Time Series Analysis in the Financial Market with R

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Analyzing the Financial Market

For this project we will analyze the financial market, more specifically the shares of Berkshire Hathaway Inc.s

Stage 1 - Import the libraries and getting the ticket

Here is the explanation for the library http://www.quantmod.com

```
library(quantmod)
library(xts)
library(moments)

# Selection of analysis period
startDate = as.Date("2023-01-01")
endDate = as.Date("2023-04-04")

# Download period data
# Note: Yahoo Finance is undergoing changes and the online quotes service may be unstable
getSymbols("BRKB.VI", src = "yahoo", from = startDate, to = endDate, auto.assign = T)
```

```
## [1] "BRKB.VI"
```

Stage 2 - Selecting the data properly

```
# Parsing the closing data
BRKB.VI.Close <- BRKB.VI[, 'BRKB.VI.Close']
is.xts(BRKB.VI.Close)
```
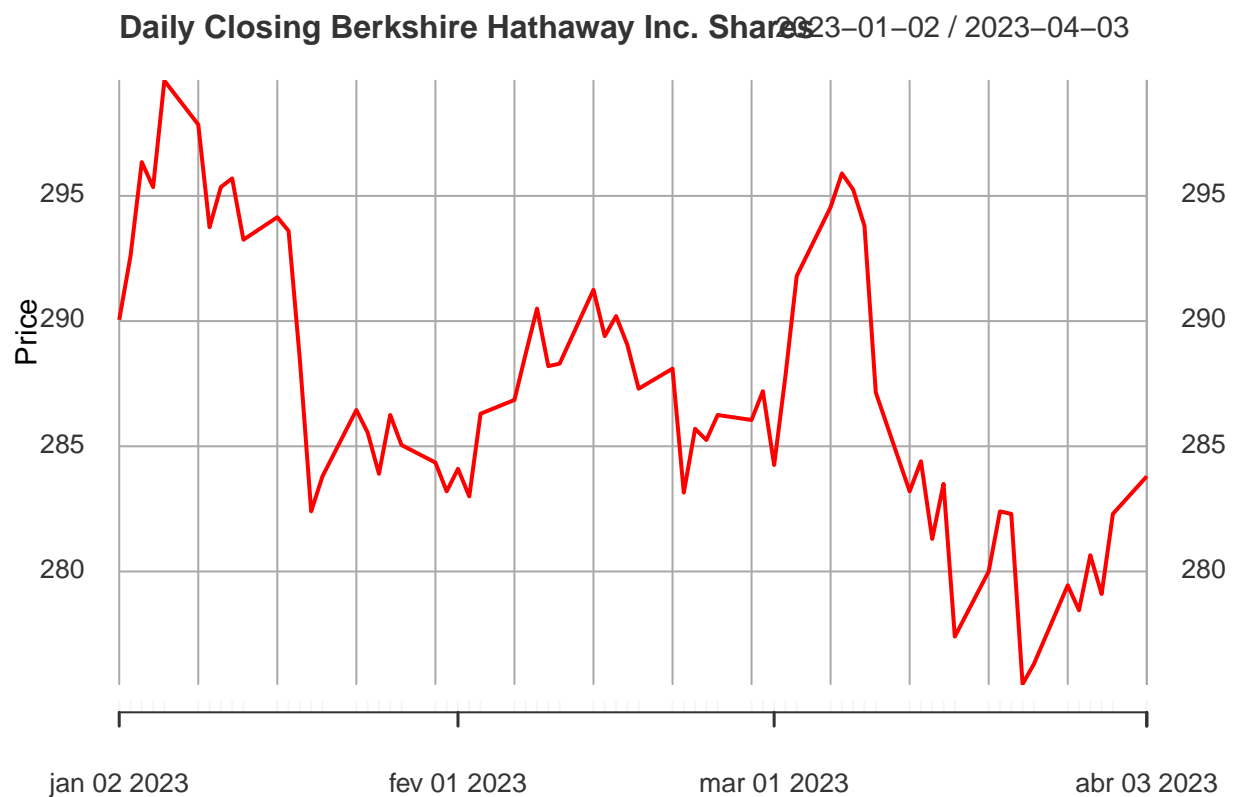
```
## [1] TRUE
```

```
head(Cl(BRKB.VI),5)
```

```
##            BRKB.VI.Close
## 2023-01-02        290.05
## 2023-01-03        292.60
## 2023-01-04        296.35
## 2023-01-05        295.35
## 2023-01-06        299.60
```

