "red"))