Macro Project: Blizzard Stock

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tid
```

```
## v ggplot2 3.3.5     v purrr   0.3.4
## v tibble  3.1.5     v dplyr   1.0.7
## v tidyr   1.1.4     v stringr 1.4.0
## v readr   2.0.2     v forcats 0.5.1
```

```
## -- Conflicts ------------------------------------------ tidyverse
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(dplyr)
library(ggplot2)
library(prettydoc)
library(quantmod)
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
```

```
##     as.Date, as.Date.numeric
```

```
##
## Attaching package: 'xts'
```

```
## The following objects are masked from 'package:dplyr':
##
##     first, last
```

```
## Loading required package: TTR
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
library(scales)
```

```
##
## Attaching package: 'scales'
```

```
## The following object is masked from 'package:purrr':
##
##     discard
```

```
## The following object is masked from 'package:readr':
##
##     col_factor
```

```
library(gridExtra)
```

```
##
## Attaching package: 'gridExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     combine
```

This data consists of opens, closes, volumes, adjusted closes, from 2017 - 2022. Need to adjust data to work for regression as linear regression cannot directly take time-series data.

```
ATVI_Data <- read.csv("BlizzardStocks_5Y.csv")
ATVI_Data <- ATVI_Data %>% mutate(id = row_number())
ATVI_Data$Date <- as.Date(ATVI_Data$Date)

glimpse(ATVI_Data)
```

```
## Rows: 1,259
## Columns: 8
## $ Date      <date> 2017-03-31, 2017-04-03, 2017-04-04, 2017-04-05
## $ Open      <dbl> 50.02, 49.86, 49.37, 49.19, 49.19, 49.30, 49.50
## $ High      <dbl> 50.09, 50.07, 49.50, 49.75, 49.39, 49.72, 49.64
## $ Low       <dbl> 49.61, 49.25, 48.88, 48.86, 48.95, 49.22, 48.87
## $ Close     <dbl> 49.86, 49.53, 49.04, 49.20, 49.36, 49.61, 49.04
## $ Adj.Close <dbl> 48.65189, 48.32988, 47.85175, 48.00787, 48.1640
## $ Volume    <int> 6801700, 4992200, 5724900, 4606900, 3412100, 40
## $ id        <int> 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
```

```
summary(ATVI_Data)
```

```
##       Date                 Open             High              Low
##  Min.   :2017-03-31   Min.   : 40.34   Min.   : 42.00   Min.   :
##  1st Qu.:2018-06-30   1st Qu.: 56.38   1st Qu.: 57.47   1st Qu.:
##  Median :2019-10-01   Median : 66.99   Median : 67.67   Median :
##  Mean   :2019-09-30   Mean   : 68.24   Mean   : 69.06   Mean   :
##  3rd Qu.:2020-12-29   3rd Qu.: 79.61   3rd Qu.: 80.56   3rd Qu.:
##  Max.   :2022-03-30   Max.   :103.82   Max.   :104.53   Max.   :1
##      Close          Adj.Close          Volume                id
##  Min.   : 40.11   Min.   : 39.34   Min.   :  1562900   Min.   :
```

```
##  1st Qu.: 56.44   1st Qu.: 55.40   1st Qu.:  5032900   1st Qu.: 3
##  Median : 66.82   Median : 66.33   Median :  6460100   Median : 6
##  Mean   : 68.19   Mean   : 67.45   Mean   :  7713082   Mean   : 6
##  3rd Qu.: 79.57   3rd Qu.: 79.10   3rd Qu.:  8887350   3rd Qu.: 9
##  Max.   :103.81   Max.   :103.31   Max.   :120192800   Max.   :12
```

This data starts at 2017-03-31 and ends 2022-03-30

