F03

R資料分析
報告文件製作:
R Markdown

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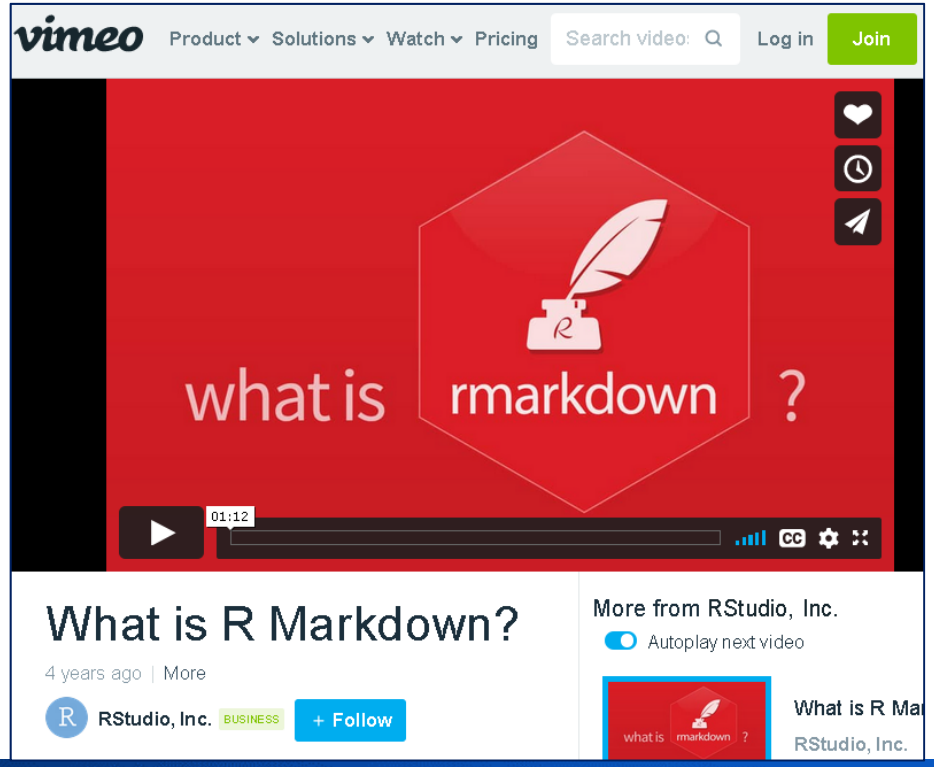
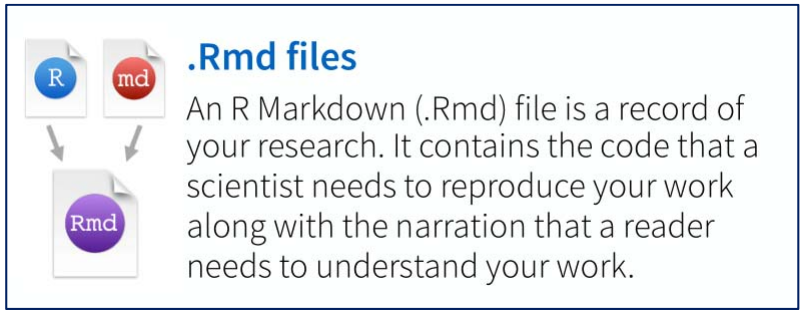
http://www.hmwu.idv.tw

https://rmarkdown.rstudio.com/

- R Markdown provides an authoring framework for data science. You can use a single R Markdown file to both
  - save and execute code
  - generate high quality reports that can be shared with an audience
- R Markdown documents are fully reproducible and support dozens of static and dynamic output formats.



What is R Markdown?
https://vimeo.com/178485416



可以在 .Rmd 純文字檔案中同時寫程式與撰寫說明內容，不需要另外將程式碼、輸出與圖形另外複製貼上或匯出至文書編輯軟體中。

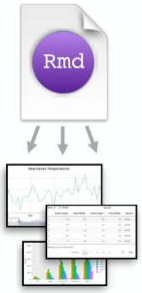
Gallery: outputs and formats you can create using R Markdown

- **Documents** (e.g., HTML, PDF, Word, Handouts)
- **Interactive Documents** (e.g., HTML Widgets, Shiny).
- **Dashboards** (e.g., Dashboard with gauges and value boxes、htmlwidgets、storyboard).
- **Presentations** (e.g, Beamer, Slidy, ioslides, reveal.js).
- **Books** (e.g., R for Data Science, Efficient R Programming).
- **Websites** (e.g., R Markdown, flexDashboard, bookdown, profvis).
- **Templates** (e.g., JSS, R Journal, Skeleton, CV).
- **Package Vignettes** (e.g., httr, rvest).

https://rmarkdown.rstudio.com/gallery.html

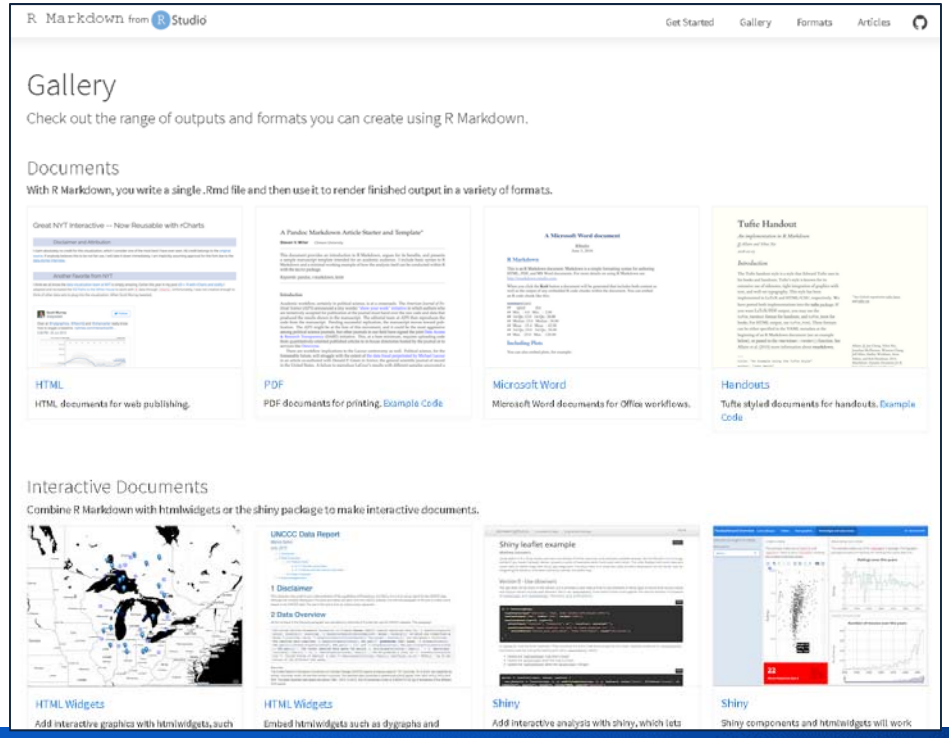
Dynamic Documents

You can choose to export the finished report as a html, pdf, MS Word, ODT, RTF, or markdown document; or as a html or pdf based slide show.



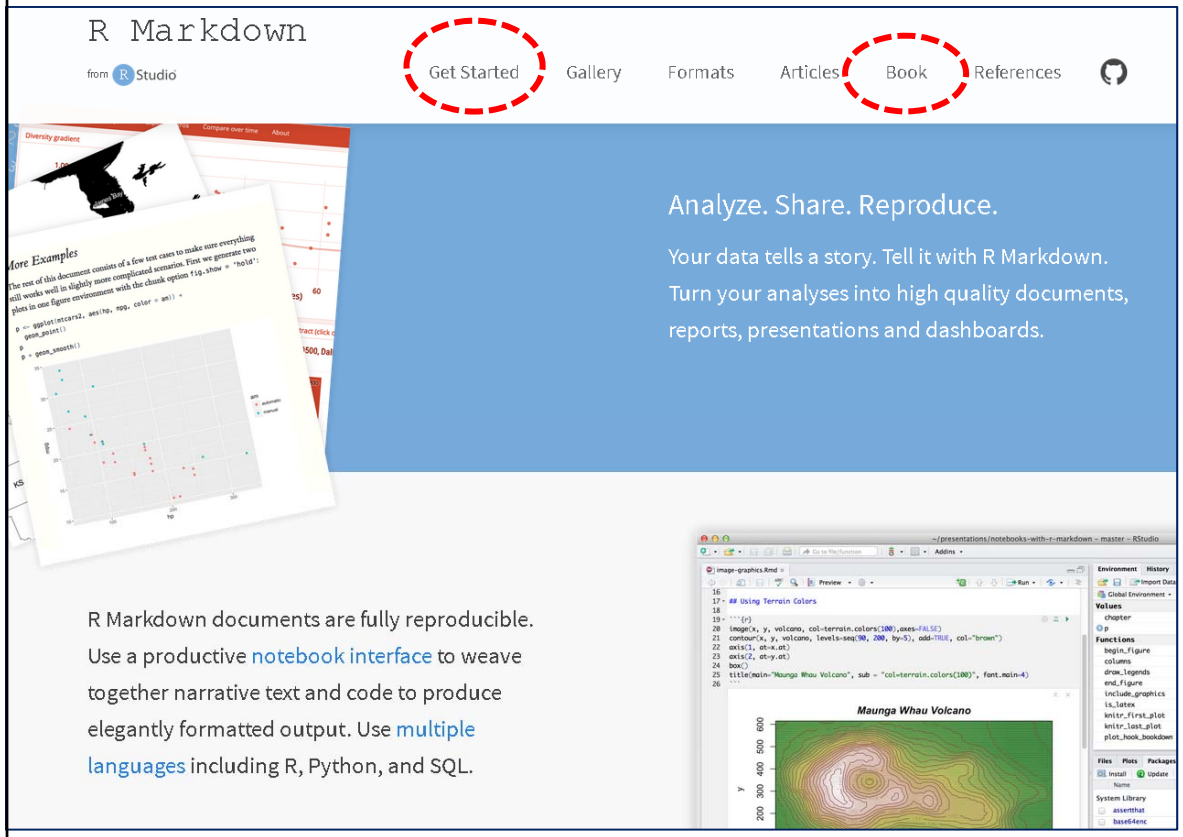
Reproducible Research

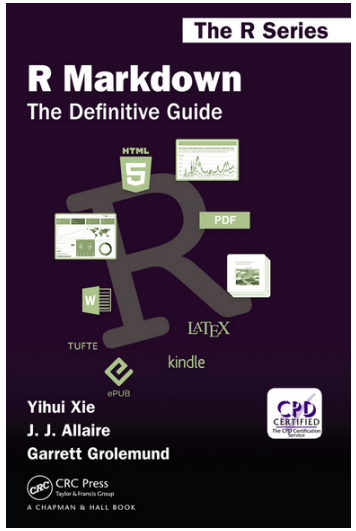
At the click of a button, or the type of a command, you can rerun the code in an R Markdown file to reproduce your work and export the results as a finished report.



學習資源:

