Risk assessment

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This study is about assessing the risk involved on investing in some virtual currencies suck as: bitcoin, etherium and dogecoin

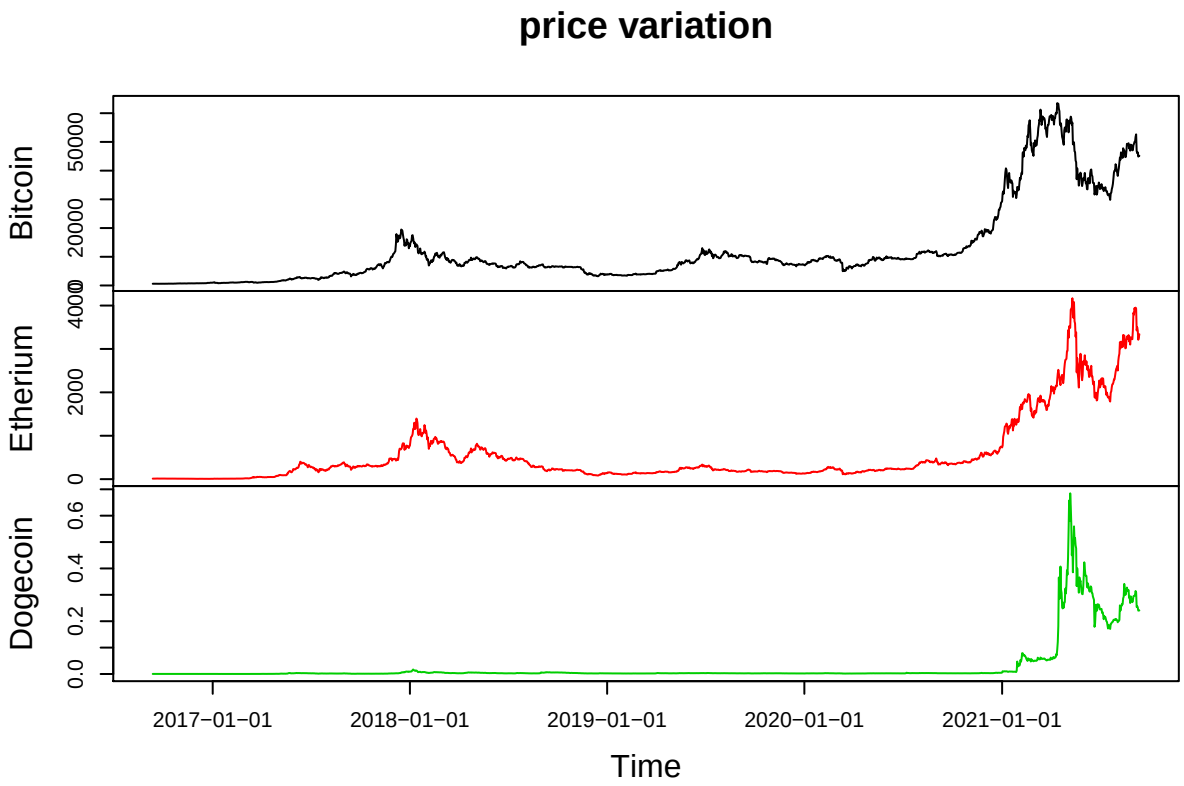
Loading data into R

EDA

```
## Loading required package: cccp
## Loading required package: Rglpk
## Loading required package: slam
## Using the GLPK callable library version 4.65
## Loading required package: timeSeries
## Loading required package: timeDate
## Financial Risk Modelling and Portfolio Optimisation with R (version 0.4-1)
## spec_tbl_df [1,827 x 7] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ Date     : Date[1:1827], format: "2016-09-12" "2016-09-13" ...
##  $ Open     : num [1:1827] 607 608 609 611 607 ...
##  $ High     : num [1:1827] 608 611 612 611 609 ...
##  $ Low      : num [1:1827] 605 607 608 607 607 ...
##  $ Close    : num [1:1827] 608 609 611 607 607 ...
##  $ Adj Close: num [1:1827] 608 609 611 607 607 ...
##  $ Volume   : num [1:1827] 72812304 86920600 47877700 59464600 64963400 ...
##  - attr(*, "problems")= tibble [24 x 5] (S3: tbl_df/tbl/data.frame)
##   ..$ row     : int [1:24] 1314 1314 1314 1314 1314 1314 1489 1489 1489 1489 ...
##   ..$ col     : chr [1:24] "Open" "High" "Low" "Close" ...
##   ..$ expected: chr [1:24] "a double" "a double" "a double" "a double" ...
##   ..$ actual  : chr [1:24] "null" "null" "null" "null" ...
##   ..$ file    : chr [1:24] "'~/Downloads/BTC.csv'" "'~/Downloads/BTC.csv'" "'~/Downloads/BTC.csv'" "
##  - attr(*, "spec")=
##   .. cols(
##   ..   Date = col_date(format = ""),
##   ..   Open = col_double(),
##   ..   High = col_double(),
##   ..   Low = col_double(),
##   ..   Close = col_double(),
##   ..   `Adj Close` = col_double(),
##   ..   Volume = col_double()
##   .. )
```

```
## [1] 0
```