```
min(ATVI_Data$Date)
```

```
## [1] "2017-03-31"
```

```
max(ATVI_Data$Date)
```

```
## [1] "2022-03-30"
```

Linear Regression

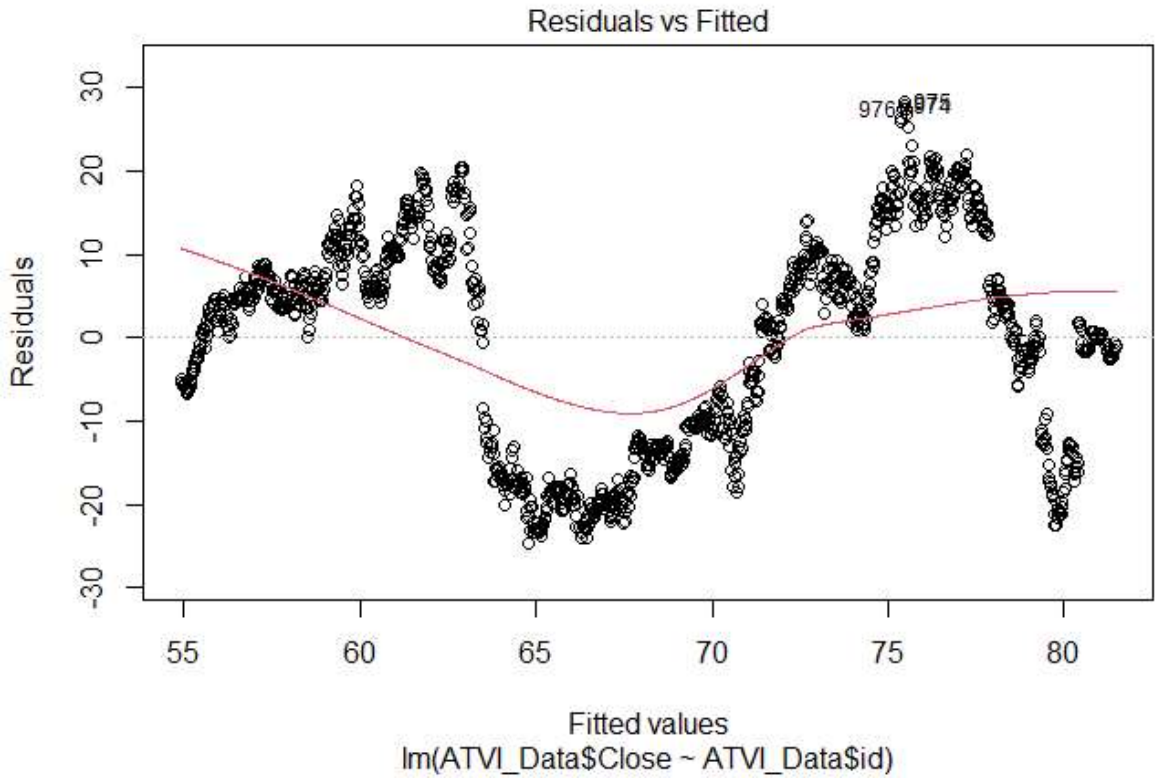
Looking at monthly close prices vs the time index

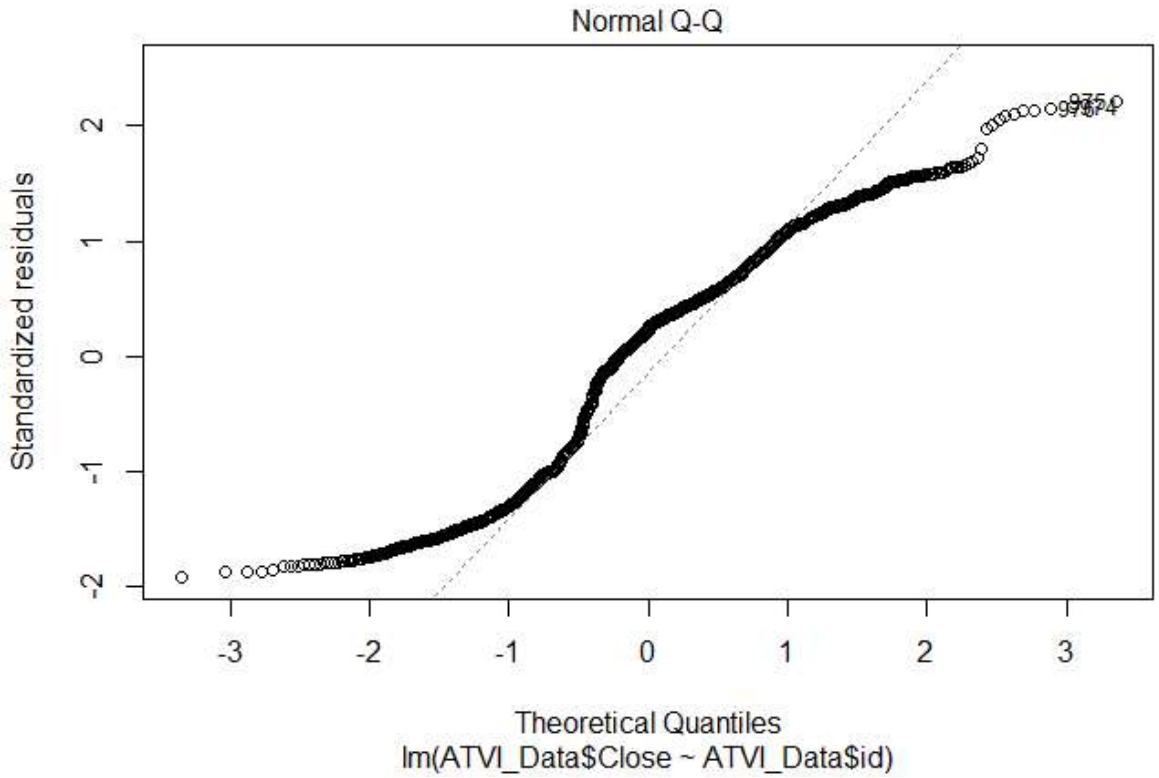
```
ATVI_Reg <- lm(ATVI_Data$Close ~ ATVI_Data$id)