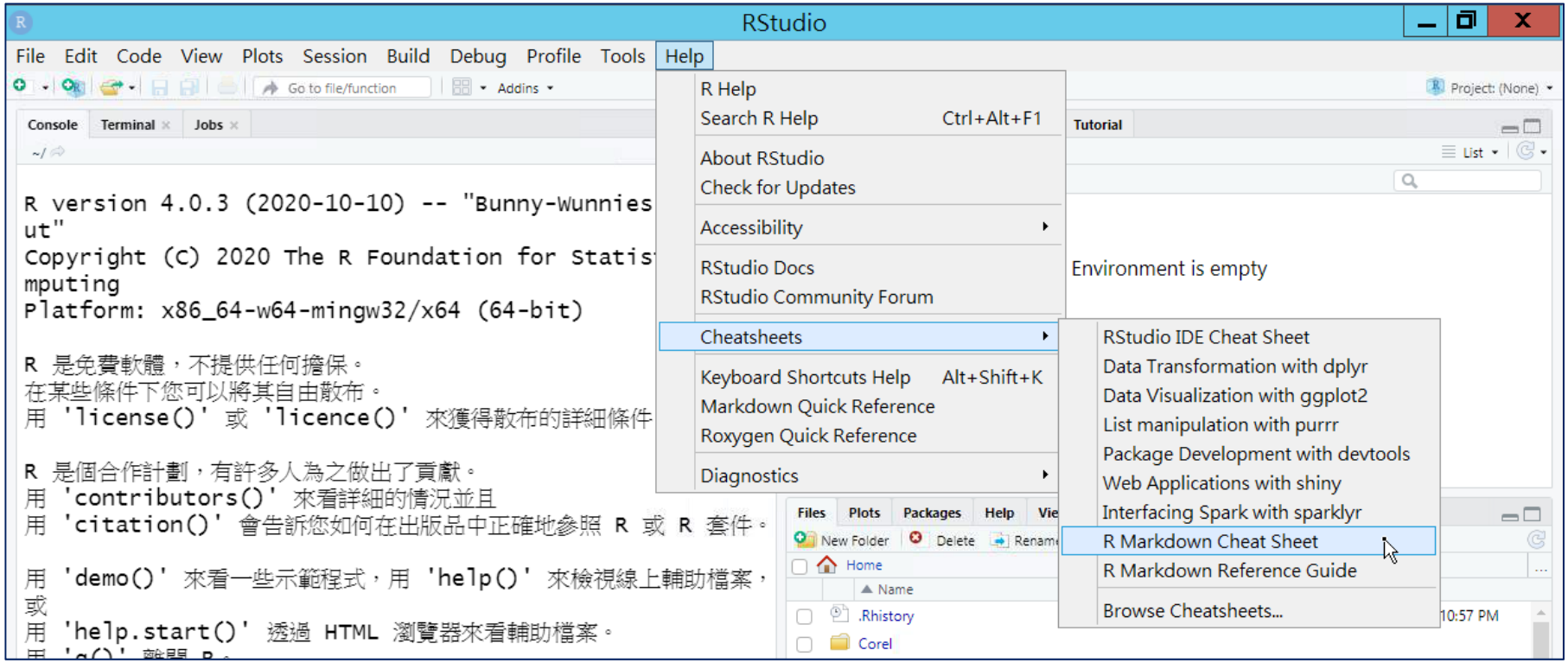
https://rmarkdown.rstudio.com/



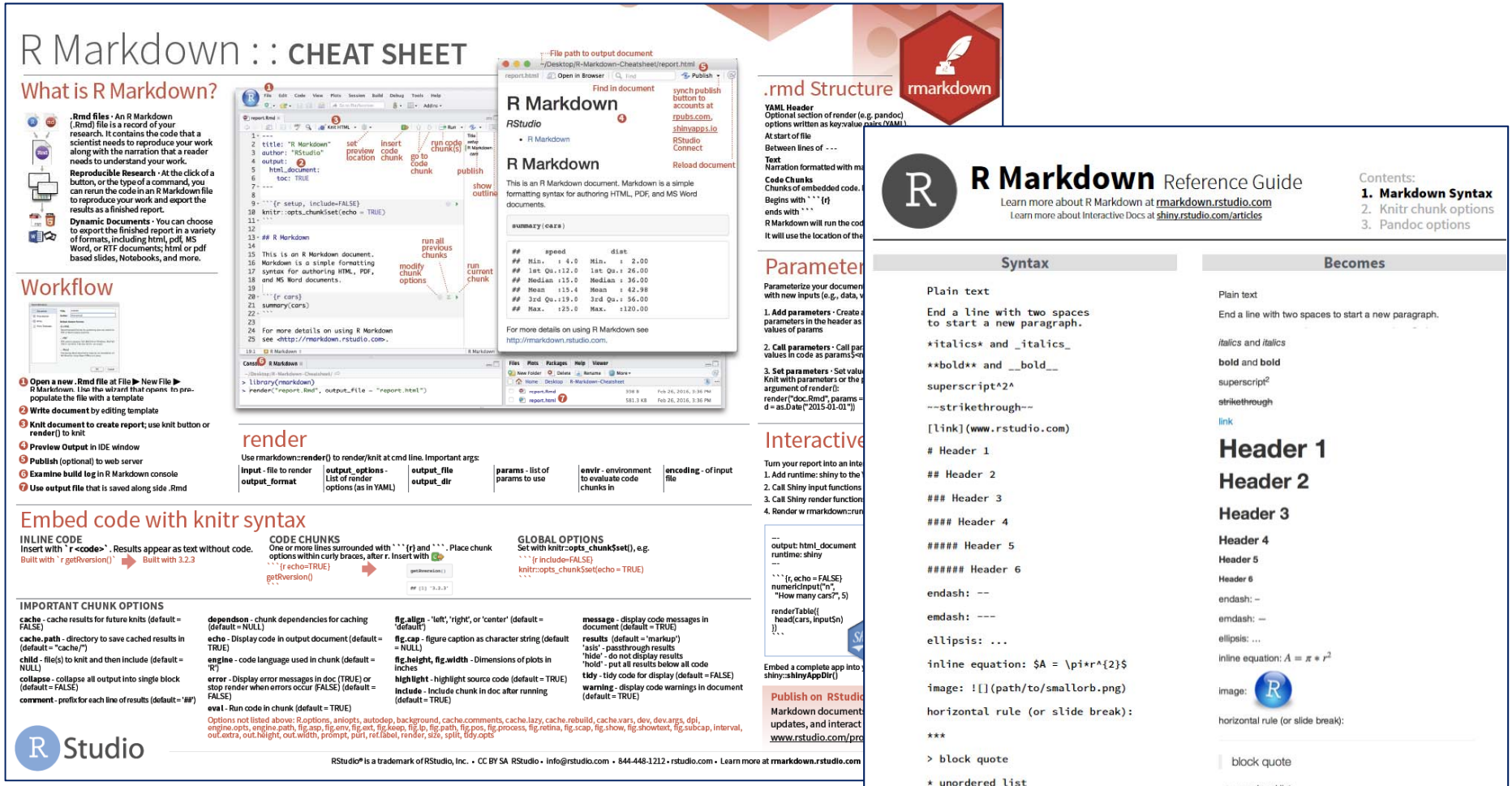


學習資源: Cheatsheet, Reference Guide

- The R Markdown Cheatsheet
  https://rstudio.com/wp-content/uploads/2016/03/rmarkdown-cheatsheet-2.0.pdf
- The R Markdown Reference Guide
  https://www.rstudio.com/wp-content/uploads/2015/03/rmarkdown-reference.pdf



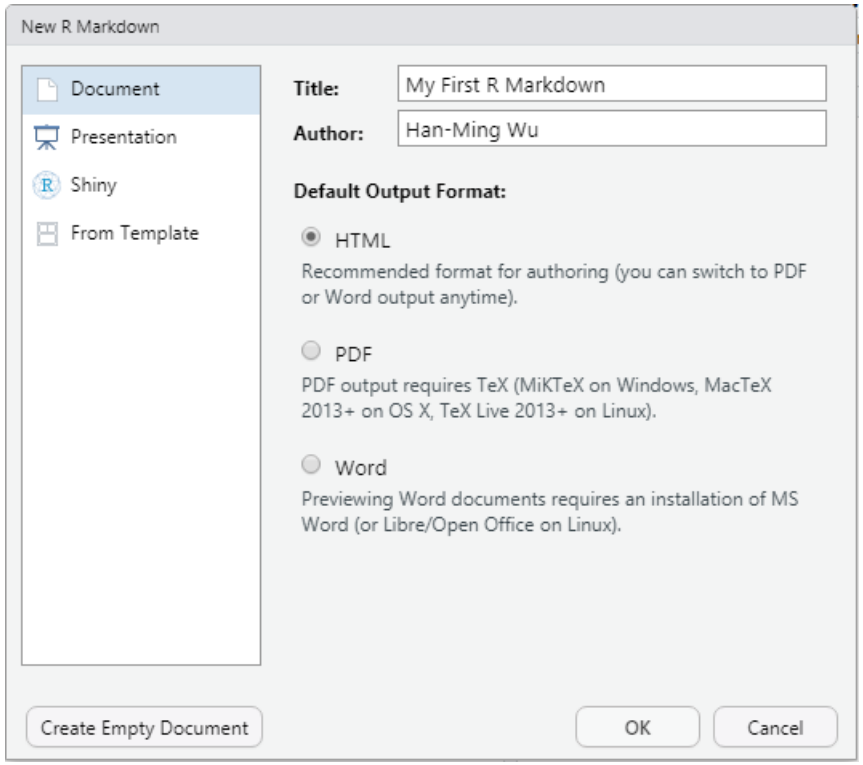
學習資源:
Cheatsheet, Reference Guide



軟體安裝

- 必要
  - The R Project for Statistical Computing: (檔名: R-4.0.3-win.exe)
    https://www.r-project.org
  - RStudio Desktop (Open Source Edition) (檔名RStudio-1.3.1093.exe)
    https://rstudio.com/products/rstudio/download

- 選要(Windows):
  - MikTeX (檔名: basic-miktex-20.12-x64.exe)
    https://miktex.org



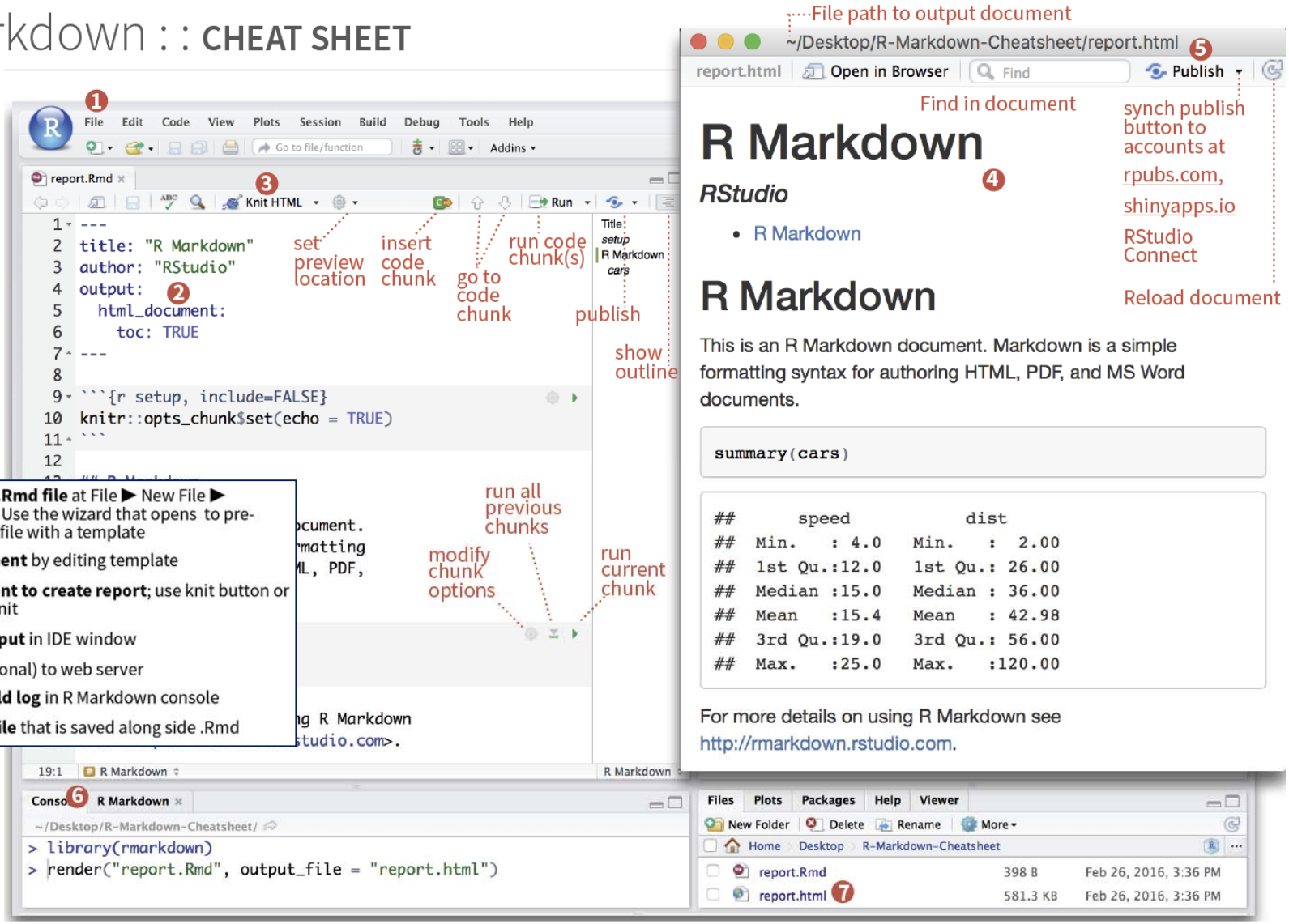
Workflow

How it works

- R Markdown generates a new file that contains selected text, code, and results from the .Rmd file.
- knitr: Elegant, flexible, and fast dynamic report generation with R https://yihui.org/knitr/
- Pandoc: a universal document converter https://pandoc.org/
- The new file can be a finished web page, PDF, MS Word document, slide show, notebook, handout, book, dashboard, package vignette or other format.

Workflow Using RStudio

R Markdown : : CHEAT SHEET



https://raw.githubusercontent.com/rstudio/cheatsheets/master/rmarkdown-2.0.pdf

https://zh.wikipedia.org/wiki/YAML

維基百科
自由的百科全書

首頁
分類索引
特色內容
新聞動態
近期變更
隨機條目

說明

說明
維基社群
方針與指引
互助客棧
知識問答

[關閉]

YAML [編輯]

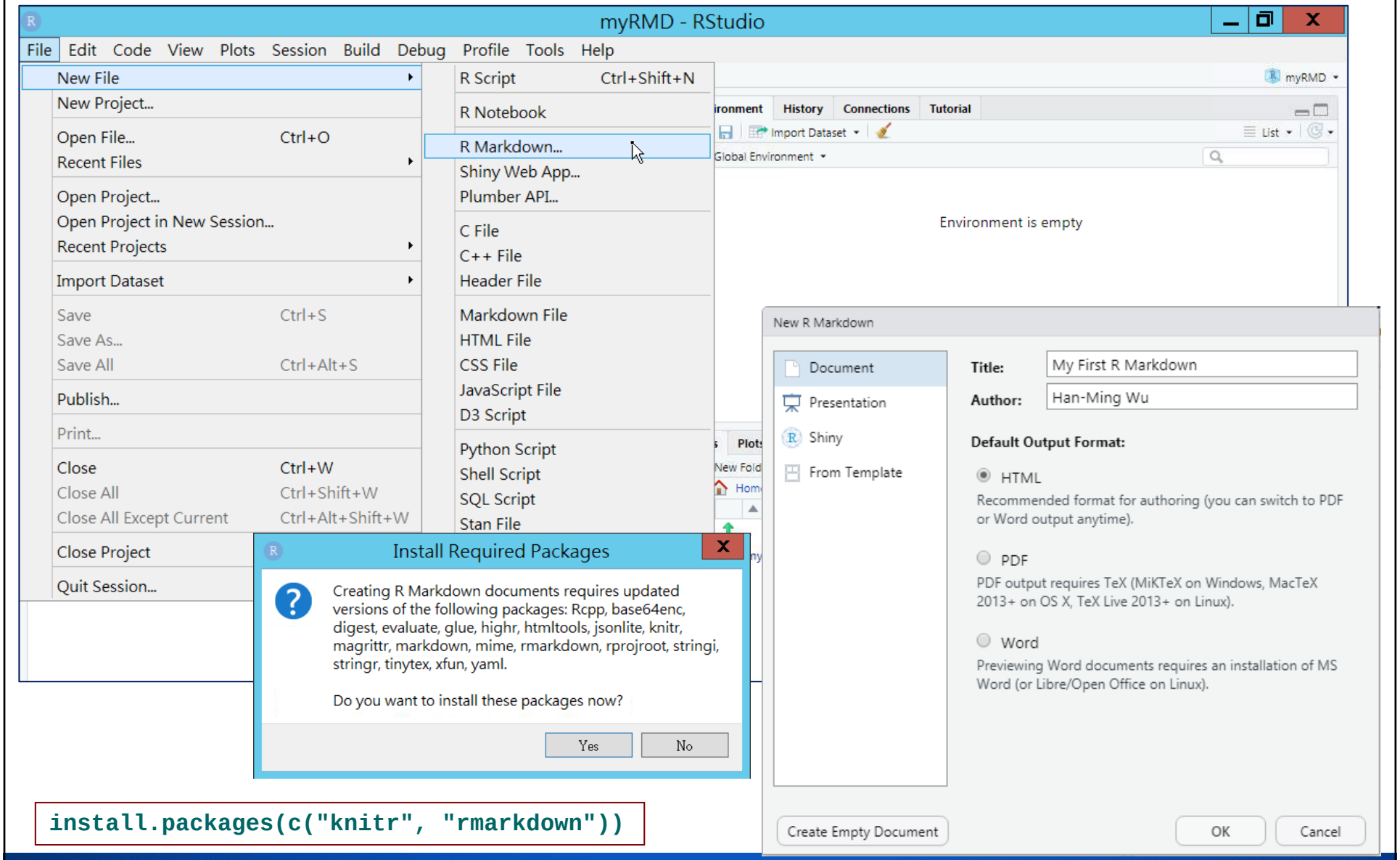
維基百科，自由的百科全書

YAML（/ˈjæməl/，尾音類似*camel*駱駝）是一個可讀性高，用來表達資料序列的格式。YAML參考了其他多種語言，包括：C語言、Python、Perl，並從XML、電子郵件的數據格式（RFC 2822）中獲得靈感。Clark Evans在2001年首次發表了這種語言[1]，另外Ingy döt Net與Oren Ben-Kiki也是這語言的共同設計者[2]。目前已經有數種程式語言或腳本語言支援（或者說解析）這種語言。

*YAML*是"YAML Ain't a Markup Language"（YAML不是一種標記語言）的遞迴縮寫。在開發的這種語言時，*YAML* 的意思其實是："Yet Another Markup Language"（仍是一種標記語言）[3]，但為了強調這種語言以數據做為中心，而不是以標記語言為重點，而用反向縮略語重新命名。

YAML	
副檔名	.yaml, .yml
網路媒體型式	*尚未註冊*
初始版本	2001年5月11日，17年前
最新版本	1.2 (Third Edition) (2009年10月1日，8年前)
格式類型	Data interchange
自由格式？	是
網站	yaml.org

範例: 新增R Markdown文件




```
install.packages(c("knitr", "rmarkdown"))
```

直接編譯(knit)範例Rmd檔

myRMD - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

先存檔: main.Rmd

Knit to HTML
Knit to PDF
Knit to Word
Knit with Parameters...
Knit Directory
Clear Knitr Cache...

```
---
title: "My First R Markdown"
author: "Han-Ming Wu"
date: "2021/1/7"
output: html_document
---

## R Markdown

This is an R Markdown doc
authoring HTML, PDF, and
Markdown see <http://rmar

When you click the **Knit
includes both content as
within the document. You

```{r cars}
summary(cars)
```

Including Plots

You can also embed plots, for example:

```{r pressure, echo=FALSE}
plot(pressure)
```

Note that the `echo = FALSE` parameter was added to the code chunk to
prevent printing of the R code that generated the plot.
```

```
Console  Terminal  R Markdown  Jobs
~/myRMD/main.Rmd
9%
label: setup (with options)
List of 1
 $ include: logi FALSE

  |..............................                                        |  4%
  ordinary text without R code

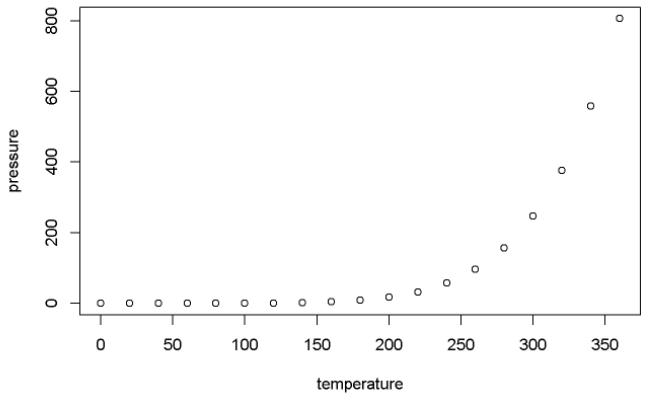
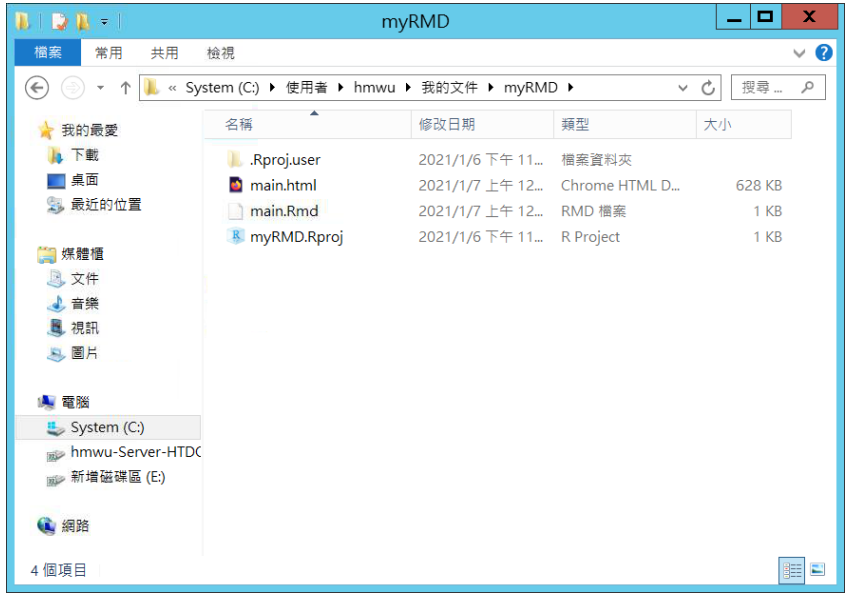
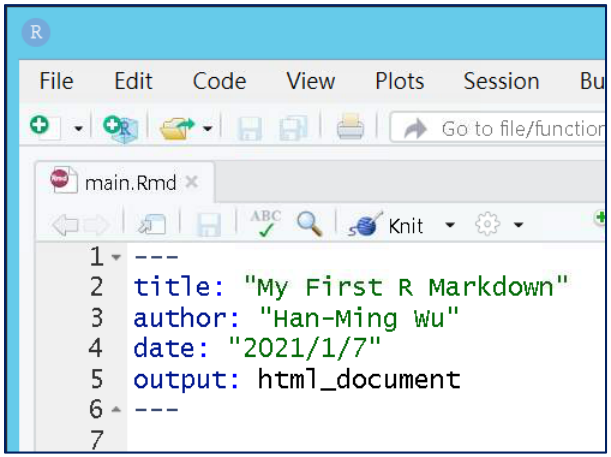
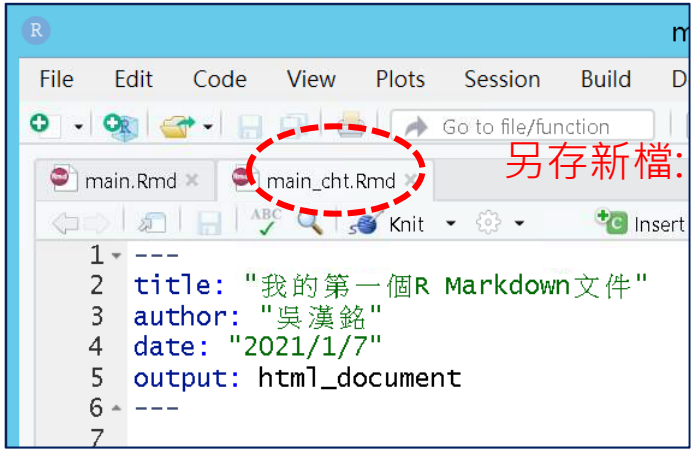
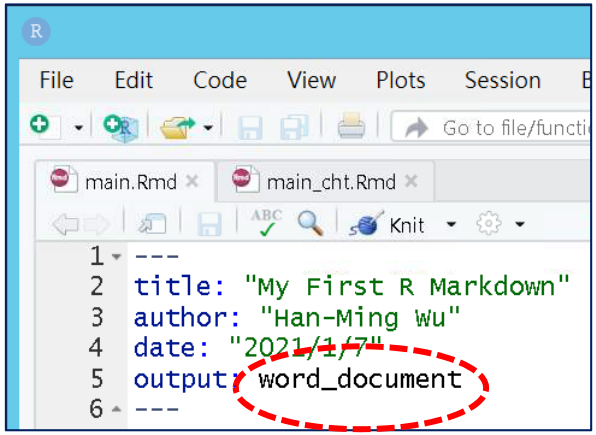
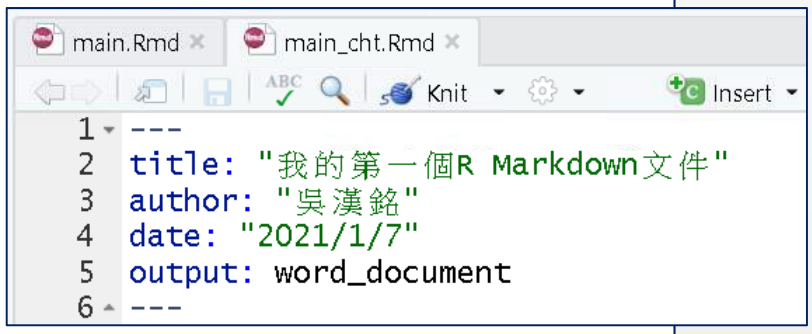
  |........................................                              |  5%
label: cars
  |...................................................                   |  7%
  ordinary text without R code

  |.......................................................................|  8%
label: pressure (with options)
List of 1
 $ echo: logi FALSE

  |.......................................................................|  10%
  ordinary text without R code


output file: main.knit.md

"C:/Program Files/RStudio/bin/pandoc/pandoc" +RTS -K512m -RTS main.utf8.md --t
o html4 --from markdown+autolink_bare_uris+tex_math_single_backslash --output
 main.html --lua-filter "C:\Users\hmwu\Documents\R\win-library\4.0\rmarkdown\r
markdown\lua\pagebreak.lua" --lua-filter "C:\Users\hmwu\Documents\R\win-librar
y\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-contained --standalone --s
ection-divs --template "C:\Users\hmwu\Documents\R\win-library\4.0\rmarkdown\rm
d\h\default.html" --no-highlight --variable highlightjs=1 --variable "theme:bo
otstrap" --include-in-header "C:\Users\hmwu\AppData\Local\Temp\1\RtmpyG0cCP\rm
arkdown-str21b8343590e.html" --mathjax --variable "mathjax-url:https://mathja
x.rstudio.com/latest/MathJax.js?config=TeX-AMS-MML_HTMLorMML"

Output created: main.html
```

```
library(rmarkdown)
render("main.Rmd")
```

如果順利的話，可以看到產生的文件

~/myRMD/main.html

main.html | Open in Browser | Find | Publish

My First R Markdown

Han-Ming Wu

2021/1/7

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed           dist
##  Min.   : 4.0   Min.   :  2.00
##  1st Qu.:12.0   1st Qu.: 26.00
##  Median :15.0   Median : 36.00
##  Mean   :15.4   Mean   : 42.98
##  3rd Qu.:19.0   3rd Qu.: 56.00
##  Max.   :25.0   Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.



改成中文試試看! (html)





另存新檔: main_cht.Rmd

產生Word文件(英文、中文)





產生PDF文件(英文)

myRMD - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

main.Rmd | main_cht.Rmd

```
---
title: "My First R Markdown"
author: "Han-Ming Wu"
date: "2021/1/7"
output: pdf_document
---

```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```
```

Console | Terminal | R Markdown | Jobs

~/myRMD/main.Rmd

```
o latex --from markdown+autolink_bare_uris+tex_math_single_backslash --output
 main.tex --lua-filter "C:\Users\hmwu\Documents\R\win-library\4.0\rmarkdown\rm
arkdown\lua\pagebreak.lua" --lua-filter "C:\Users\hmwu\Documents\R\win-library
\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-contained --highlight-style
 tango --pdf-engine pdflatex --variable graphics --variable "geometry:margin=1
in"
output file: main.knit.md

錯誤: LaTeX failed to compile main.tex. See https://yihui.org/tinytex/r/#debugg
ing for debugging tips.
此外: Warning message:
In system2(..., stdout = if (use_file_stdout()) f1 else FALSE, stderr = f2) :
  '"pdflatex"' not found
停止執行

No LaTeX installation detected (LaTeX is required to create PDF output). You s
hould install a LaTeX distribution for your platform: https://www.latex-projec
t.org/get/

  If you are not sure, you may install TinyTeX in R: tinytex::install_tinytex
()

  Otherwise consider MiKTeX on Windows - http://miktex.org

  MacTeX on macOS - https://tug.org/mactex/
  (NOTE: Download with Safari rather than Chrome _strongly_ recommended)

  Linux: Use system package manager
```

DOWNLOAD DOCS PACKAGES HELP GIVEBACK

This website uses cookies to personalize content and ads. Learn More

Welcome

https://miktex.org

Welcome to the MiKTeX project page!

MiKTeX is a modern TeX distribution for Windows, Linux and macOS.

MiKTeX's integrated package manager installs missing components from the Internet, if required. This allows you to keep your TeX installation as minimal as possible ("Just enough TeX").

MiKTeX is open source. You are welcome to redistribute MiKTeX under certain conditions.

Read more...

(檔名: basic-miktex-20.12-x64.exe)

Basic MiKTeX Installer (20.12, 7653, 64-bit)

Executing
The main task is being executed.

Installing: metapost

Overall progress

this is MiKTeX Setup Service 4.1 (MiKTeX 20.12)
starting installer...
Loading package database...
starting package maintenance...
installation directory: "C:\Program Files\MiKTeX"

< 上一步(B) 下一步(N) > 取消

編譯一定不會順利~

關掉RStudio=>重新開啟 => knit

Console | Terminal | R Markdown | Jobs

~/myRMD/main.Rmd

```
  |.....................................................................| 100%
  ordinary text without R code