Stage 3 - Plot the charts

```
candleChart(BRKB.VI)
```



```
plot(BRKB.VI.Close, main = "Daily Closing Berkshire Hathaway Inc. Shares",
    col = "red", xlab = "Date", ylab = "Price", major.ticks = 'months',
    minor.ticks = FALSE)
```

Daily Closing Berkshire Hathaway Inc. Shares 2023−01−02 / 2023−04−03


```
# Added bollinger bands to the chart, with 20 period average and 2 deviations
# Bollinger Band
# Since the standard deviation is a measure of volatility,
# Bollinger Bands adjust to market conditions. more volatile markets,
# have the bands furthest from the mean, while less volatile markets have the
# stalls closest to the average
candleChart(BRKB.VI)
```

```
addBBands(n = 20, sd = 2)
```

```r
# Adding the ADX indicator, average 11 of the exponential type
addADX(n = 11, maType = "EMA")
```

```r
# Calculating daily logs
BRKB.VI.ret <- diff(log(BRKB.VI.Close), lag = 1)

# Remove NA values in transition 1
BRKB.VI.ret <- BRKB.VI.ret[-1]

# Plot the rate of return
plot(BRKB.VI.ret, main = "Daily Closing of Berkshire Hathaway Inc. Shares",
     col = "red", xlab = "Date", ylab = "Return", major.ticks = 'months',
     minor.ticks = FALSE)
```