summary(ATVI_Reg)
```

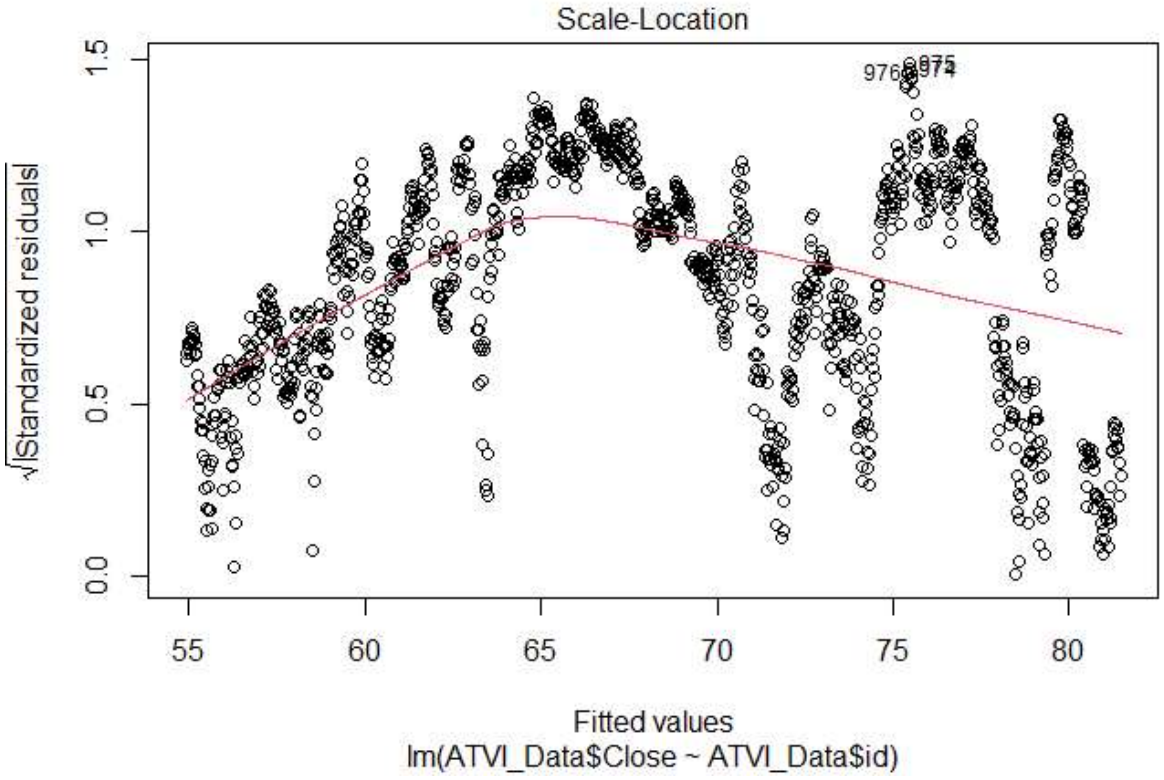
```
##
## Call:
## lm(formula = ATVI_Data$Close ~ ATVI_Data$id)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -24.685 -12.666   2.893   9.284  28.337
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  5.490e+01  7.231e-01   75.92   <2e-16 ***