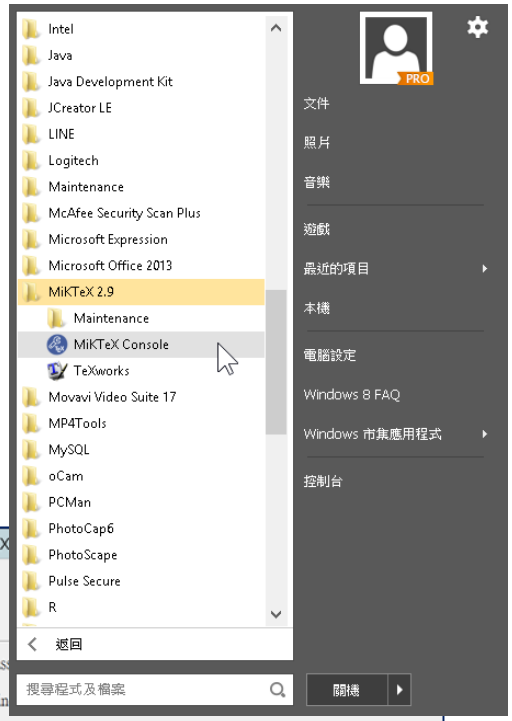
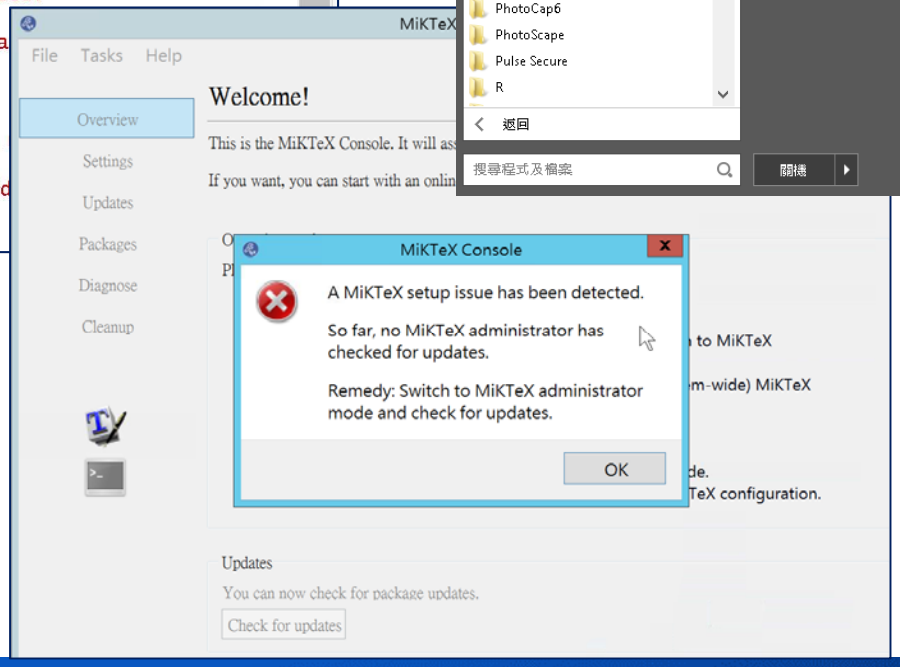
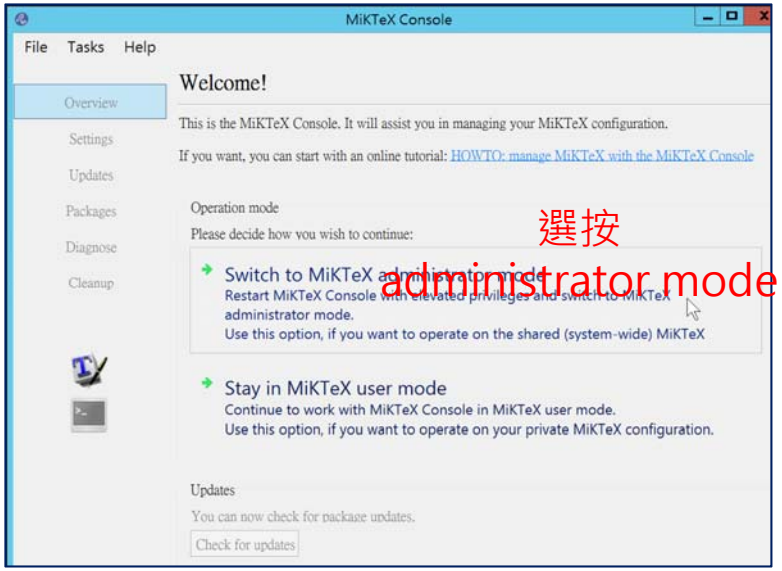
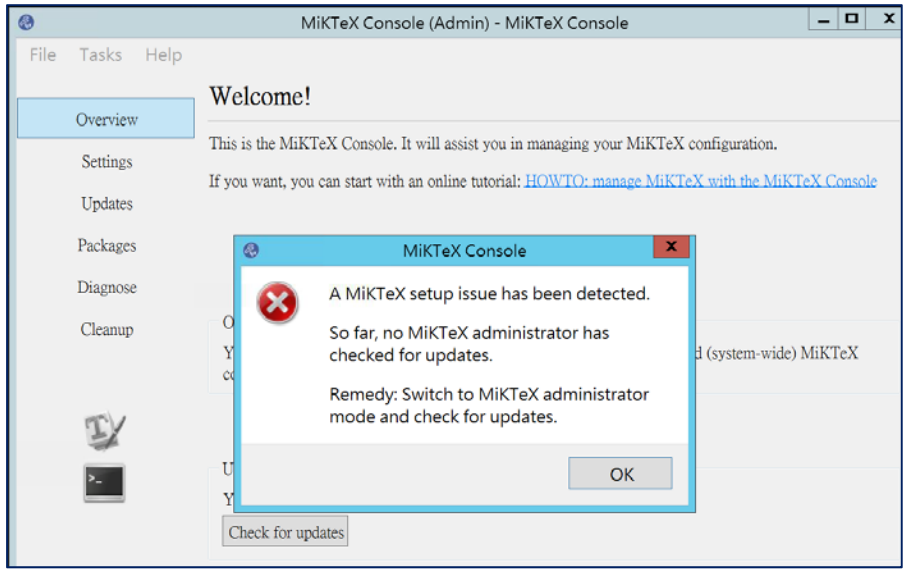
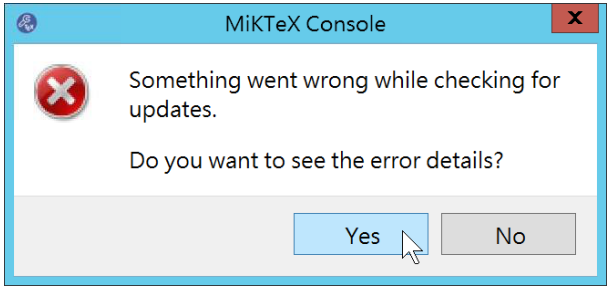
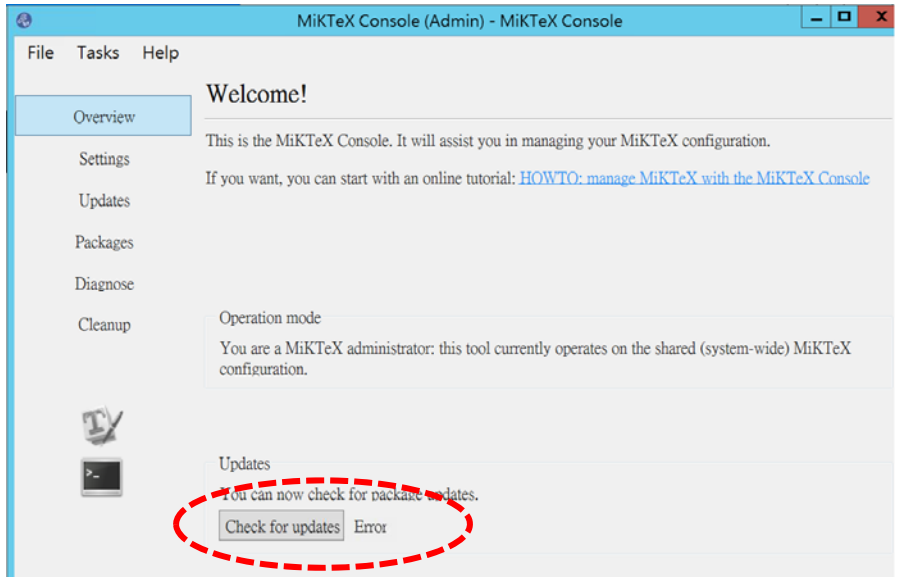
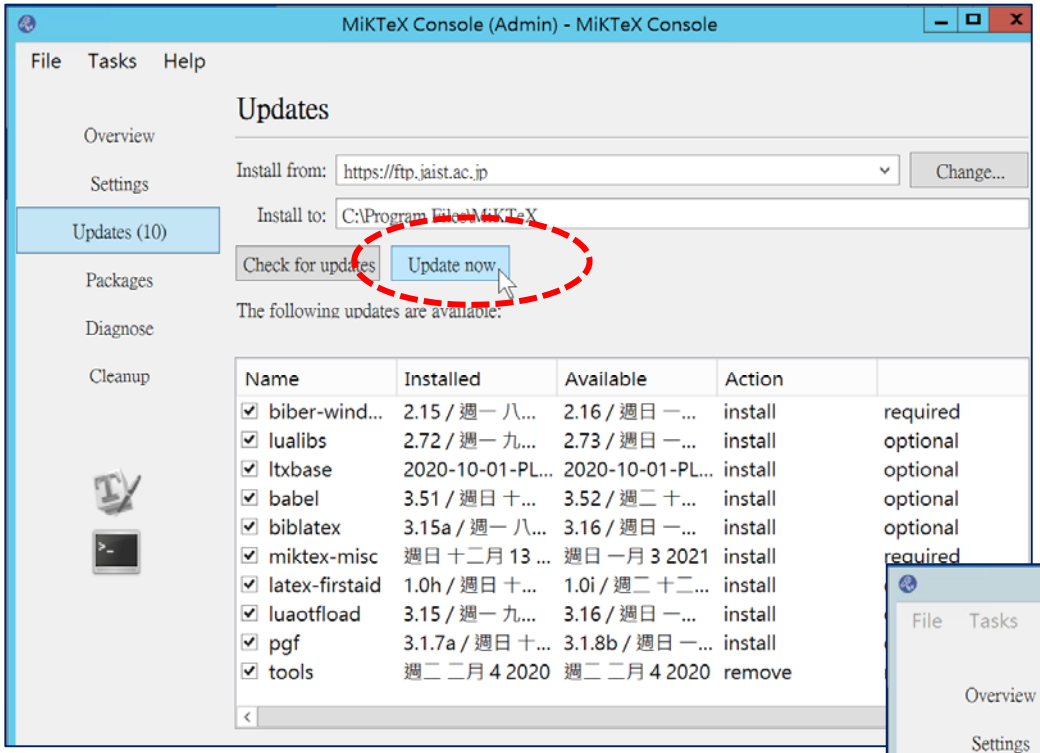
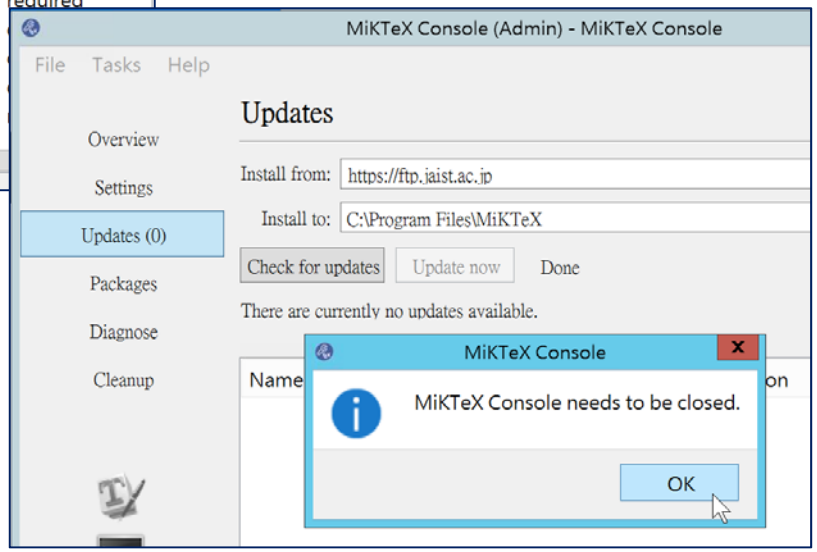

"C:/Program Files/RStudio/bin/pandoc/pandoc" +RTS -K512m -RTS main.utf8.md --to latex --from ma
rkdown+autolink_bare_uris+tex_math_single_backslash --output main.tex --lua-filter "C:\Users\hm
wu\Documents\R\win-library\4.0\rmarkdown\rmarkdown\lua\pagebreak.lua" --lua-filter "C:\Users\hm
wu\Documents\R\win-library\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-contained --highli
ght-style tango --pdf-engine pdflatex --variable graphics --variable "geometry:margin=1in"
output file: main.knit.md

! Sorry, but C:\PROGRA~1\MiKTeX\miktex\bin\x64\pdflatex.exe did not succeed.

! The log file hopefully contains the information to get MiKTeX going aga

!   C:\Users\hmwu\AppData\Local\MiKTeX\miktex\log\pdflatex.log

! pdflatex: major issue: So far, no MiKTeX administrator has checked for

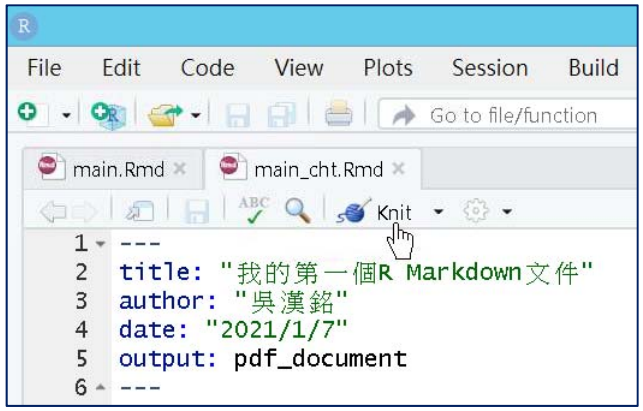
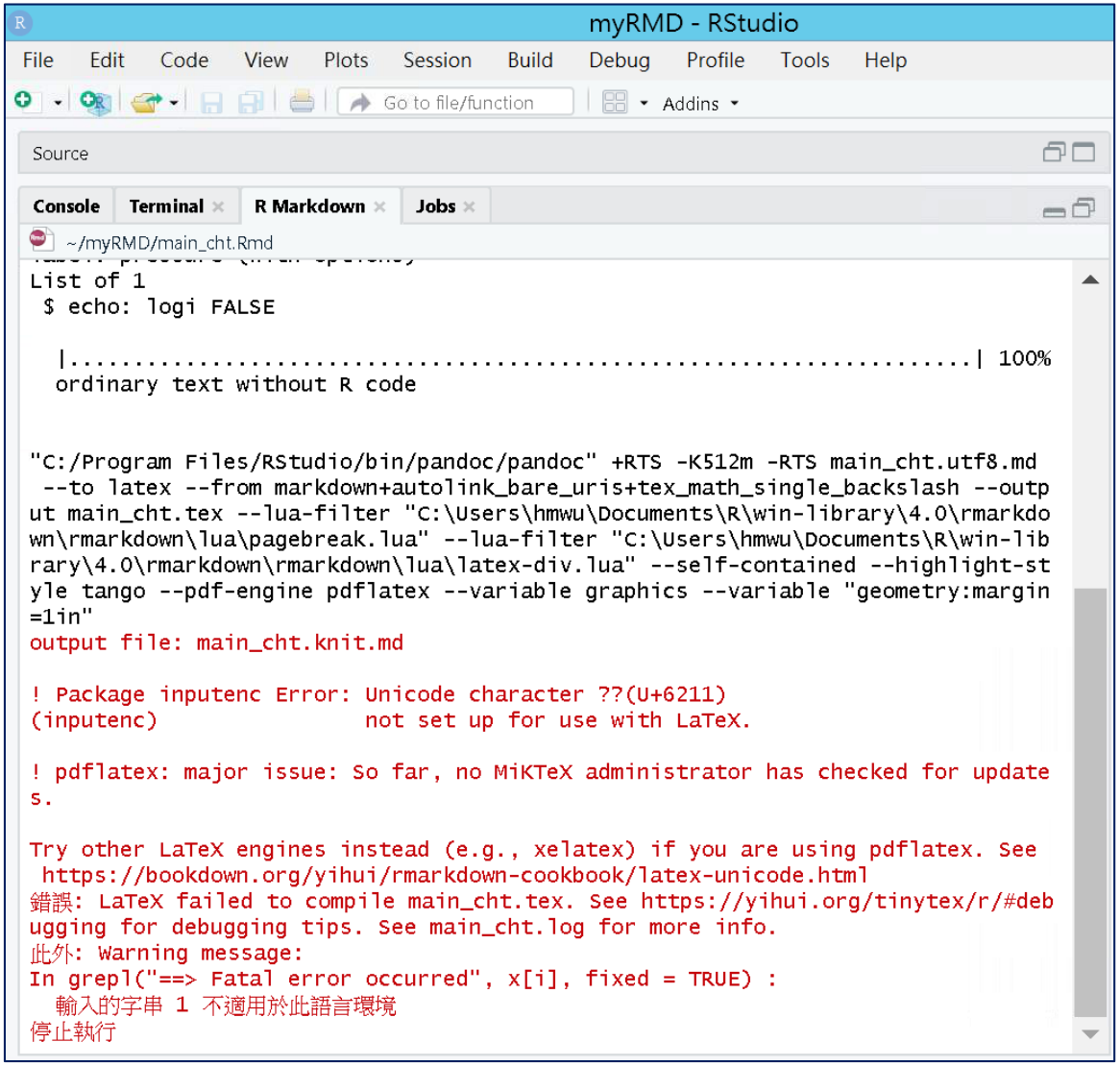
錯誤: LaTeX failed to compile main.tex. See https://yihui.org/tinytex/r/#d
 tips. See main.log for more info.
停止執行
```





開啟MikTeX Console
進行更新和設定

MikTeX 更新和設定









MikTeX 更新和設定

MiKTeX Console (Admin) - MiKTeX Console

File Tasks Help

Overview
Settings
Updates
Packages
Diagnose
Cleanup

Settings

General | Directories | Formats | Languages

Package installation

Packages are installed from: a random package repository on the Internet — Change...

You can choose whether missing packages are to be installed on-the-fly:

- Always install missing packages on-the-fly
  - For anyone who uses this computer (all users)
- Ask me
- Never install missing packages on-the-fly

Paper

Select your default paper format: A4

Changing the paper format triggers a rebuild of the format f

MiKTeX Console (Admin) - MiKTeX Console

File Tasks Help

Overview
Settings
Updates
Packages
Diagnose
Cleanup

Updates

Install from: a random package repository on the Internet — Change...

Install to: C:\Program Files\MiKTeX

Check for updates | Update now | Error

You have not yet checked for updates.

Name	Installed	Available	Action

Change Package Repository

Package Source

Packages can be retrieved from different sources.

Please choose the type of package source:

- Remote package repository (Internet) — Connection Settings...
  - Retrieve pre-release (experimental) packages
- Local package repository (file system)

  If you do not have a local package repository yet, it is easy to set one up:
  HOWTO: set up a local package repository
- MiKTeX DVD (mounted drive or ISO image)

Next | Cancel

Change Package Repository

Remote Package Repository

Many servers on the Internet host a MiKTeX package repository.

For easy selection, the following list is sorted by network proximity. It is recommended that you select a host in your country which supports a secure transport protocol:

Country	Protocol	Host	Date
China	HTTPS	mirrors.sjtug.sjtu.edu.cn	2021/1/6
China	HTTPS	mirrors.hit.edu.cn	2021/1/6
China	HTTPS	mirrors.cqu.edu.cn	2021/1/6
Japan	HTTPS	ftp.jaist.ac.jp	2021/1/6
Japan	HTTP	ftp.jaist.ac.jp	2021/1/6
Singapore	HTTPS	mirror.yongbok.net	2021/1/6

Finish | Cancel

MiKTeX Console (Admin) - MiKTeX Console

File Tasks Help

Overview
Settings
Updates
Packages
Diagnose
Cleanup

Updates

Install from: https://ftp.jaist.ac.jp — Change...

Install to: C:\Program Files\MiKTeX

Check for updates | Update now | Error

You have not yet checked for updates.

Name	Installed	Available	Action

MikTeX 更新和設定



更新可能要很久!



產生PDF文件(英文)終於順利了~

main.Rmd | main_cht.Rmd

Knit | Insert

