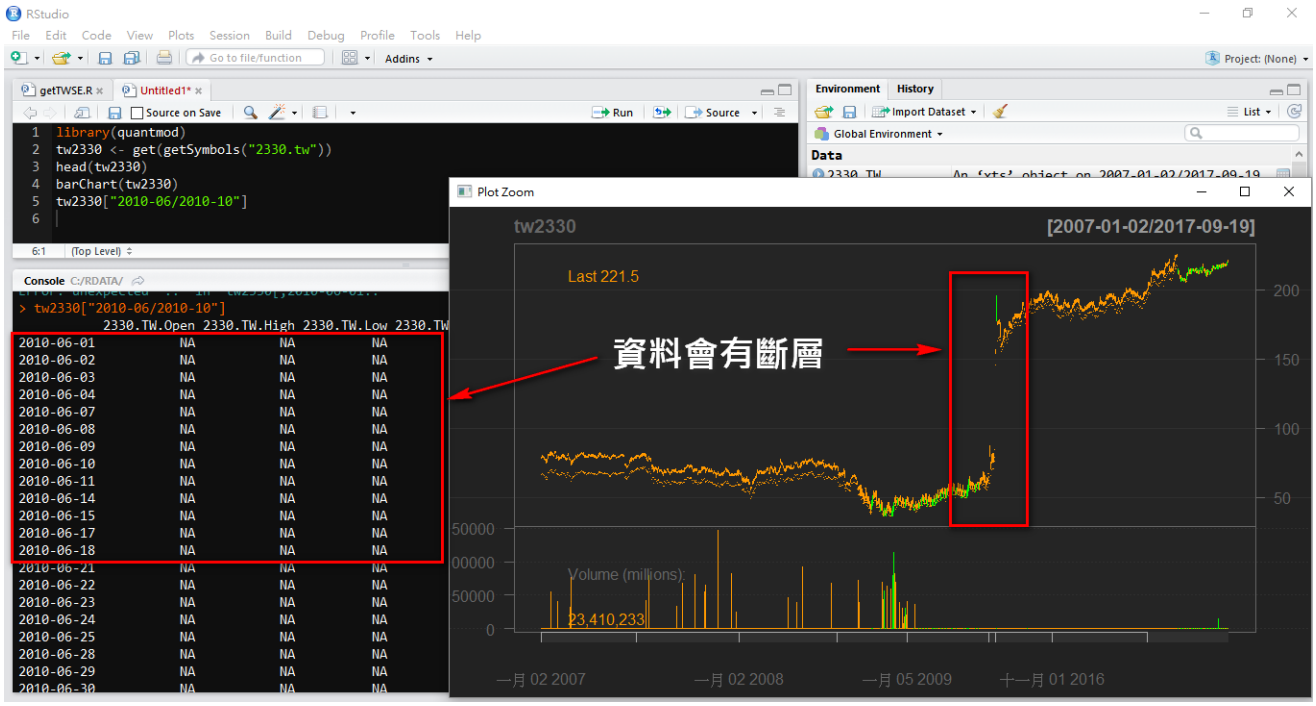