```

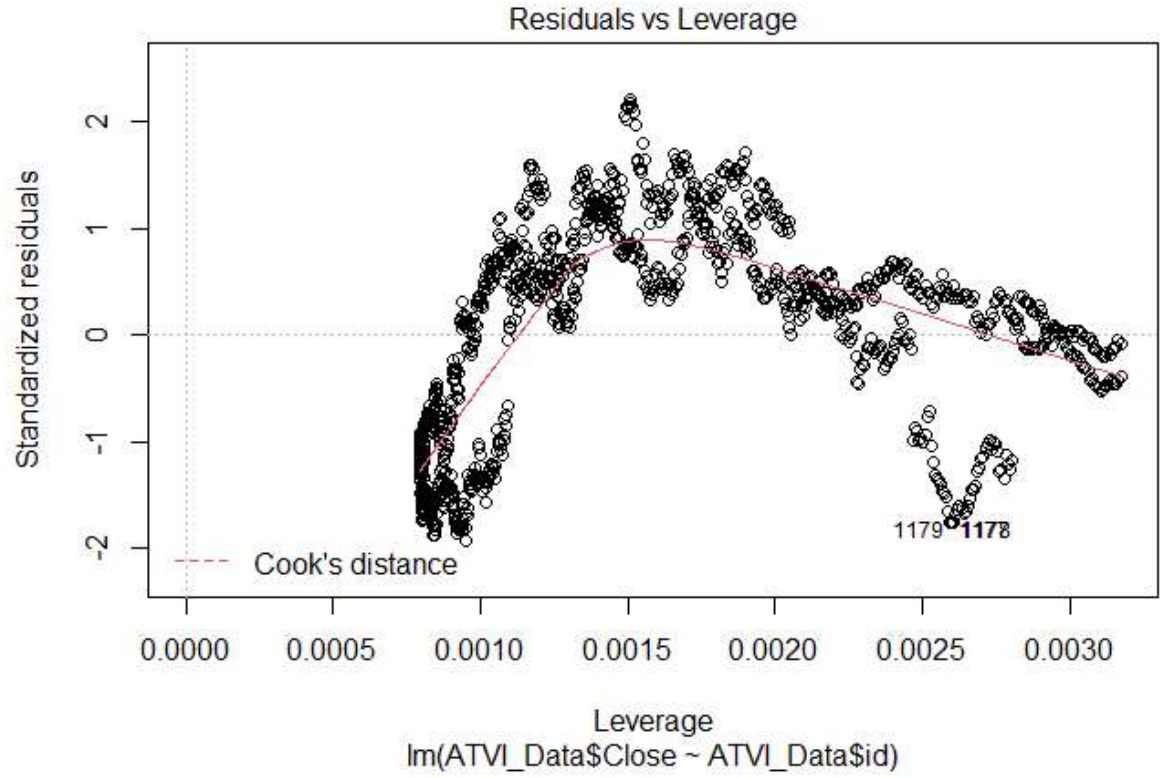
```
## ATVI_Data$id 2.110e-02  9.943e-04   21.22   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 12.82 on 1257 degrees of freedom
## Multiple R-squared:  0.2638, Adjusted R-squared:  0.2632
## F-statistic: 450.4 on 1 and 1257 DF,  p-value: < 2.2e-16
```