```
---
title: "My First R Markdown"
author: "Han-Ming Wu"
date: "2021/1/7"
output: pdf_document
---
```

myRMD - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function | Addins

Source

Console | Terminal | R Markdown | Jobs

~/myRMD/main.Rmd

```
  |.....................................
  |  57%
label: cars
  |.................................................
  |  71%
  ordinary text without R code

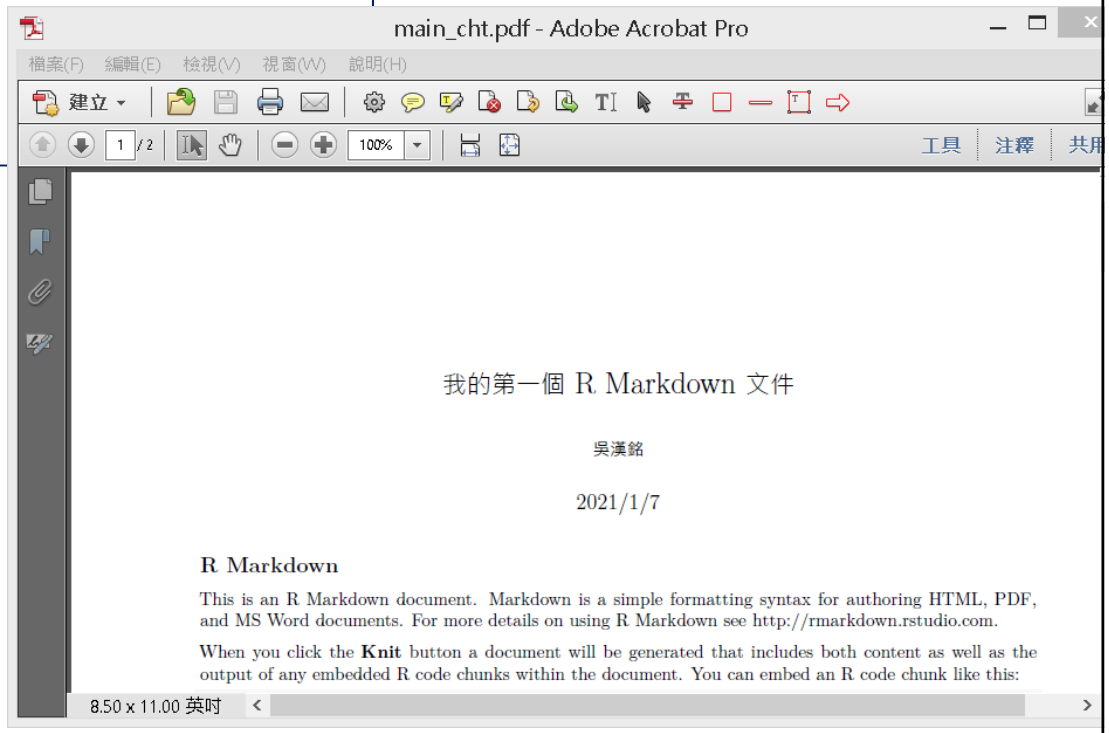
  |.......................................................
  |  86%
label: pressure (with options)
List of 1
 $ echo: logi FALSE

  |.........................................................................
| 100%
  ordinary text without R code

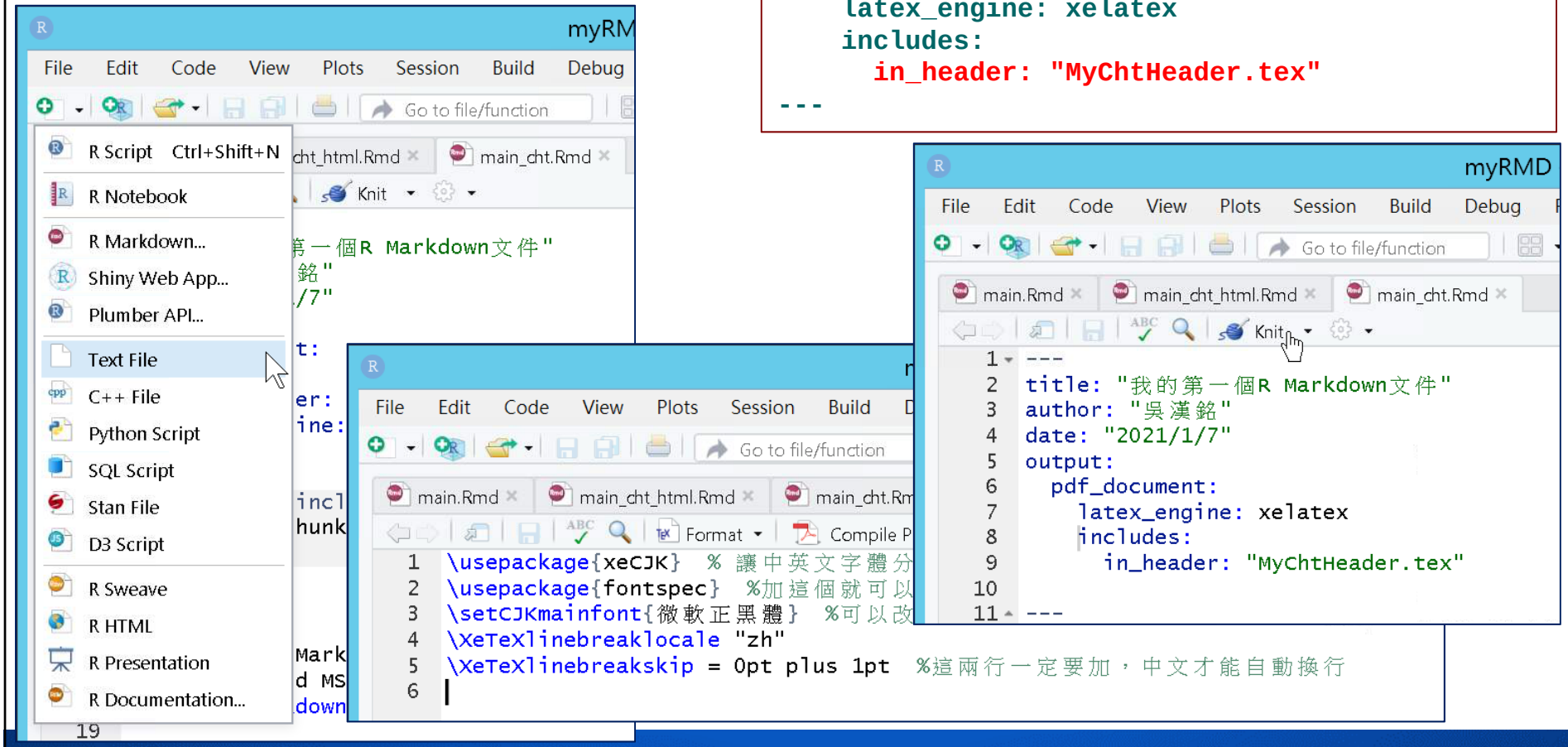
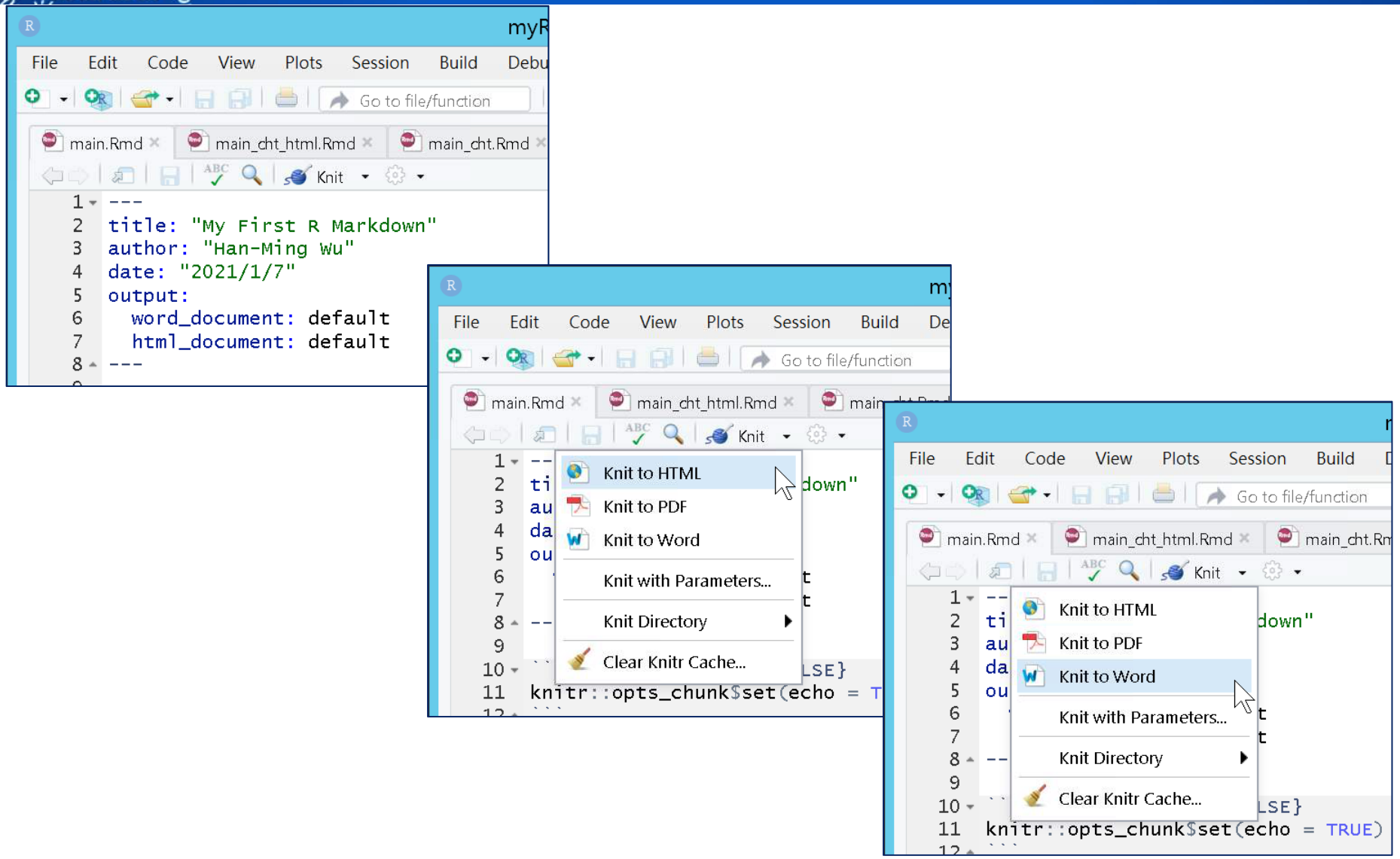
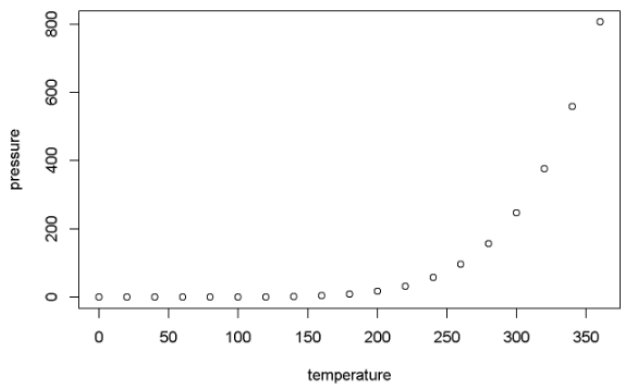
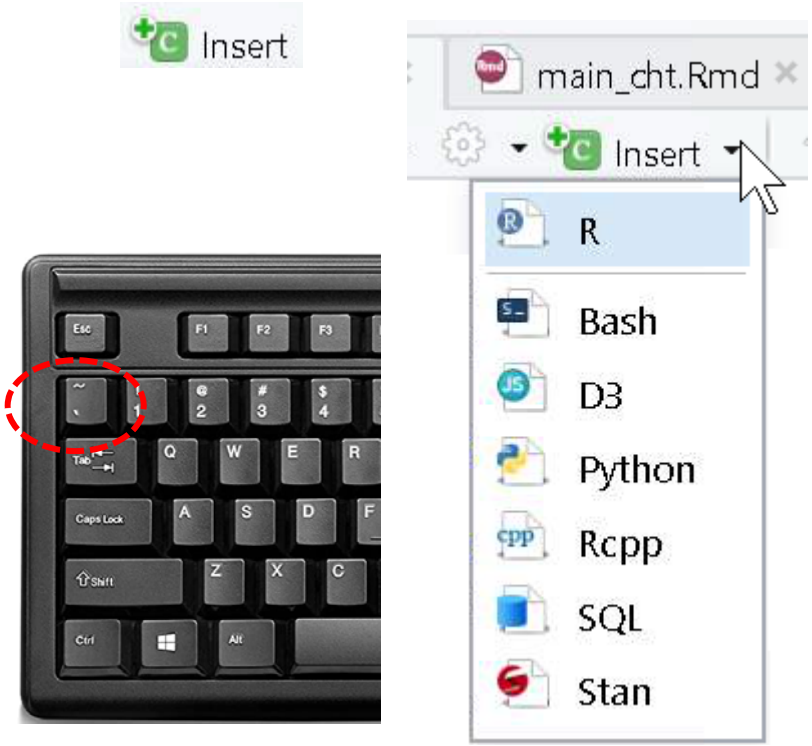

output file: main.knit.md

"C:/Program Files/RStudio/bin/pandoc/pandoc" +RTS -K512m -RTS main.utf8.m
d --to latex --from markdown+autolink_bare_uris+tex_math_single_backslash
 --output main.tex --lua-filter "C:\Users\hmwu\Documents\R\win-library\4.
0\rmarkdown\rmarkdown\lua\pagebreak.lua" --lua-filter "C:\Users\hmwu\Docu
ments\R\win-library\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-con
tained --highlight-style tango --pdf-engine pdflatex --variable graphics
 --variable "geometry:margin=1in"

Output created: main.pdf
```

main.pdf - Adobe Acrobat Pro

R Markdown

Including Plots

My First R Markdown

Han-Ming Wu

2021/1/7

R Markdown

Including Plots

產生PDF文件(中文)，又不順了!!





https://bookdown.org/yihui/rmarkdown-cookbook/latex-unicode.html

(解決方法1)
加入LaTeX 設置碼: header-includes

main.Rmd | main_cht.Rmd

Knit | Insert | Run

```
---
header-includes:
- \usepackage{xeCJK}  % 讓中英文字體分開設置
- \usepackage{fontspec}  %加這個就可以設定字體
- \setCJKmainfont{微軟正黑體}  %可以改用「標楷體」、「細明體」
- \XeTeXlinebreaklocale "zh"
- \XeTeXlinebreakskip = 0pt plus 1pt  %這兩行一定要加，中文才能自動換行