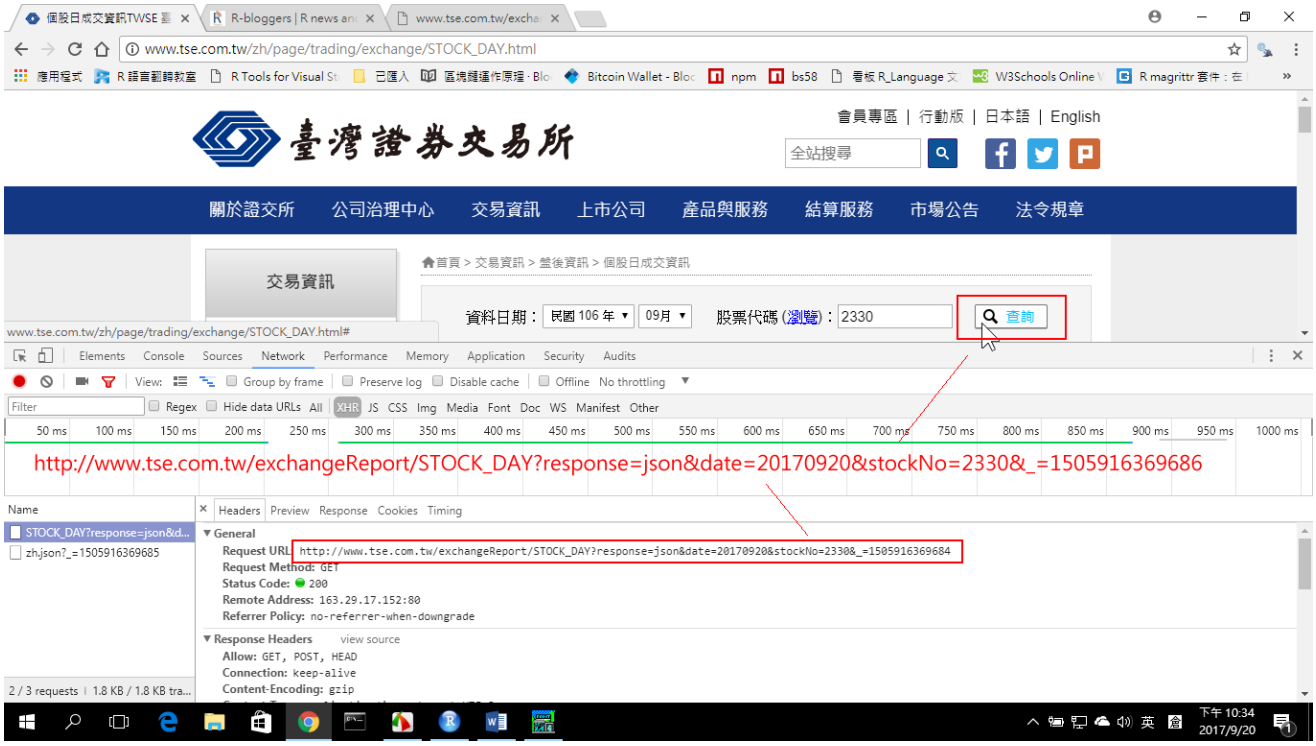
自己寫個 Function 抓證交所的股票資訊