Daily Closing of Berkshire Hathaway Inc. Shares 2023-01-03 / 2023-04-03
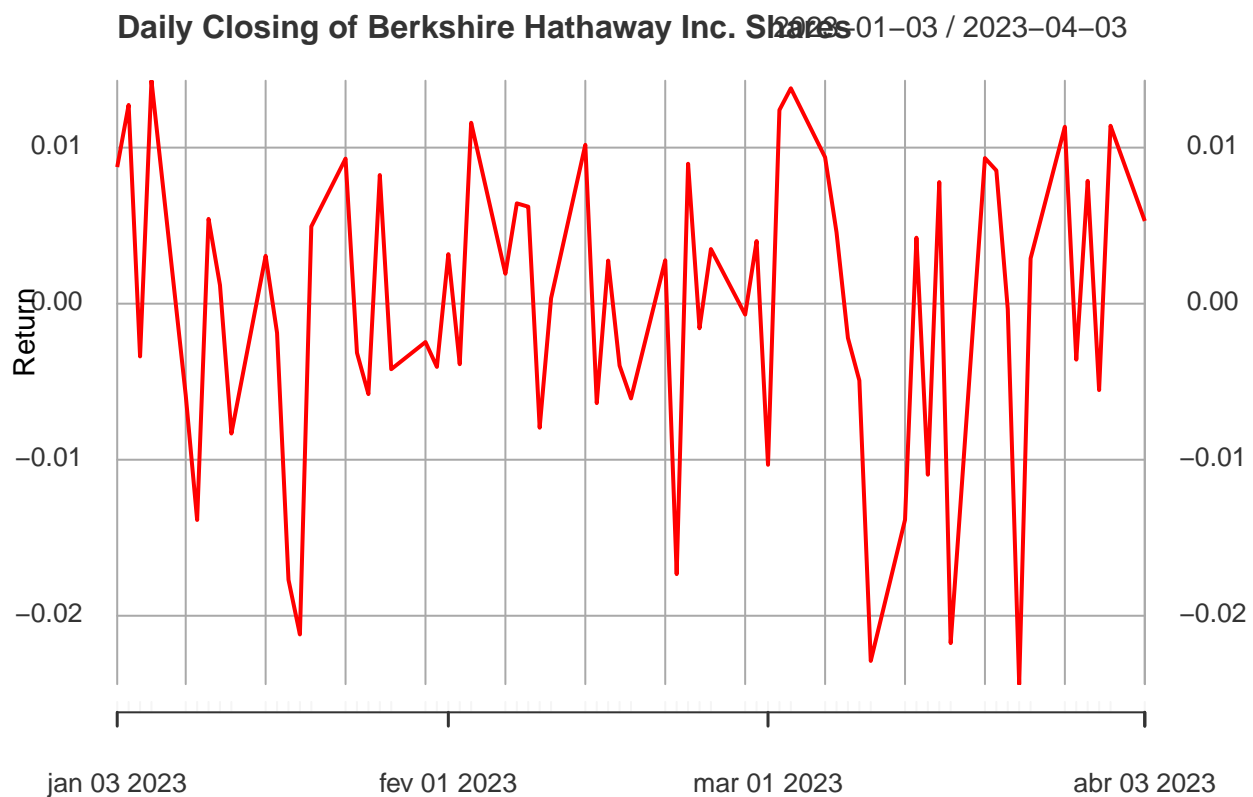
Stage 4 - Calculating some statistical measures

```
# Calculating some statistical measures
statNames <- c("Mean", "Standard Deviation", "Skewness", "Kurtosis")
BRKB.VI.stats <- c(mean(BRKB.VI.ret), sd(BRKB.VI.ret), skewness(BRKB.VI.ret), kurtosis(BRKB.VI.ret))
names(BRKB.VI.stats) <- statNames
BRKB.VI.stats
```

```
##               Mean Standard Deviation           Skewness           Kurtosis
##      -0.0003351317       0.0095803274      -0.7010818789       2.9240831030
```

Stage 5 - Saving the data

```
# Saving the data in a .rds file (R binary format file)
# getSymbols("BRKB.VI", src = 'yahoo')
saveRDS(BRKB.VI, file = "BRKB.VI.rds") # Save data in binary format
Ptr = readRDS("BRKB.VI.rds")
dir()
```

```
## [1] "BRKB.VI.rds"
## [2] "PETR4.SA.rds"
```

```
## [3] "Time-Series-Analysis-in-the-Financial-Market-Report.pdf"
## [4] "Time-Series-Analysis-in-the-Financial-Market-Report.Rmd"
## [5] "Time-Series-Analysis-in-the-Financial-Market-Report_files"
## [6] "Time Series Analysis in the Financial Market Report.Rmd"
## [7] "Time Series Analysis in the Financial Market.R"
```

```r
head(Ptr)
```

```
##            BRKB.VI.Open BRKB.VI.High BRKB.VI.Low BRKB.VI.Close BRKB.VI.Volume
## 2023-01-02       290.05       290.05      290.05        290.05              0
## 2023-01-03       292.70       297.25      292.60        292.60              8
## 2023-01-04       294.45       296.35      294.45        296.35              4
## 2023-01-05       295.35       295.35      295.35        295.35              0
## 2023-01-06       297.85       299.60      297.85        299.60              0
## 2023-01-09       299.00       299.00      297.85        297.85              0
##            BRKB.VI.Adjusted
## 2023-01-02           290.05
## 2023-01-03           292.60
## 2023-01-04           296.35
## 2023-01-05           295.35
## 2023-01-06           299.60
## 2023-01-09           297.85
```

Disclaimer:

```
## Disclaimer: a good part of this project was largely done in the Data Science Academy,
## Big Data Analytics with R and Microsoft Azure Machine Learning course
## (part of the Data Scientist training)
```

End