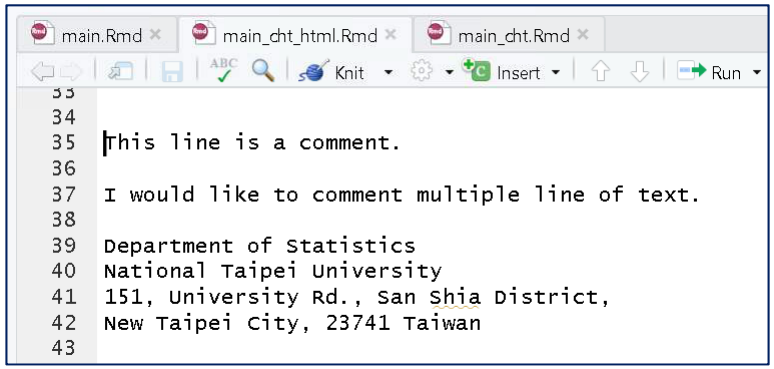
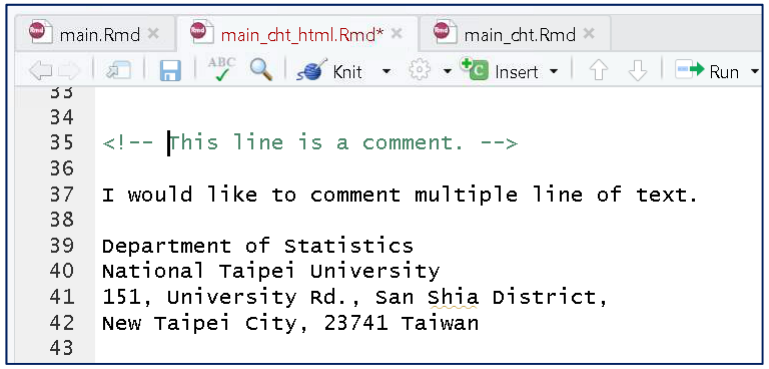
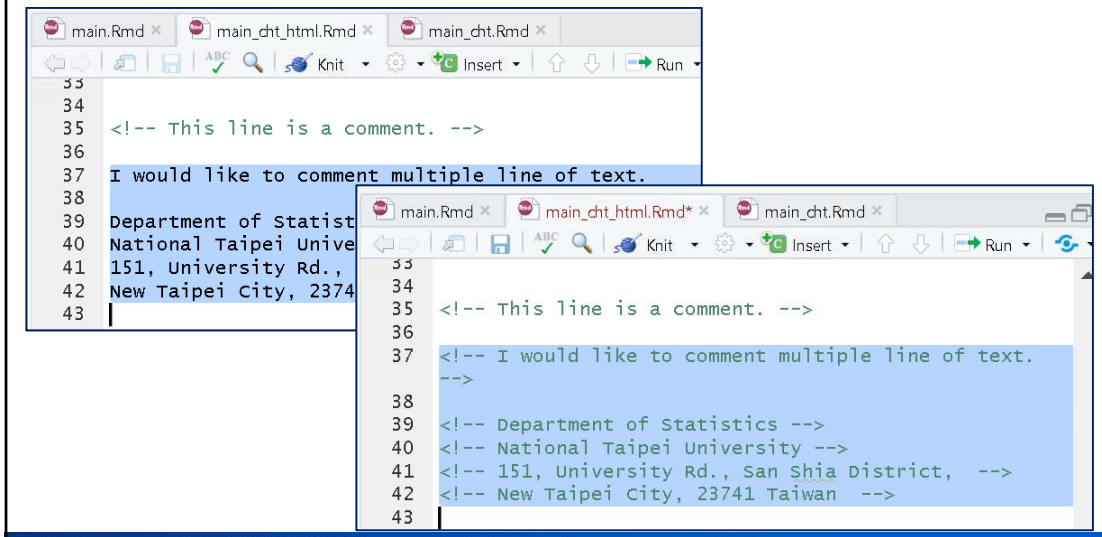
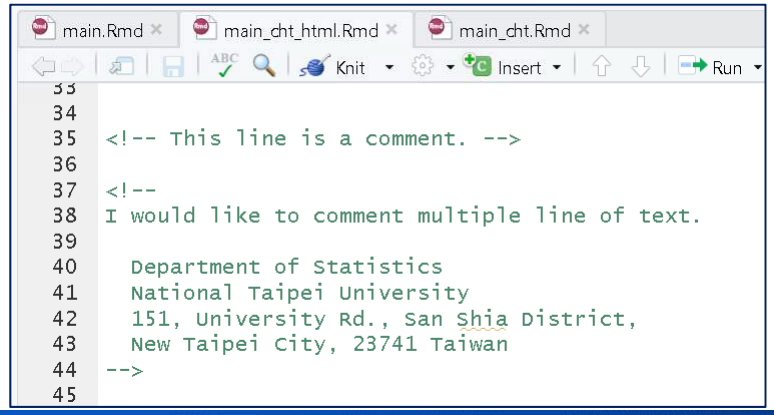
title: "我的第一個R Markdown文件"
author: "吳漢銘"
date: "2021/1/7"
output:
  pdf_document:
    latex_engine: xelatex
---
```




```
---
header-includes:
- \usepackage{xeCJK}
- \usepackage{fontspec}
- \setCJKmainfont{微軟正黑體}
- \XeTeXlinebreaklocale "zh"
- \XeTeXlinebreakskip = 0pt plus 1pt

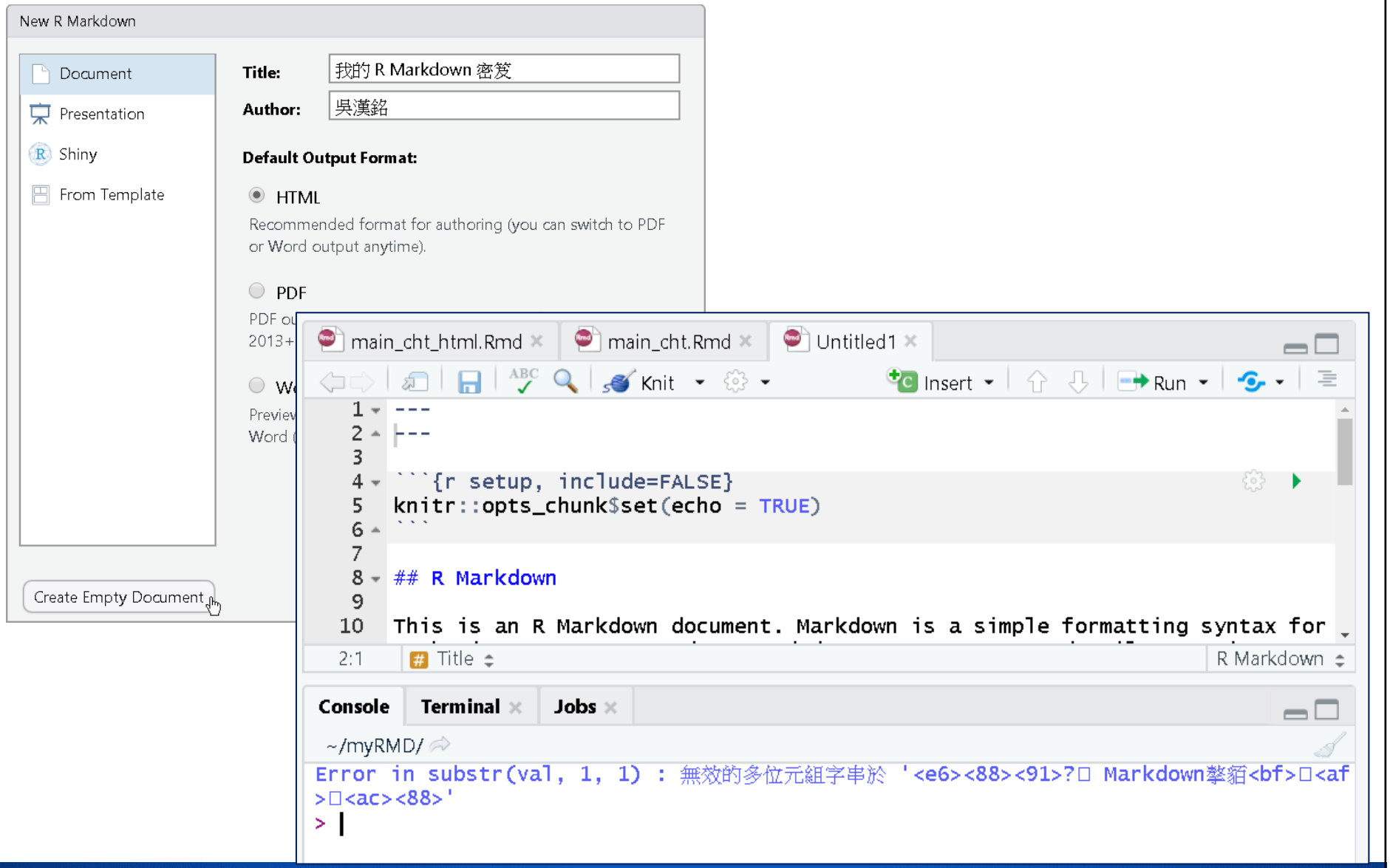
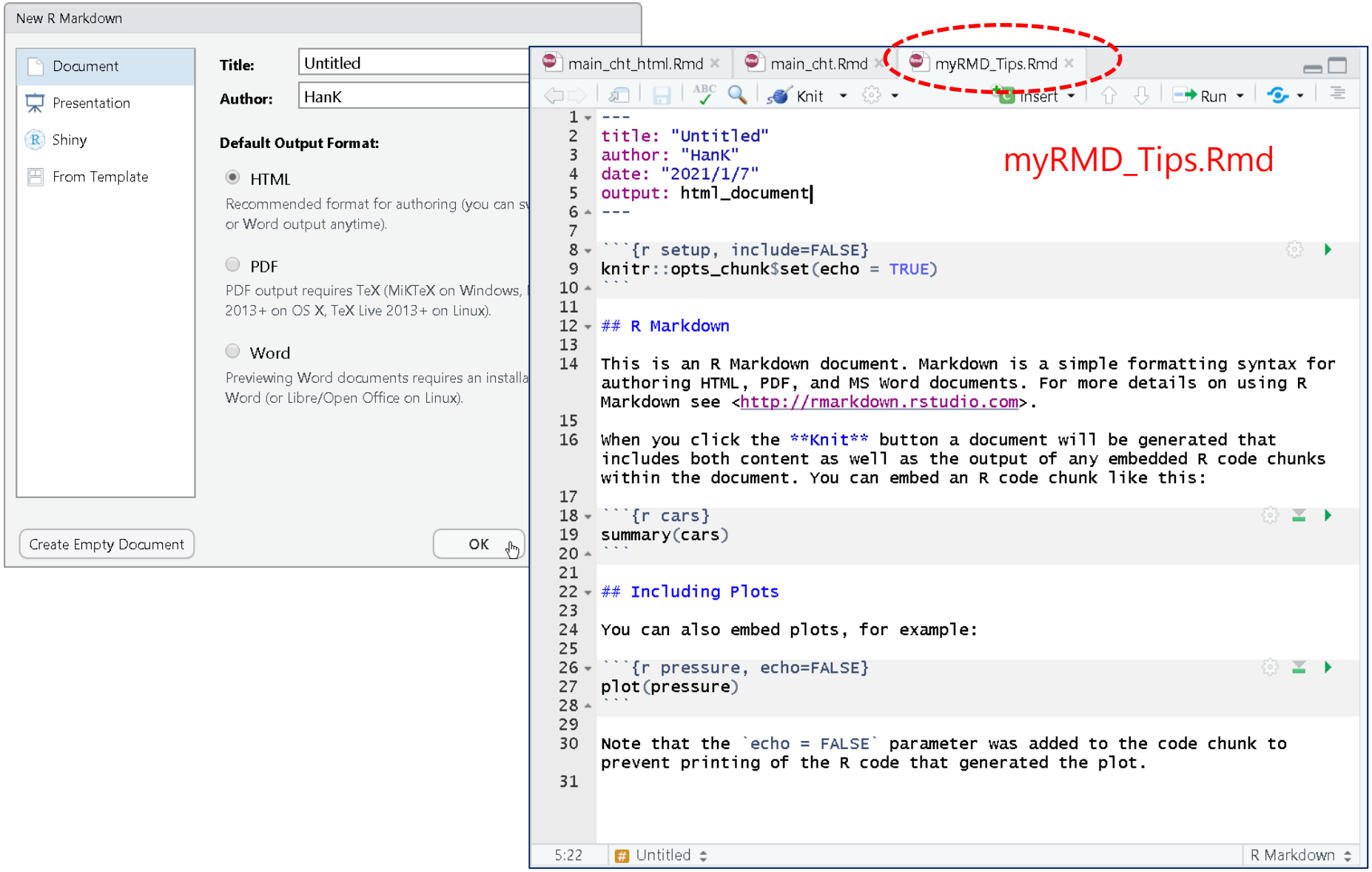
title: "我的第一個R Markdown文件"
author: "吳漢銘"
date: "2021/1/7"
output:
  pdf_document:
    latex_engine: xelatex

---
```

(解決方法2)
加入LaTeX 設置碼: in_header

MyChtHeader.tex

```
\usepackage{xeCJK}
\usepackage{fontspec}
\setCJKmainfont{微軟正黑體}
\XeTeXlinebreaklocale "zh"
\XeTeXlinebreakskip = 0pt plus 1pt
```

```
---
title: "我的第一個R Markdown文件"
author: "吳漢銘"
date: "2021/1/7"
output:
  pdf_document:
    latex_engine: xelatex
    includes:
      in_header: "MyChtHeader.tex"
---
```



Multiple Output Formats



Rmd檔及所編譯出來的html檔

main.Rmd | main_cht_html.Rmd

Knit | Insert | Run

```
1  ---
2  title: "我的第一個R Markdown文件 (HTML)"
3  author: "吳漢銘"
4  date: "2021/1/7"
5  output: html_document
6  ---
7
8  ```{r setup, include=FALSE}
9  knitr::opts_chunk$set(echo = TRUE)
10 ```
11
12 ## R Markdown
13
14 This is an R Markdown document. Markdown is a simple formatting
   syntax for authoring HTML, PDF, and MS Word documents. For more
   details on using R Markdown see <http://rmarkdown.rstudio.com>.
15
16 When you click the **Knit** button a document will be generated that
   includes both content as well as the output of any embedded R code
   chunks within the document. You can embed an R code chunk like this:
17
18 ```{r cars}
19 summary(cars)
20 ```
21
22 ## Including Plots
23
24 You can also embed plots, for example:
25
26 ```{r pressure, echo=FALSE}
27 plot(pressure)
28 ```
29
30 Note that the `echo = FALSE` parameter was added to the code chunk to
   prevent printing of the R code that generated the plot.
31 ===
```

31:4 | Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot. | R Markdown

Code Chunks

~/myRMD/main_cht_html.html

main_cht_html.html | Open in Browser | Find | Publish

我的第一個R Markdown (HTML)

吳漢銘

2021/1/7

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##     speed           dist
##  Min.   : 4.0   Min.   :  2.00
##  1st Qu.:12.0   1st Qu.: 26.00
##  Median :15.0   Median : 36.00
##  Mean   :15.4   Mean   : 42.98
##  3rd Qu.:19.0   3rd Qu.: 56.00
##  Max.   :25.0   Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

Code Chunks

- insert chunks:
  - the keyboard shortcut **`Ctrl + Alt + I`** (OS X: **`Cmd + Option + I`**)
  - the Add Chunk command in the editor toolbar
  - type the chunk delimiters **`` ```{r} ``** and **`` ``` ``**.

Global Options: apply to every chunk in your file, call **`knitr::opts_chunk$set`**, overwritten in individual chunk headers.