金融上的套件: quantmod，可在 Yahoo finance、Googlefinance 等網站，下載公開數據進行分析，但對於台股而言，雖然可在 Yahoo finance 抓取，但有時資料並不完整。
以台積電(2330)為例，透過 getSymbols("2330.tw") 抓取回來的資料，發現有缺漏。



因此改抓台灣的證券交易所，就是我們的目標。
網路上有許多類似的方法，可抓取證交所的股票資料，在這裏我也嚐試自己寫一個 Function
首先是利用 Google Chrome 開啟證交所網頁，點[交易資訊] -> [盤後資訊] -> [個股日成交資訊]

按下 F12，可進入開發人員工具模式，有利我們觀查網頁的運作，以下圖為例
當按下[查詢]後，可發現網頁以 GET 方式，送出一串 URL，仔細觀查可發現 URL 中帶有個參數，其中 respons=json，代表回傳格式為 JSON，date=20170920，代表查詢日期，實測結果發現，日期的最後 2 碼並不影響查詢結果，即 date=20170901 與 date=20170920 查回來的結果是相同的，稍後的自訂函數中，天數統一用 01，stockNo=2330 為股票代號，最後一個參數 _=1505916369686，為時間戳記，隨時間變動。



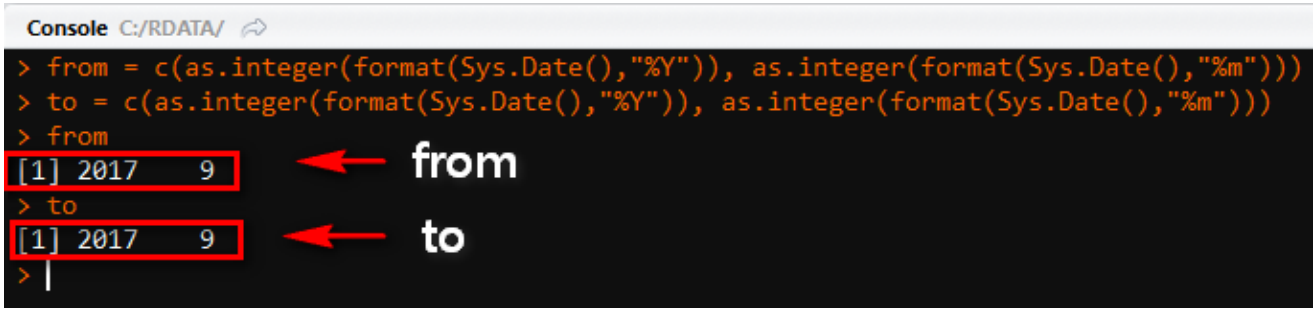
回傳 JSON

有了上述的基本觀念，將有利於 Function 的寫作。

函數：getTWSE(stockNo, from = c(year, month), to = c(year, month))，預設有 3 個參數，皆帶有預設值；當呼叫函數而未帶參數時，系統會用預設值當查詢條件。
stockNo = “2330”，預設為台積電(2330)

```r
# ============================================================================================
getTWSE <- function(stockNo = "2330",
                    from = c(as.integer(format(Sys.Date(),"%Y")), as.integer(format(Sys.Date(),"%m"))),
                    to = c(as.integer(format(Sys.Date(),"%Y")), as.integer(format(Sys.Date(),"%m")))) {
```

From、to，若未輸入，預設為查詢當下年月，如下圖



行 43~49，主要是檢查 RStudio 是否已載入 jsonlite、xts 套件，未載入則印出訊息並中斷 Function，也可以改寫成未載入，則自動安裝載入套件

```r
    # ============================================================================================
    # Using this function, you must library(jsonlite)、library(xts)
    # ============================================================================================
    packages <- gsub("package:", replacement = "", search())
    if (!("jsonlite" %in% packages)){
        print("Error: The 'jsonlite' package has not been loaded.")
        return(NULL)
    } else if (!("xts" %in% packages)){
        print("Error: The 'xts' package has not been loaded.")
        return(NULL)
    }
```

改為偵測到未載入則進行安裝及載入動作

```r
# ============================================================================================
# Using this function, you must install.packages("jsonlite") and library(jsonlite)
# ============================================================================================
packages <- gsub("package:", replacement = "", search())