```
p1 <- plot(ATVI_Reg)
```


Residuals vs Fitted
Residuals
Fitted values
lm(ATVI_Data$Close ~ ATVI_Data$id)


Normal Q-Q
Standardized residuals
Theoretical Quantiles
lm(ATVI_Data$Close ~ ATVI_Data$id)

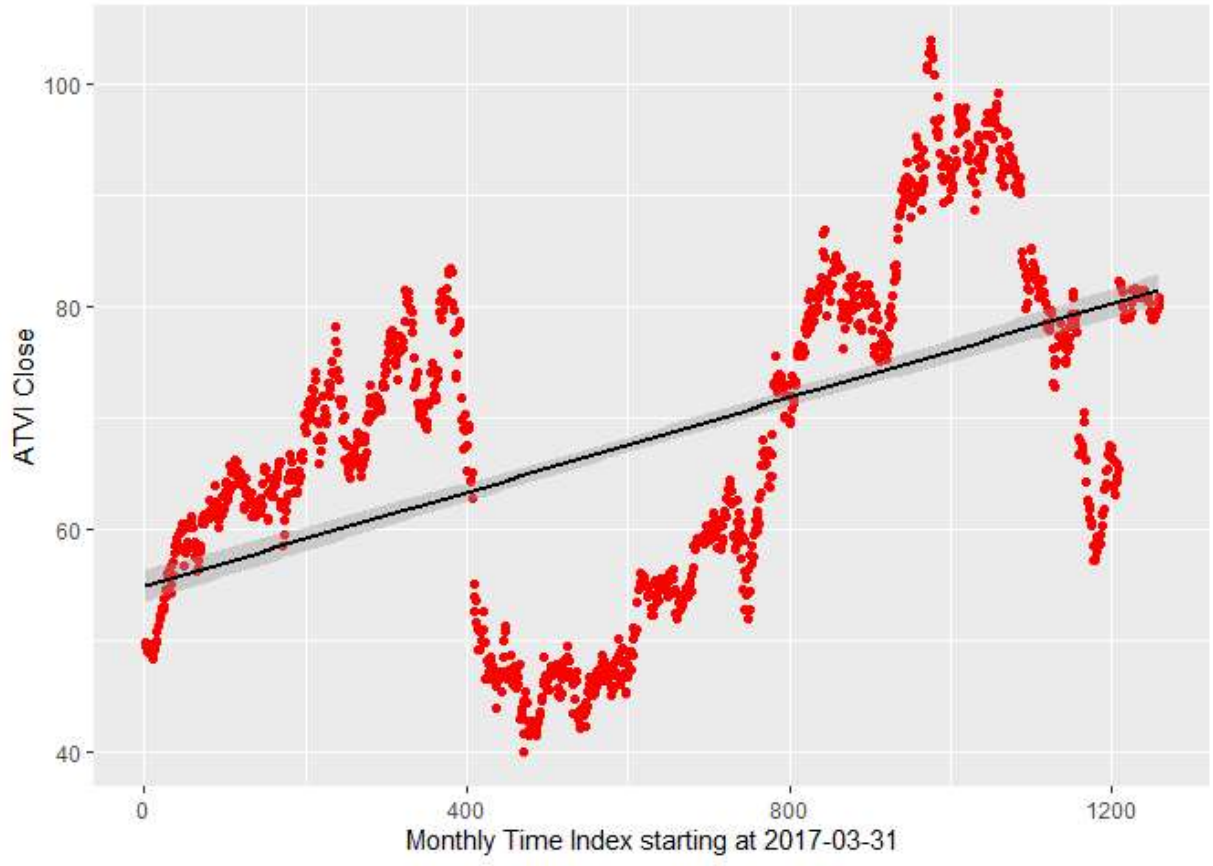




Visualize linear regression