```
8  ```{r setup, include=FALSE}
9  knitr::opts_chunk$set(echo = TRUE)
10 ```
```

```
17
18 ```{r cars}
19 summary(cars)
20 ```
21
22 ## Including Plots
23
24 You can also embed plots, for example:
25
26 ```{r pressure, echo=FALSE}
27 plot(pressure)
28 ```
29
```



Chunk Options
https://yihui.org/knitr/options/
Code evaluation, Text output, Code decoration, Cache, Plots, Animation, Code chunk, Child documents, Language engines, Option templates, Extracting source code, Other chunk options.

A Notebook Interface

myRMD - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins

main.Rmd main_cht_html.Rmd main_cht.Rmd

Knit Insert Run

```
When you click the **Knit** button a document will be generated that
includes both content as well as the output of any embedded R code
chunks within the document. You can embed an R code chunk like this:

```{r cars}
summary(cars)
```
```

```
     speed           dist
 Min.   : 4.0   Min.   :  2.00
 1st Qu.:12.0   1st Qu.: 26.00
 Median :15.0   Median : 36.00
 Mean   :15.4   Mean   : 42.98
 3rd Qu.:19.0   3rd Qu.: 56.00
 Max.   :25.0   Max.   :120.00
```

```
## Including Plots

You can also embed plots, for example:

```{r pressure, echo=FALSE}
plot(pressure)
```
```

Run Current Chunk

Chunk Name: pressure

Output: Show output only

Show warnings

Show messages

Use paged tables

Use custom figure size

Chunk options Revert Apply

27:15 Chunk 3: pressure

- ✔ Preview in Window
- Preview in Viewer Pane
- (No Preview)
- ✔ Preview Images and Equations
- ✔ Show Previews Inline
- ✔ Chunk Output Inline
- Chunk Output in Console
- Expand All Output
- Collapse All Output
- Clear Output
- Clear All Output
- Output Options...

The R Markdown Reference Guide: Chunk Options

```
26 ```{r pressure, echo=FALSE}
27 plot(pressure)
28 ```
```

Chunk options

option	default value	description
Code evaluation		
child	NULL	A character vector of filenames. Knitr will knit the files and place them into the main document.
code	NULL	Set to R code. Knitr will replace the code in the chunk with the code in the code option.
engine	'R'	Knitr will evaluate the chunk in the named language, e.g. **engine = 'python'**. Run **names(knitr::knit_engines$get())** to see supported languages.
✓ **eval**	TRUE	If **FALSE**, knitr will not run the code in the code chunk.
include	TRUE	If **FALSE**, knitr will run the chunk but not include the chunk in the final document.
purl	TRUE	If **FALSE**, knitr will not include the chunk when running **purl()** to extract the source code.
Results		
collapse	FALSE	If **TRUE**, knitr will collapse all the source and output blocks created by the chunk into a single block.
✓ **echo**	TRUE	If **FALSE**, knitr will not display the code in the code chunk above it's results in the final document.
✓ **results**	'markup'	If **'hide'**, knitr will not display the code's results in the final document. If **'hold'**, knitr will delay displaying all output pieces until the end of the chunk. If **'asis'**, knitr will pass through results without reformatting them (useful if results return raw HTML, etc.)
error	TRUE	If **FALSE**, knitr will not display any error messages generated by the code.
message	TRUE	If **FALSE**, knitr will not display any messages generated by the code.
warning	TRUE	If **FALSE**, knitr will not display any warning messages generated by the code.
Code Decoration		
comment	'##'	A character string. Knitr will append the string to the start of each line of results in the final document.
highlight	TRUE	If **TRUE**, knitr will highlight the source code in the final output.
✓ **prompt**	FALSE	If **TRUE**, knitr will add > to the start of each line of code displayed in the final document.
strip.white	TRUE	If **TRUE**, knitr will remove white spaces that appear at the beginning or end of a code chunk.
tidy	FALSE	If **TRUE**, knitr will tidy code chunks for display with the **tidy_source()** function in the **formatR** package.

The R Markdown Reference Guide: Chunk Options

Chunks		
opts.label	NULL	The label of options set in **knitr:: opts_template()** to use with the chunk.
R.options	NULL	Local R options to use with the chunk. Options are set with **options()** at start of chunk. Defaults are restored at end.
ref.label	NULL	A character vector of labels of the chunks from which the code of the current chunk is inherited.

快取

Cache		
autodep	FALSE	If **TRUE**, knitr will attempt to figure out dependencies between chunks automatically by analyzing object names.
cache	FALSE	If **TRUE**, knitr will cache the results to reuse in future knits. Knitr will reuse the results until the code chunk is altered.
cache.comments	NULL	If **FALSE**, knitr will not rerun the chunk if only a code comment has changed.
cache.lazy	TRUE	If **TRUE**, knitr will use **lazyload()** to load objects in chunk. If **FALSE**, knitr will use **load()** to load objects in chunk.
cache.path	'cache/'	A file path to the directory to store cached results in. Path should begin in the directory that the .Rmd file is saved in.
cache.vars	NULL	A character vector of object names to cache if you do not wish to cache each object in the chunk.
dependson	NULL	A character vector of chunk labels to specify which other chunks a chunk depends on. Knitr will update a cached chunk if its dependencies change.

The R Markdown Reference Guide: Chunk Options

Plots		
dev	'png'	The R function name that will be used as a graphical device to record plots, e.g. **dev='CairoPDF'**.
dev.args	NULL	Arguments to be passed to the device, e.g. **dev.args=list(bg='yellow', pointsize=10)**.
dpi	72	A number for knitr to use as the dots per inch (dpi) in graphics (when applicable).
external	TRUE	If **TRUE**, knitr will externalize tikz graphics to save LaTex compilation time (only for the **tikzDevice::tikz()** device).
fig.align	'default'	How to align graphics in the final document. One of 'left', 'right', or 'center'.
fig.cap	NULL	A character string to be used as a figure caption in LaTex.
fig.env	'figure'	The Latex environment for figures.
fig.ext	NULL	The file extension for figure output, e.g. **fig.ext='png'**.
fig.height, fig.width	7	The width and height to use in R for plots created by the chunk (in inches).
fig.keep	'high'	If **'high'**, knitr will merge low-level changes into high level plots. If **'all'**, knitr will keep all plots (low-level changes may produce new plots). If **'first'**, knitr will keep the first plot only. If **'last'**, knitr will keep the last plot only. If **'none'**, knitr will discard all plots.
fig.lp	'fig:'	A prefix to be used for figure labels in latex.
fig.path	'figure/'	A file path to the directory where knitr should store the graphics files created by the chunk.
fig.pos	''	A character string to be used as the figure position arrangement in LaTex.
fig.process	NULL	A function to post-process a figure file. Should take a filename and return a filename of a new figure source.
fig.retina	1	Dpi multiplier for displaying HTML output on retina screens.
fig.scap	NULL	A character string to be used as a short figure caption.
fig.subcap	NULL	A character string to be used as captions in sub-figures in LaTex.
fig.show	'asis'	If **'hide'**, knitr will generate the plots created in the chunk, but not include them in the final document. If **'hold'**, knitr will delay displaying the plots created by the chunk until the end of the chunk. If **'animate'**, knitr will combine all of the plots created by the chunk into an animation.
fig.showtext	NULL	If **TRUE**, knitr will call **showtext::showtext.begin()** before drawing plots.
out.extra	NULL	A character string of extra options for figures to be passed to LaTex or HTML.
out.height, out.width	NULL	The width and height to scale plots to in the final output. Can be in units recognized by output, e.g. **8\\linewidth, 50px**
resize.height, resize.width	NULL	The width and height to resize tike graphics in LaTex, passed to **\resizebox{}{}**.
sanitize	FALSE	If **TRUE**, knitr will sanitize tike graphics for LaTex.

```
```{r fig.cap  = "The index plot"}
plot(iris$Sepal.Length)
```
```

Comment out text

- Comment out text in the source Rmd document, which will not be displayed in the final output.
- HTML syntax (single line):

```
<!-- your comment -->
```

- HTML syntax (multiple line):

```
<!--
  your comment here
  second line
-->
```

- RStudio shortcut: **Ctrl + Shift + C** (Command + Shift + C, macOS).









Inline Code

```
45 <!-- Code Chunk -->
46 Here is a simple "Code Chunk".
47 ```{r}
48 myname <- "Hank Wu"
49 cat("Hello~ My name is", myname, "\n")
50 paste("Today is ", date())
51 ```
```

```
Hello~ My name is Hank Wu
[1] "Today is  Thu Jan 07 13:13:40 2021"
```

```
52
53
54 I would like to introduce myself.
55 My name is `r myname`.
56 Today is `r date()`.
57 The sum of integers from 1 to 100 is `r sum(1:100)`.
   The `r` command is `sum(1:100)`.
58
```

~/myRMD/main_cht_html.html

main_cht_html.html | Open in Browser | Find | Publish

Here is a simple “Code Chunk”.

```
myname <- "Hank Wu"
cat("Hello~ My name is", myname, "\n")
```

```
## Hello~ My name is Hank Wu
```

```
paste("Today is ", date())
```

```
## [1] "Today is  Thu Jan 07 13:13:55 2021"
```

I would like to introduce myself. My name is Hank Wu. Today is Thu Jan 07 13:13:55 2021. The sum of integers from 1 to 100 is 5050. The `r` command is `sum(1:100)`.

```
<!-- Code Chunk -->
Here is a simple "Code Chunk".
```{r}
myname <- "Hank Wu"
cat("Hello~ My name is", myname, "\n")
paste("Today is ", date())
```

I would like to introduce myself.
My name is `r myname`.
Today is `r date()`.
The sum of integers from 1 to 100 is `r sum(1:100)`. The `r` command is `sum(1:100)`.
```

```
The sum of integers from 1 to 100 is `r s <- sum(1:100)`.
The sum is `r s`.
```

The sum of integers from 1 to 100 is . The sum is 5050.

新增R Markdown檔案 Title及Author不能有中文



新增R Markdown檔案
先用內建「Title及Author」



練習: 我的R Markdown學習密笈

我的R Markdown學習密笈

Department of Statistics, National Taipei University

吳漢銘

08 一月 2021

myRMD_Tips.Rmd

Knit

```
---
title: "我的R Markdown學習密笈"
subtitle: "Department of Statistics, National Taipei University"
author: "吳漢銘"
date: "`r format(Sys.time(), '%d %B %Y')`"
output:
  bookdown::html_document2:
    toc: true
    toc_depth: 3
    number_sections: true
    theme: united
    highlight: tango
---

<!-- 全域設定 -->
```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```

```

# 標題及列舉

## 1 Markdown Syntax 語法

### 1.1 標題

# Header 1 標題1 (不標號)

## Header 2 標題2 (不標號)

### Header 3 標題3

#### Header 4 標題4

##### Header 5 標題5

###### Header 6 標題6

### 1.2 列舉: 項目符號清單

- Plain text 一般文字
  - *italics* and *italics*
  - *斜體* 和 *斜體*
  - *italics 斜體*
    - **bold** and **bold**
    - **粗體** 和 **粗體**
- 顏色(html): 這裡是綠色的字。

### 1.3 列舉: 編號清單

1. superscript$^2$, 上標$^2$
2. subscript$_2$, 下標$_2$
   i. 這裡是RStudio連結。
   ii. 我的網站: http://www.hmwu.idv.tw
      A. endash: – 連接號: –
      B. emdash: — 破折號: —
      C. ellipsis: … 省略符號: …
      D. ~~strikethrough~~, ~~刪除線~~

End a line with two spaces to start a new paragraph. 使用兩列空格來結束一行，開始新的的段落。

```
<!--
##
第一章: Markdown Syntax
這註解是個人風格，也不一定要照著做
##
-->

Markdown Syntax 語法 {#Syntax}

標題
Header 1 標題1 (不標號) {.unnumbered}
Header 2 標題2 (不標號) {-}
Header 3 標題3 {-}
Header 4 標題4 {-}
Header 5 標題5 {-}
Header 6 標題6 {-}

列舉: 項目符號清單
* Plain text 一般文字
     + *italics* and _italics_
     + *斜體* 和 _斜體_
     + italics 斜體
          - **bold** and __bold__
          - **粗體** 和 __粗體__
* 顏色(html): 這裡是綠色的字。

列舉: 編號清單
1. superscript^2^, 上標^2^
2. subscript~2~, 下標~2~
    i) 這裡是[RStudio](http://www.rstudio.com)連結。
    ii) 我的網站: <http://www.hmwu.idv.tw>
        A. endash: --   連接號: --
        B. emdash: --- 破折號: ---
        C. ellipsis: ... 省略符號: ...
        D. ~~strikethrough~~, ~~刪除線~~

End a line with two spaces to start a new paragraph.
使用兩列空格來結束一行，開始新的的段落。

```

# 程式碼

## 2 程式碼

### 2.1 文中程式指令

我最常用的R指令是 `str`，最好的用的是 `apply` 系列指令。

### 2.2 內嵌程式碼 (code inline)

整數1連加到100的總和是 5050, `R` 語言的程式碼是 `sum(1:100)`。

### 2.3 code chunk 程式區塊 (列出程式碼)

```
paste("Hello", "World!")
```

```
## [1] "Hello World!"
```

2.4 code chunk 程式區塊 (印出提示符號)

```
> paste("Hello", "World!")
```

```
## [1] "Hello World!"
```

2.5 code chunk 程式區塊 (不列出程式碼)

```
## [1] "Hello World!"
```

2.6 程式碼照印 (verbatim)

```
# 109-1-R-exam2
# ex1(a)
my.inverse <- function(n){
  cat("計算反矩陣\n")
  cat("請輸入", n, " by ", n, "之矩陣:")
  m <- matrix(scan(), ncol=n, nrow=n)
  list(Mat=m, Mat.inverse=solve(m))
}

my.inverse(n=3)
```

```
<!--
##############################################################
# 程式碼                                                     #
#                                                            #
##############################################################
-->
# 程式碼


## 文中程式指令
我最常用的R指令是`str`，最好的用的是`apply`系列指令。

## 內嵌程式碼 (code inline)
整數1連加到100的總和是 `r sum(1:100)`，`R`語言的程式碼是`sum(1:100)`。


## code chunk 程式區塊 (列出程式碼)
```{r}
paste("Hello", "World!")
```

code chunk 程式區塊 (印出提示符號)
```{r prompt=TRUE}
paste("Hello", "World!")
```

code chunk 程式區塊 (不列出程式碼)
```{r eval=TRUE, echo=FALSE}
paste("Hello", "World!")
```

程式碼照印 (verbatim)

```
# 109-1-R-exam2
# ex1(a)
my.inverse <- function(n){
  cat("計算反矩陣\n")
  cat("請輸入", n, " by ", n, "之矩陣:")
  m <- matrix(scan(), ncol=n, nrow=n)
  list(Mat=m, Mat.inverse=solve(m))
}

my.inverse(n=3)
```
```
```
```

表格

```
<!--
##############################################################
# 表格                                                       #
#                                                            #
##############################################################
-->
# 表格


## 手繪表格
Table Header | Second Header
-------------| -------------
Table Cell   | Cell 2
Cell 3       | Cell 4


## 原本的資料框(`data.frame`)表格
```{r results = 'asis'}
head(airquality) # don't work in R Markdown
```

knitr::kable的表格
```{r airquality, results = 'asis'}
mydata <- airquality[1:4, ]
knitr::kable(mydata, caption = "Table with kable")
```

xtable::xtable的表格
```{r results = "asis"}
# install.packages("xtable")
library(xtable)
print(xtable(mydata, caption = "Table with xtable"), type = "html")
```
```

3 表格

3.1 手繪表格

Table Header	Second Header
Table Cell	Cell 2
Cell 3	Cell 4

3.2 原本的資料框(`data.frame`)表格

```r
head(airquality) # don't work in R Markdown
```

Ozone Solar.R Wind Temp Month Day 1 41 190 7.4 67 5 1 2 36 118 8.0 72 5 2 3 12 149 12.6 74 5 3 4 18 313 11.5 62 5 4 5 NA NA 14.3 56 5 5 6 28 N
66 5 6

3.3 knitr::kable的表格

```r
mydata <- airquality[1:4, ]
knitr::kable(mydata, caption = "Table with kable")
```

Table 3.1: Table with kable

Ozone	Solar.R	Wind	Temp	Month
41	190	7.4	67	5
36	118	8.0	72	5
12	149	12.6	74	5
18	313	11.5	62	5