if (!("jsonlite" %in% packages)){
  install.packages("jsonlite")
  library(jsonlite)
}
```

安裝並載入

行 65~68，判斷 from 及 to 的內容，若僅有年度，則補上月份

```r
    # ============================================================================================
    # parameter check & parse
    # ============================================================================================
    if (from[1] > to[1]){
        print("The starting year is greater than the deadline.")
        return(NULL)
    }
    nowYear <- as.integer(format(Sys.Date(),"%Y"))
    nowMonth <- as.integer(format(Sys.Date(),"%m"))
    MM <- c("01", "02", "03", "04", "05", "06", "07", "08", "09", "10", "11", "12")
    queryDate <- NULL
    historyStock <- NULL
    startYM <- from
    endYM <- to
    if (length(startYM) == 1) startYM <- c(startYM, 1)
    if (length(endYM) == 1){
        ifelse (endYM[1] == nowYear, endYM <- c(endYM, nowMonth), endYM <- c(endYM, 12))
    }
    if (startYM[2] < 1 | startYM[2] > 12 | endYM[2] < 1 | endYM[2] > 12){
        print("Month must be between 1 ~ 12.")
        return(NULL)
    }
```

當from只有年, 補為c(年, 1)
當to只有年, 判斷是否為當下, 是->c(年, 當下月), 否->c(年, 12)

行 84~96，計算出查詢區間的明細，待會組 URL 時，參數 date 的內容

```
83      # ============================================================================================
84      if (startYM[1] == endYM[1]) {
85          queryDate <- paste0(startYM[1], MM[startYM[2]:endYM[2]], "01")
86      } else if ((endYM[1] - startYM[1]) == 1) {
87          queryDate <- c(paste0(startYM[1], MM[startYM[2]:12], "01"),
88                         paste0(endYM[1], MM[1:endYM[2]], "01"))
89      } else {
90          tmpY <- c((startYM[1]+1):(endYM[1]-1))
91          queryDate <- paste0(startYM[1], MM[startYM[2]:12], "01")
92          for (tY in tmpY){
93              queryDate <- c(QueryDate, paste0(tY, MM, "01"))
94          }
95          queryDate <- c(QueryDate, paste0(endYM[1], MM[1:endYM[2]], "01"))
96      }
```