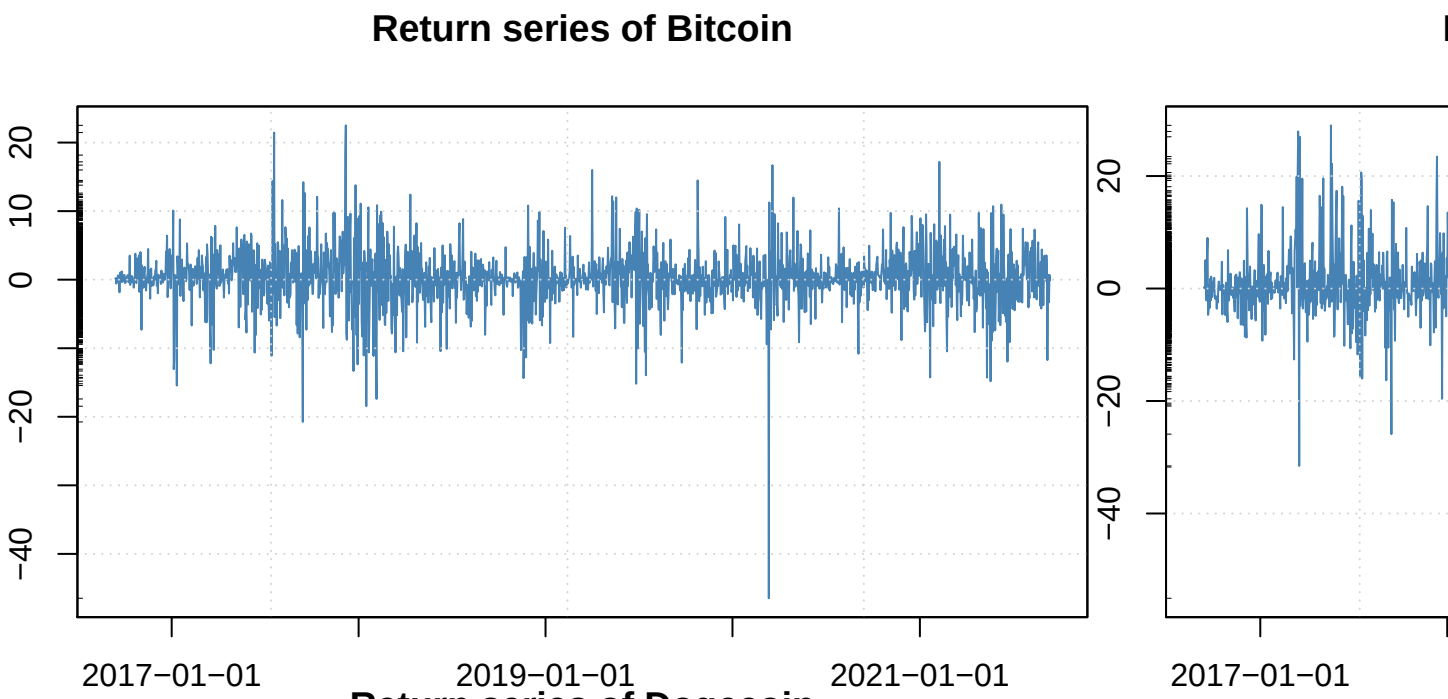
```
## [1] 1823
```

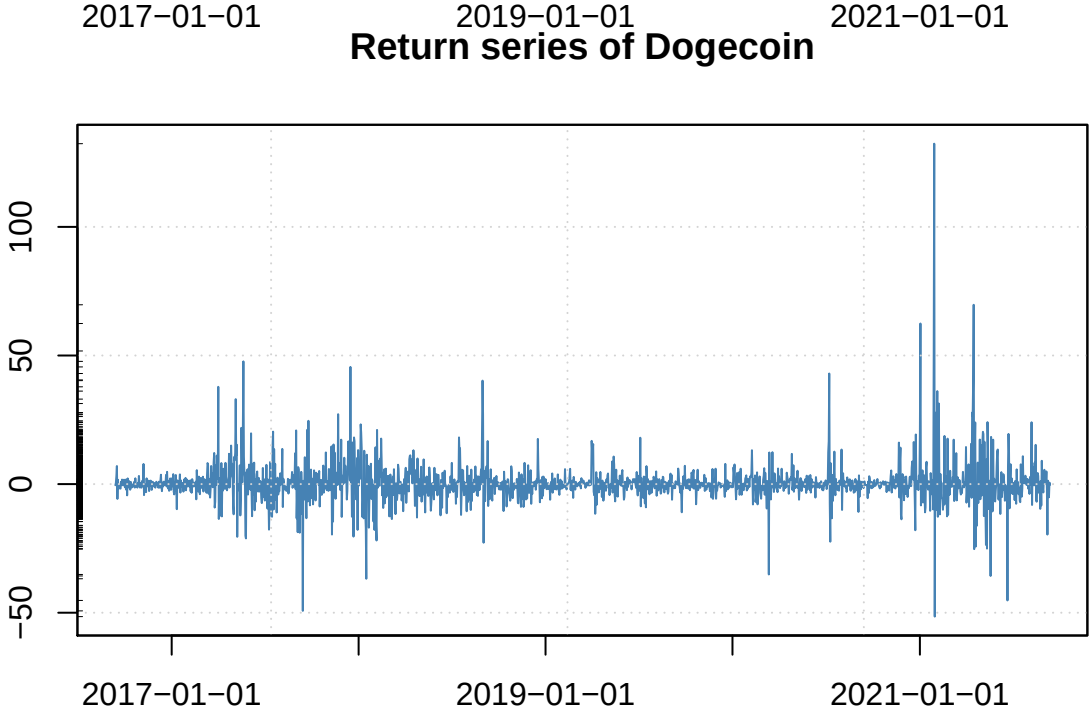


The historical dataset represent the daily prices of bitcoin, etherium and dogecoin obtained from yahoo finance https://finance.yahoo.com/quote/DOGE-USD/history?period1=1473638400&period2=1631404800&interval=1d&filter=history&frequency=1d&includeAdjustedClose=true, ranging from September 12, 2016 to September 12, 2021. We have only considered the "Adjusted close" prices.

Return series

```
##  num [1:1823] 608 609 611 607 607 ...
##  - attr(*, "time")= Date[1:1823], format: "2016-09-12" "2016-09-13" ...
```





Average rate of return of all three coins

```
ERb<-mean(BTCRet, na.rm = T)
ERd<-mean(DOGRet, na.rm = T)
ERe<-mean(ETHRet, na.rm = T)
c(ERb,ERd,ERe)
```

```
## [1] 0.2364199 0.3826031 0.3094141
```

Dogecoin has a higher return over bitcoin and etherium.

Risk of each Coin Measured as Standard Deviation & return per risk

```
## [1] 4.165947 8.104087 5.622477
```

```
## [1] 0.05675058 0.04721114 0.05503164
```

It's more risky to invest on dodgecoin than etherium and bitcoin.

So bitcoin is better assets to invest on based on return over risk.

Risk of a portfolio of 3 assets made up of Bitcoin, Etherium, Dogecoin.

Proportion (%) to invest on each asset for a Global Minimum Variance Portfolio (PGMV)

```
##    BTCRet    ETHRet    DOGRet
## 89.382127  8.069529  2.548345
```

For a portfolio of the 3 currencies with global minimum variance, the Expected return would be (ERp=0.25) and the Risk would be (Risk=4.167) and a value at risk of (VaR=6.85)

Proportion (%) to invest on each asset for an equal risk contributed portfolio (PERC)

```
##   BTCRet   ETHRet   DOGRet
## 43.23058 32.41156 24.35786
```

For a portfolio of the 3 currencies with an equal risk contributed portfolio (PERC), the Expected return would be (ERp=0.30) and the Risk would be (Risk=4.78) and value at risk of (VaR=7.86)