3.4 xtable::xtable的表格

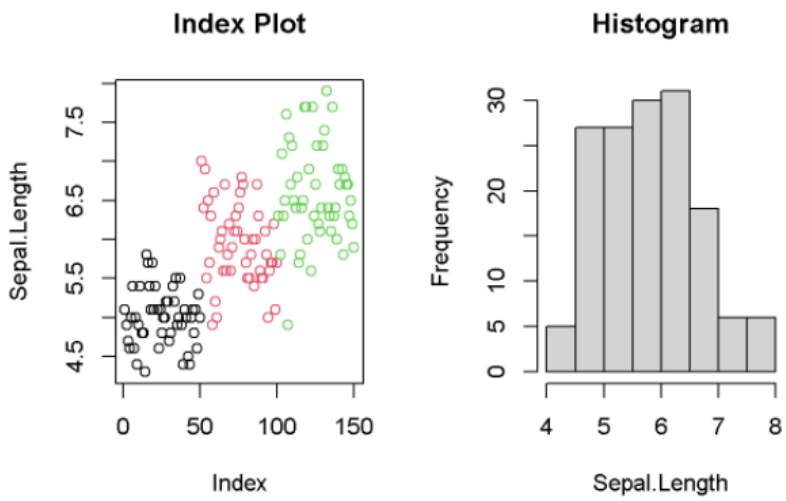
```r
# install.packages("xtable")
library(xtable)
print(xtable(mydata, caption = "Table with xtable"), type = "html")
```

	Ozone	Solar.R	Wind	Temp	Month	Day
1	41	190	7.40	67	5	1
2	36	118	8.00	72	5	2
3	12	149	12.60	74	5	3
4	18	313	11.50	62	5	4

Table with xtable

圖形

```
<!--
##########################################################
# 圖形                                                   #
#                                                        #
##########################################################
-->
# 圖形

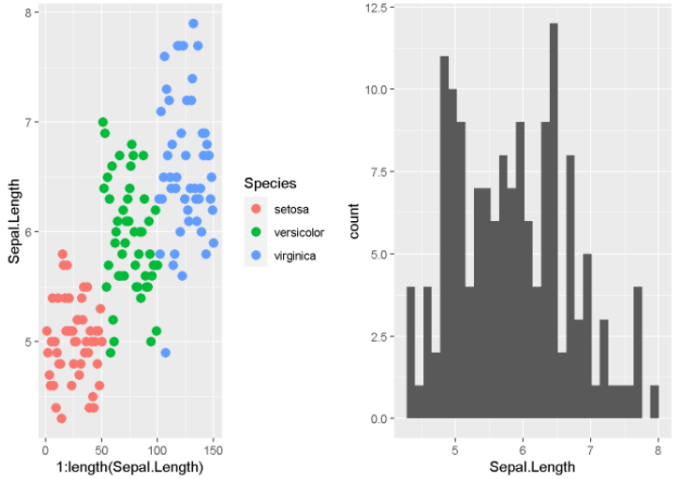

## 基礎圖形(Base Graphics)
```{r iris-plot, fig.cap="The iris data."}
attach(iris)
par(mfrow=c(1, 2))
plot(Sepal.Length, col=iris$Species, main="Index Plot")
hist(Sepal.Length, main="Histogram")
```
```

4 圖形

4.1 基礎圖形(Base Graphics)

```
attach(iris)
par(mfrow=c(1, 2))
plot(Sepal.Length, col=iris$Species, main="Index Plot")
hist(Sepal.Length, main="Histogram")
```

Figure 4.1: The iris data.

圖形: 控制大小

4.2 基礎圖形(Base Graphics) (控制大小)

```
attach(iris)
```

```
## The following objects are masked from iris (pos = 3):
##
##     Petal.Length, Petal.Width, Sepal.Length, Sepal.Width, Species
```

```
par(mfrow=c(1, 2))
plot(Sepal.Length, col=iris$Species, main="Index Plot")
hist(Sepal.Length, main="Histogram")
```




```
## 基礎圖形(Base Graphics) (控制大小)
```{r fig.height = 4, fig.width = 6}
attach(iris)
par(mfrow=c(1, 2))
plot(Sepal.Length, col=iris$Species, main="Index Plot")
hist(Sepal.Length, main="Histogram")
```
```

圖形: ggplot2

4.3 ggplot2圖形(置中)

```r
# install.packages("ggplot2")
# install.packages("gridExtra")
#library(ggplot2)
suppressMessages(require(ggplot2))
library(gridExtra)
p1 <- ggplot(iris, aes(x=1:length(Sepal.Length), y=Sepal.Length,
                       color=Species)) + geom_point(size=3)
p2 <- ggplot(iris, aes(x=Sepal.Length)) +
        geom_histogram()
grid.arrange(p1, p2, nrow=1, ncol=2)
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




```r

## ggplot2圖形(置中)
```{r fig.align = "center"}
# install.packages("ggplot2")
# install.packages("gridExtra")
#library(ggplot2)
suppressMessages(require(ggplot2))
library(gridExtra)
p1 <- ggplot(iris, aes(x=1:length(Sepal.Length), y=Sepal.Length,
                       color=Species)) + geom_point(size=3)
p2 <- ggplot(iris, aes(x=Sepal.Length)) +
        geom_histogram()
grid.arrange(p1, p2, nrow=1, ncol=2)
```

```

# 圖片

```
圖片
image 圖片: ![這是R語言的官方標誌](Rlogo.png){width=30%}

圖片(利用knitr)
```{r, out.width='25%', fig.align="center", fig.cap="R的Logo"}
knitr::include_graphics("Rlogo.png")
```
```

4.4 圖片

image 圖片: 

4.5 圖片(利用knitr)

```
knitr::include_graphics("Rlogo.png")
```

Figure 4.2: R的Logo

數學式

5 數學式

5.1 文中數式

圓面積: $A = \pi\times r^{2}$，平均數$\bar{X}=\frac{\sum_{i=1}^n x_i}{n}$.

5.2 單獨數式 (無編號)

這是常態分佈的機率密度函數:

$$f(x)=\frac{1}{\sqrt{2\pi}\sigma}e^{\frac{(x-\mu)^2}{2\sigma^2}}$$

5.3 單獨數式 (有編號)

以下是有數學式編號的範例:

$$\Theta = \begin{pmatrix} \alpha & \beta \\ \gamma & \delta \end{pmatrix}$$

$$E=mc^2$$

```
<!--
##########################################################
# 數學式                                                 #
#                                                        #
##########################################################
-->
# 數學式


## 文中數式
圓面積: $A = \pi\times r^{2}$，平均數$\bar{X}=\frac{\sum_{i=1}^n x_i}{n}$.


## 單獨數式 (無編號)
這是常態分佈的機率密度函數:
\[
f(x)=\frac{1}{\sqrt{2\pi}\sigma}e^{\frac{(x-\mu)^2}{2\sigma^2}}
\]


## 單獨數式 (有編號)

以下是有數學式編號的範例:
\begin{equation}
\Theta =
  \begin{pmatrix}
    \alpha & \beta \\
    \gamma & \delta
  \end{pmatrix} (\#eq:matrix)
\end{equation}


\begin{equation}
  E=mc^2
  (\#eq:emc)
\end{equation}

```

其它

6 其它

三個以上的連續星號(*)產生一水平線:

三個以上的連續減號(-)產生一斷頁(Page Break):

> block quote 這裡是引用區塊

這是第一句話，以下有二列空白。

這是第二句話，上面有二列空白。

加一條灰色水平線(html碼):

```
235 <!--
236 ##########################################################
237 # 其它                                                   #
238 #                                                        #
239 ##########################################################
240 -->
241 # 其它
242
243
244 三個以上的連續星號(*)產生一水平線:
245
246 ******
247
248 三個以上的連續減號(-)產生一斷頁(Page Break):
249
250 ------
251
252
253 > block quote 這裡是引用區塊
254
255
256
257 這是第一句話，以下有二列空白。
258 <br><br/><br><br/>
259 這是第二句話，上面有二列空白。
260
261
262 加一條灰色水平線(html碼):
263 <hr style="border:1px solid gray"> </hr>
264
265
266 這是需要註解的一句話footnote ^[這裡是註解]
267
```

引用

這是需要註解的一句話Footnote [1]

7 引用

- 標題引用: Markdown Syntax 語法在第1章。
- 圖形引用: See Figure 4.1
- 表格引用: See Table 3.1
- 數學式引用: See Equation (5.1)

---

1. 這裡是註解↩

```
<!--
##########################################################
# 參考書目                                               #
#                                                        #
##########################################################
-->
# 引用

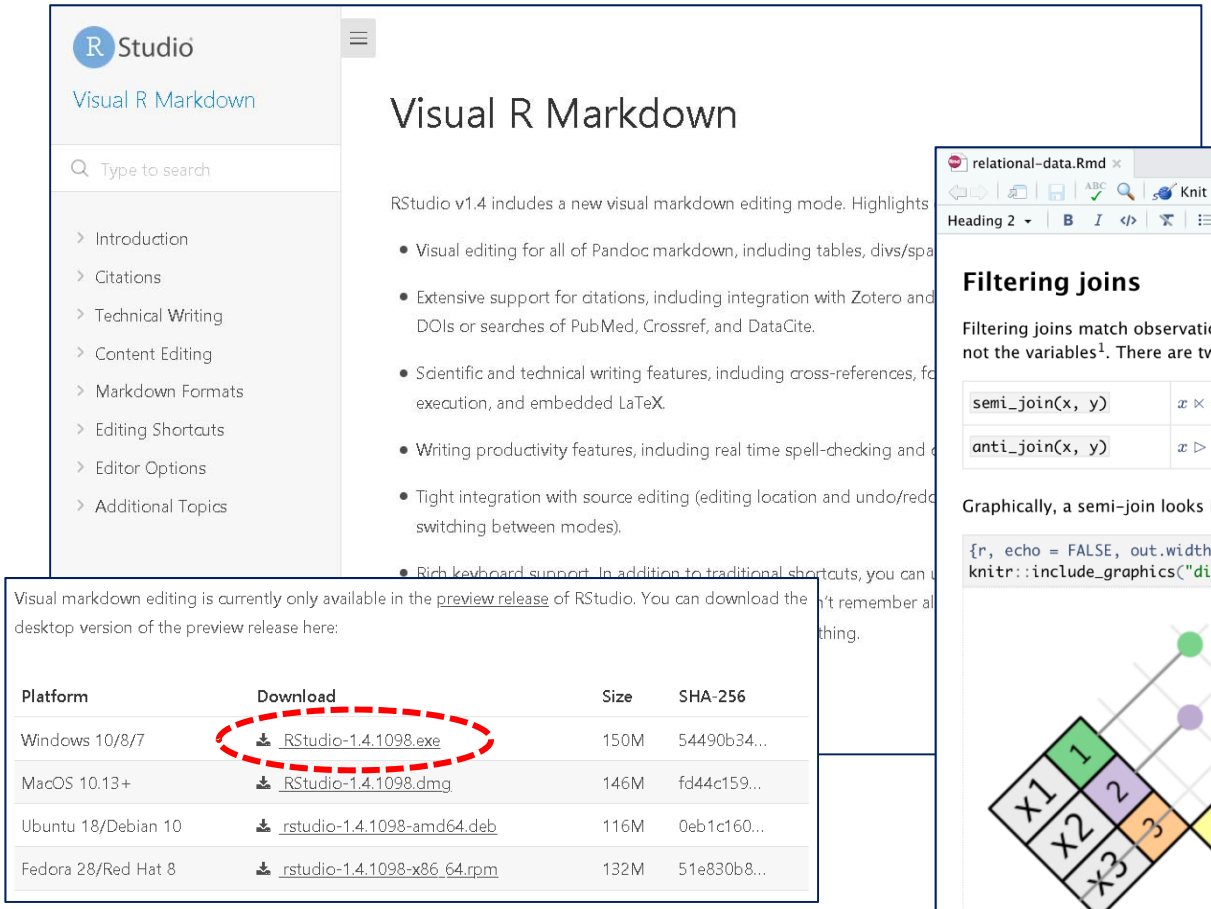
* 標題引用: Markdown Syntax 語法在第\@ref(Syntax)章。
* 圖形引用: See Figure \@ref(fig:iris-plot)
* 表格引用: See Table \@ref(tab:airquality)
* 數學式引用: See Equation \@ref(eq:matrix)

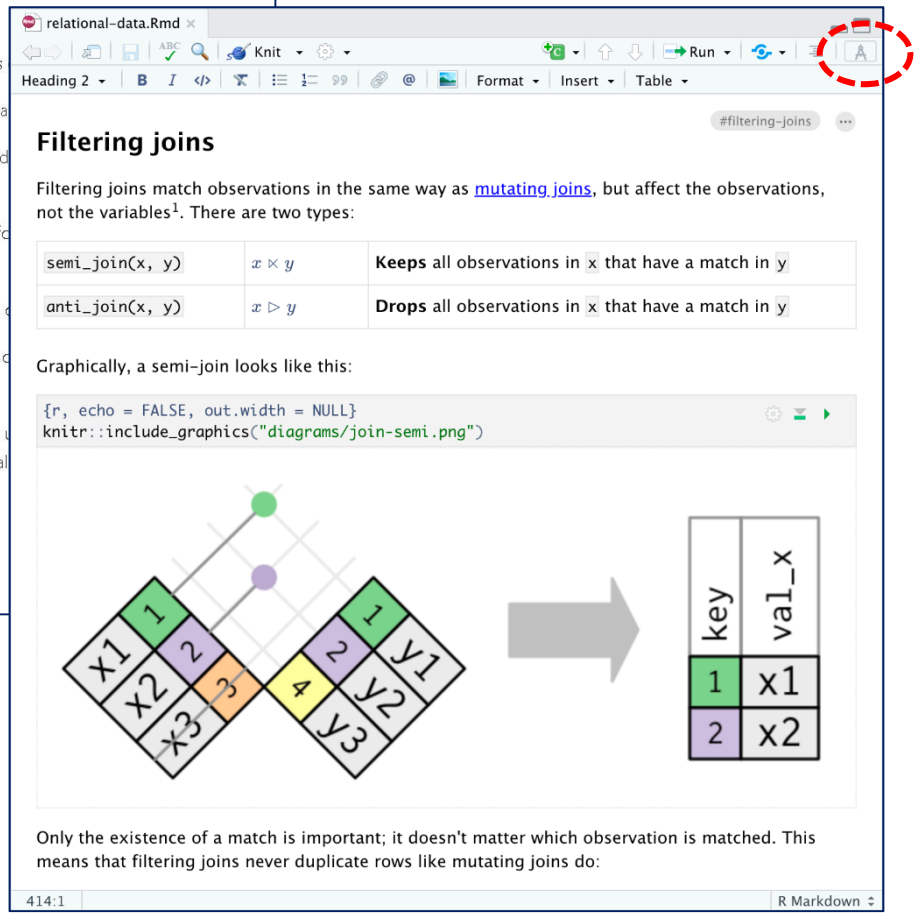
```

Visual Markdown Editing

https://rstudio.github.io/visual-markdown-editing

source or visual mode.





RStudio Desktop 1.3.1093

2021/01/07

pagedreport Package

- **pagedreport**: pagedreport is an R package to help you make beautiful PDF-based reports from RMarkdown.
- https://pagedreport.rfortherestofus.com/
- https://rfortherestofus.com/2021/01/announcing-pagedreport/

```
remotes::install_github("rfortherestofus/pagedreport", ref = "main")
```

其它問題:

- 中文目錄問題
- 用R安裝，**install.packages("rmarkdown", depdnecies=T)**
- bookdown，ggplot2要裝
- miktex 若是選自已使用
- mac os: mactex
- PDF若不跑不順，可在表頭加「documentclass:ctexart」，可不用寫Latex到YAML。