行 102，組查詢網址，傳入 4 個參數；行 104，真正到證交所抓資料，判斷回傳的 JSON，取 stat=OK 的資料，組 OHLC 格式(Open, High, Low, Close)

```
97      # ============================================================================================
98      # to TWSE get History Stock
99      # ============================================================================================
100     for (qyDate in queryDate){
101         ttime <- as.character(as.integer(as.POSIXct(Sys.time()))*100)
102         twseUrl <- paste0(url, "response=", response, "&date=", qyDate, "&stockNo=", stockNo,
103                           "&_=", ttime)
104         jsonData <- fromJSON(twseUrl, flatten = TRUE)
105         if (jsonData$stat == "OK"){
106             tmpStock <- data.frame(jsonData$data[, 1],
107                                    jsonData$data[, 4:7],
108                                    jsonData$data[, 2:3],
109                                    stringsAsFactors = FALSE)
110             historyStock <- rbind(historyStock, tmpStock)
111         }
112     }
```

組查詢網址

讀取JSON

將資料組成OHLC格式

合併查詢結果

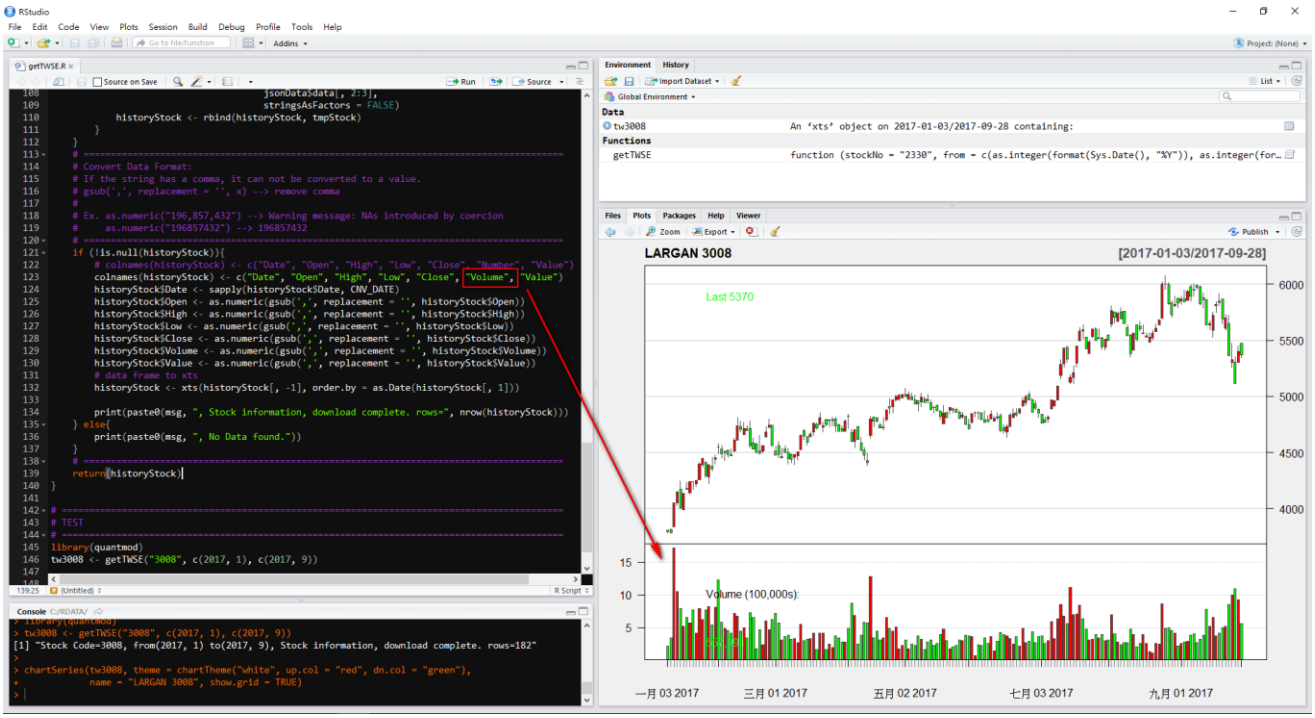
行 121~130，資料格式轉換，行 124，利用自訂函數 CNV_DATE()，透過 sapply 函數將民國年轉為西元年，行 125~130，則是將 string 轉為 number，因為含千分號(,)，故先要濾掉，行 132，將 data frame 轉為 xts 格式

```
120     # ============================================================================================
121     if (!is.null(historyStock)){
122         # colnames(historyStock) <- c("Date", "Open", "High", "Low", "Close", "Number", "Value")
123         colnames(historyStock) <- c("Date", "Open", "High", "Low", "Close", "Volume", "Value")
124         historyStock$Date <- sapply(historyStock$Date, CNV_DATE)
125         historyStock$Open <- as.numeric(gsub(',', replacement = '', historyStock$Open))
126         historyStock$High <- as.numeric(gsub(',', replacement = '', historyStock$High))
127         historyStock$Low <- as.numeric(gsub(',', replacement = '', historyStock$Low))
128         historyStock$Close <- as.numeric(gsub(',', replacement = '', historyStock$Close))
129         historyStock$Volume <- as.numeric(gsub(',', replacement = '', historyStock$Volume))
130         historyStock$Value <- as.numeric(gsub(',', replacement = '', historyStock$Value))
131         # data frame to xts
132         historyStock <- xts(historyStock[, -1], order.by = as.Date(historyStock[, 1]))
133
134         print(paste0(msg, ", Stock information, download complete. rows=", nrow(historyStock)))
135     } else{
136         print(paste0(msg, ", No Data found."))
137     }
138     # ============================================================================================
139     return(historyStock)
140 }
```