```
p2 <- ggplot(data=ATVI_Data, mapping = aes(id, Close))+
  geom_point(color = "red") +
  geom_smooth(method = "lm", color = "black")+
  labs(x="Monthly Time Index starting at 2017-03-31", y = "ATVI Clos

plot(p2)
```

```
## `geom_smooth()` using formula 'y ~ x'
```




```
par(mfrow = c(2,2))
uni_open <- ggplot(ATVI_Data, aes(ATVI_Data$Open)) + geom_histogram(

uni_high <- ggplot(ATVI_Data, aes(ATVI_Data$High)) + geom_histogram(

uni_low <- ggplot(ATVI_Data, aes(ATVI_Data$Low)) + geom_histogram(bi
```

```
uni_close <- ggplot(ATVI_Data, aes(ATVI_Data$Close)) + geom_histogra
grid.arrange(uni_open, uni_high, uni_low, uni_close, nrow = 2, ncol
```

```
## Warning: Use of `ATVI_Data$Open` is discouraged. Use `Open` inste

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```

```
## Warning: Use of `ATVI_Data$High` is discouraged. Use `High` inste

## Warning: Use of `ATVI_Data$High` is discouraged. Use `High` inste
```

```
## Warning: Use of `ATVI_Data$Low` is discouraged. Use `Low` instead

## Warning: Use of `ATVI_Data$Low` is discouraged. Use `Low` instead
```

```
## Warning: Use of `ATVI_Data$Close` is discouraged. Use `Close` ins

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```
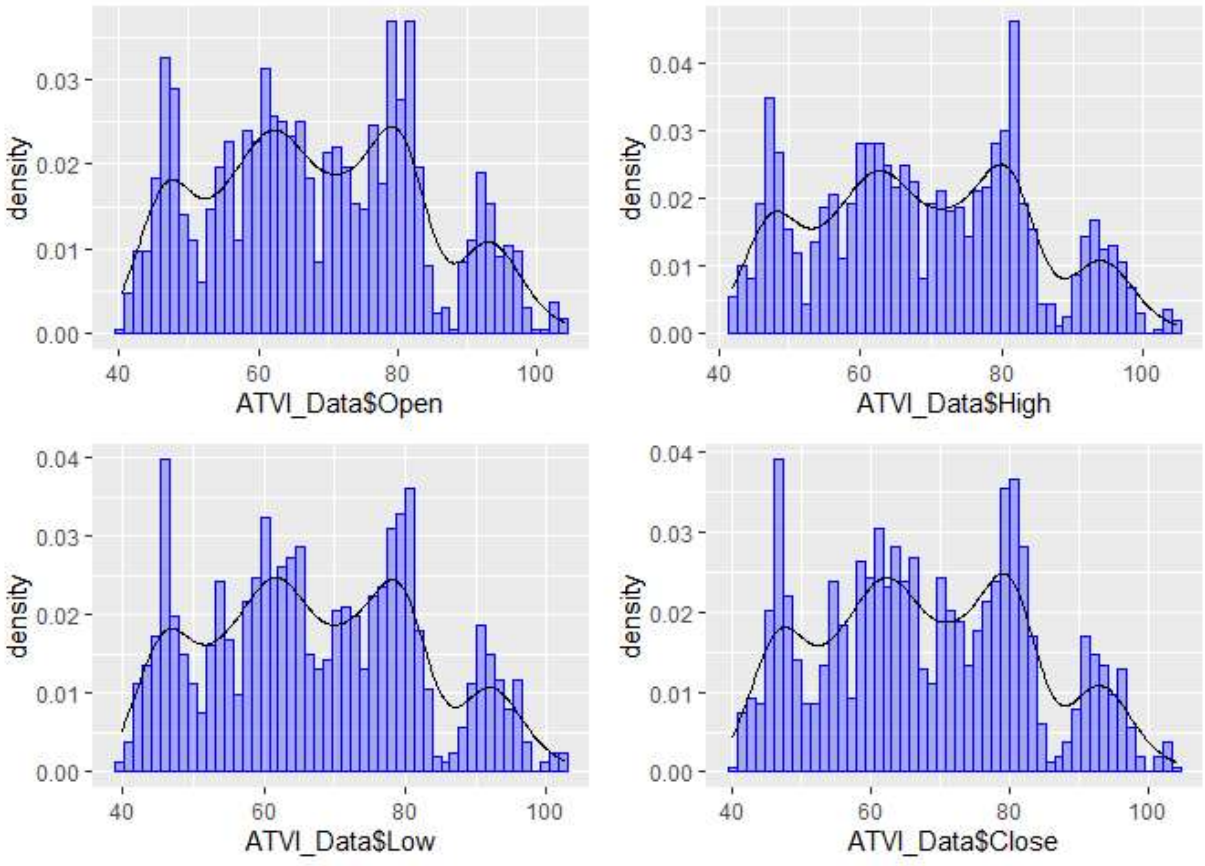



Two moving averages for the stock price, 10 day window and 30 days

```
ATVI_mm <- subset(ATVI_Data, index(ATVI_Data) >= "2017-03-31")

ATVI_mm10 <- rollmean(ATVI_mm[,6], 10, fill = list(NA, NULL, NA), al
ATVI_mm30 <- rollmean(ATVI_mm[,6], 30, fill = list(NA, NULL, NA), al