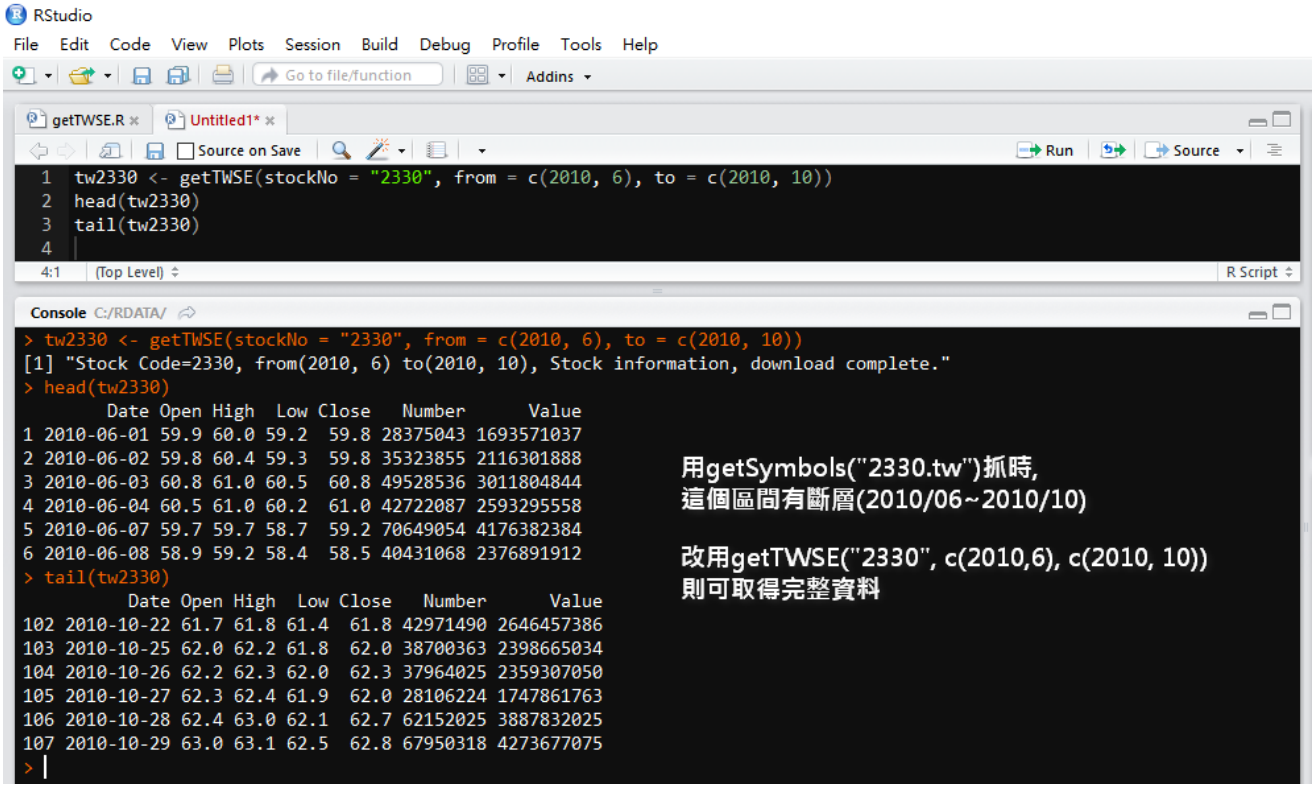
利用自訂函數, 將民國年轉為西元年

轉xts

修正: 行 123, 設定 colnames 時, 為了能在 chartSeries 畫出正確的圖形, 在資料集中定要有一個 Column 叫"Volume", 圖形才會完整。



驗測結果如下圖，原來用 getSymbols 抓取為斷層的部份，改用 getTWSE 可正常取得資料。



完整程式，請至 GitHub 下載

GitHub: https://github.com/dong945/R

完整程式碼

```
# ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
# Author: TUNG-SHENG, CHEN
# DATE:     2017/09/26
# Package: jsonlite, xts
# ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
# install.packages(c("jsonlite", "xts"))
library(jsonlite)
library(xts)
# ================================================================================================
# Parameter:
#     stockNo: String, Stock code of TWSE, default: 2330 (TSMC)
#     from:       Vector, c(year, month), default: now
#     to:         Vector, c(year, month), default: now
# Examples:
#     ## return '2330', this month
#     getTWSE()
#
#     ## return '2330', from 2016/01 ~ now
#     getTWSE("2330", 2016)
#
#     ## return '2330', from 2015/01 ~ 2016/12
#     getTWSE("2330", 2015, 2016)
#
#     ## return '2330', from 2015/06 ~ 2017/03
#     getTWSE("2330", c(2105, 6), c(2017, 3))
# ================================================================================================
```

```
getTWSE <- function(stockNo = "2330",
                    from = c(as.integer(format(Sys.Date(),"%Y")), as.integer(format(Sys.Date(),"%m"))),
                    to = c(as.integer(format(Sys.Date(),"%Y")), as.integer(format(Sys.Date(),"%m")))) {
  # ============================================================================================
  # Inside Function: Change Date to yyyy-mm-dd
  # ============================================================================================
  CNV_DATE <- function(x){
    TMP <- strsplit(x, split = "/")
    paste(as.integer(TMP[[1]][1])+1911, TMP[[1]][2], TMP[[1]][3], sep = "-")
  }
  # ============================================================================================
  response <- "json"
  url <- "http://www.tse.com.tw/exchangeReport/STOCK_DAY?"
  # ============================================================================================
  # Using this function, you must library(jsonlite) 、library(xts)
  # ============================================================================================
  packages <- gsub("package:", replacement = "", search())
  if (!("jsonlite" %in% packages)){
    print("Error: The 'jsonlite' package has not been loaded.")
    return(NULL)
  } else if (!("xts" %in% packages)){
    print("Error: The 'xts' package has not been loaded.")
    return(NULL)
  }
  # ============================================================================================
  # parameter check & parse
  # ============================================================================================
```

```
if (from[1] > to[1]){
        print("The starting year is greater than the deadline.")
        return(NULL)
}
nowYear <- as.integer(format(Sys.Date(),"%Y"))
nowMonth <- as.integer(format(Sys.Date(),"%m"))
MM <- c("01", "02", "03", "04", "05", "06", "07", "08", "09", "10", "11", "12")
queryDate <- NULL
historyStock <- NULL
startYM <- from
endYM <- to
if (length(startYM) == 1) startYM <- c(startYM, 1)
if (length(endYM) == 1){
        ifelse (endYM[1] == nowYear, endYM <- c(endYM, nowMonth), endYM <- c(endYM, 12))
}
# Check
if (startYM[2] < 1 | startYM[2] > 12 | endYM[2] < 1 | endYM[2] > 12){
        print("Month must be between 1 ~ 12.")
        return(NULL)
} else if (startYM[1] > endYM[1]) {
    print("Start year is greater than the End year.")
    return(NULL)
} else if ((startYM[1] == endYM[1]) & (startYM[2] > endYM[2])) {
    print("Start month is greater than the End month.")
    return(NULL)
}
msg <- paste0("Stock Code=", stockNo,
```

```
                ", from(", startYM[1], ", ", startYM[2], ")",
                " to(", endYM[1], ", ", endYM[2], ")")
# ================================================================================
if (startYM[1] == endYM[1]) {
    queryDate <- paste0(startYM[1], MM[startYM[2]:endYM[2]], "01")
} else if ((endYM[1] - startYM[1]) == 1) {
    queryDate <- c(paste0(startYM[1], MM[startYM[2]:12], "01"),
                   paste0(endYM[1], MM[1:endYM[2]], "01"))
} else {
    tmpY <- c((startYM[1]+1):(endYM[1]-1))
    queryDate <- paste0(startYM[1], MM[startYM[2]:12], "01")
    for (tY in tmpY){
        queryDate <- c(QueryDate, paste0(tY, MM, "01"))
    }
    queryDate <- c(QueryDate, paste0(endYM[1], MM[1:endYM[2]], "01"))
}
# ================================================================================
# to TWSE get History Stock
# ================================================================================
for (qyDate in queryDate){
    ttime <- as.character(as.integer(as.POSIXct(Sys.time()))*100)
    twseUrl <- paste0(url, "response=", response, "&date=", qyDate, "&stockNo=", stockNo,
                      "&_=", ttime)
    jsonData <- fromJSON(twseUrl, flatten = TRUE)
    if (jsonData$stat == "OK"){
        tmpStock <- data.frame(jsonData$data[, 1],
                               jsonData$data[, 4:7],
```