ATVI_mm$mm10 <- coredata(ATVI_mm10)
ATVI_mm$mm30 <- coredata(ATVI_mm30)
```

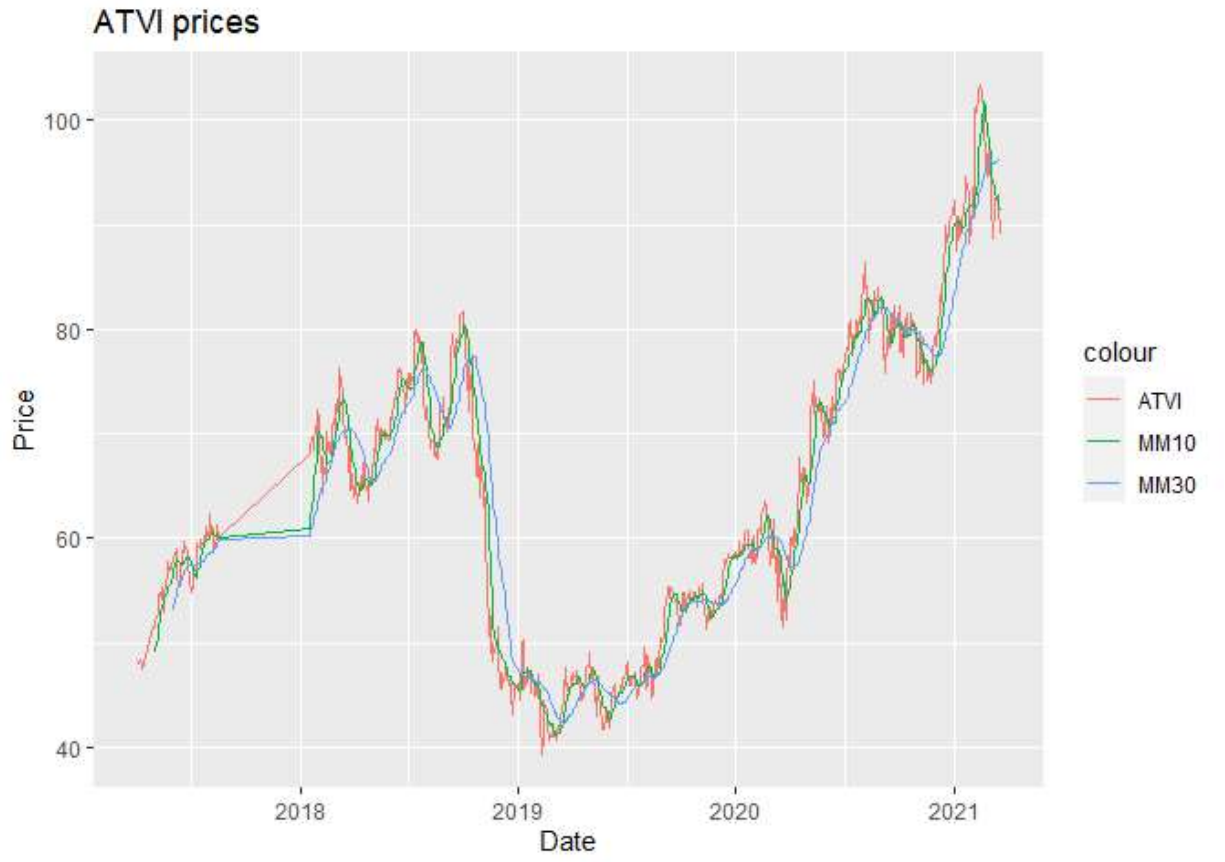
Plotting the price and moving averages for all days since 2017

```
ATVI_mm %>%
  ggplot(aes(x = Date)) +
  geom_line(aes(y = ATVI_mm[,6], color = "ATVI")) + ggtitle("ATVI pr
```

```
  geom_line(aes(y = mm10, color = "MM10")) +
  geom_line(aes(y = mm30, color = "MM30")) + xlab("Date") + ylab("Pr
```

```
## Warning: Removed 9 row(s) containing missing values (geom_path).
```

```
## Warning: Removed 29 row(s) containing missing values (geom_path).
```




```
average_price = sum(ATVI_Data$Open + ATVI_Data$Close)/(2*nrow(ATVI_D
summary(average_price)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   68.22   68.22   68.22   68.22   68.22   68.22
```