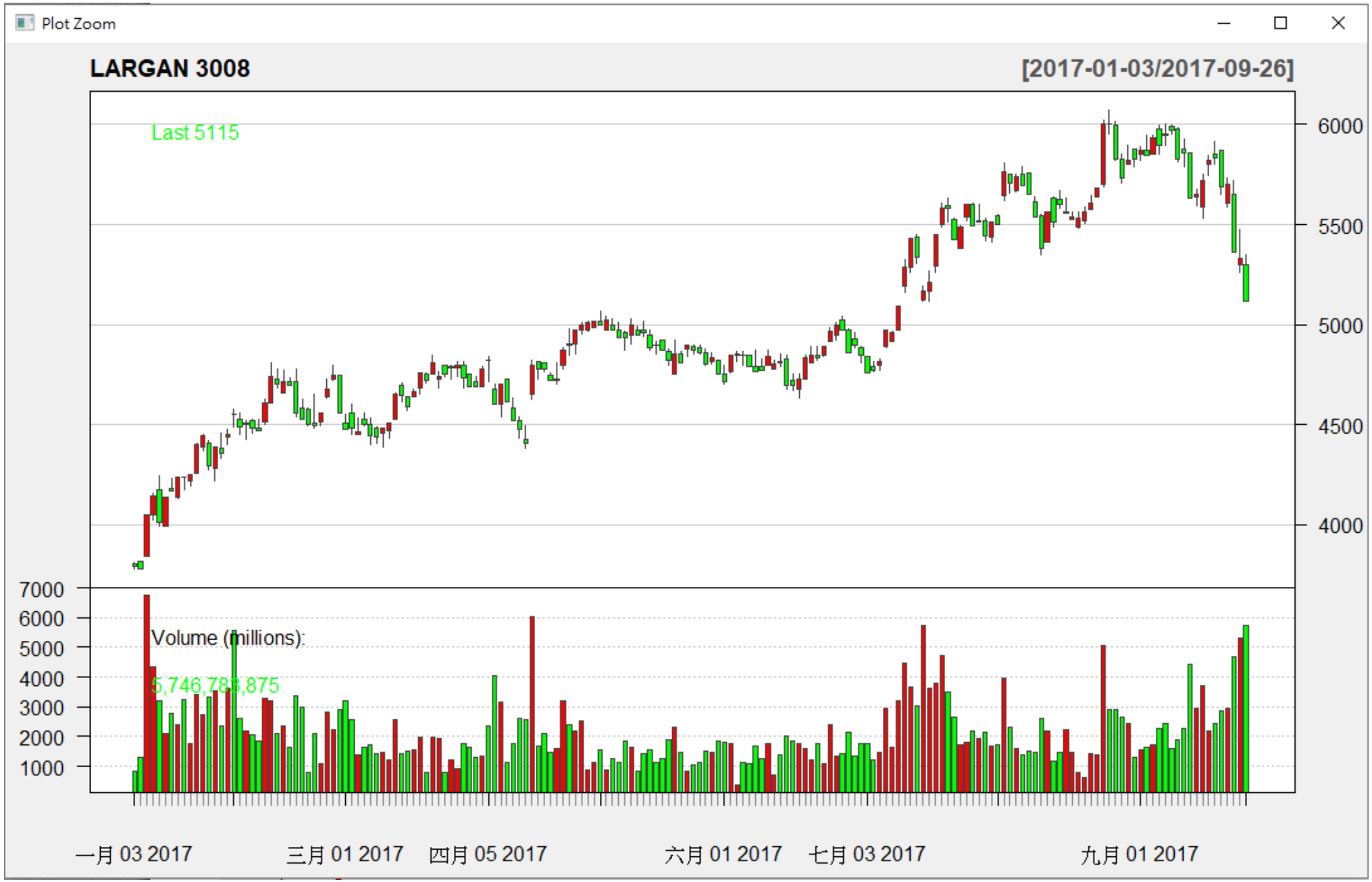
```
                                                jsonData$data[, 2:3],
                                                stringsAsFactors = FALSE)
            historyStock <- rbind(historyStock, tmpStock)
        }
}
# ================================================================================
# Convert Data Format:
# If the string has a comma, it can not be converted to a value.
# gsub(',', replacement = '', x) --> remove comma
#
# Ex. as.numeric("196,857,432") --> Warning message: NAs introduced by coercion
#         as.numeric("196857432") --> 196857432
# ================================================================================
if (!is.null(historyStock)){
        # colnames(historyStock) <- c("Date", "Open", "High", "Low", "Close", "Number", "Value")
        colnames(historyStock) <- c("Date", "Open", "High", "Low", "Close", "Volume", "Value")
        historyStock$Date <- sapply(historyStock$Date, CNV_DATE)
        historyStock$Open <- as.numeric(gsub(',', replacement = '', historyStock$Open))
        historyStock$High <- as.numeric(gsub(',', replacement = '', historyStock$High))
        historyStock$Low <- as.numeric(gsub(',', replacement = '', historyStock$Low))
        historyStock$Close <- as.numeric(gsub(',', replacement = '', historyStock$Close))
        historyStock$Volume <- as.numeric(gsub(',', replacement = '', historyStock$Volume))
        historyStock$Value <- as.numeric(gsub(',', replacement = '', historyStock$Value))
        # data frame to xts
        historyStock <- xts(historyStock[, -1], order.by = as.Date(historyStock[, 1]))

        print(paste0(msg, '', Stock information, download complete. rows='', nrow(historyStock)))
```

```
    } else{
        print(paste0(msg, '', No Data found.''))
    }
    # ================================================================================
    return(historyStock)
}

# ================================================================================
# TEST
# ================================================================================
library(quantmod)
tw3008 <- getTWSE("3008", c(2017, 1), c(2017, 9))

chartSeries(tw3008, theme = chartTheme("white", up.col = "red", dn.col = "green"),
                name = "LARGAN 3008", show.grid = TRUE)
```


Plot Zoom
LARGAN 3008
[2017-01-03/2017-09-26]
Last 5115
6000
5500
5000
4500
4000
7000
6000
5000
4000
3000
2000
1000
Volume (millions):
5,746,783,875
一月 03 2017
三月 01 2017
四月 05 2017
六月 01 2017
七月 03 2017
九月 01 2017