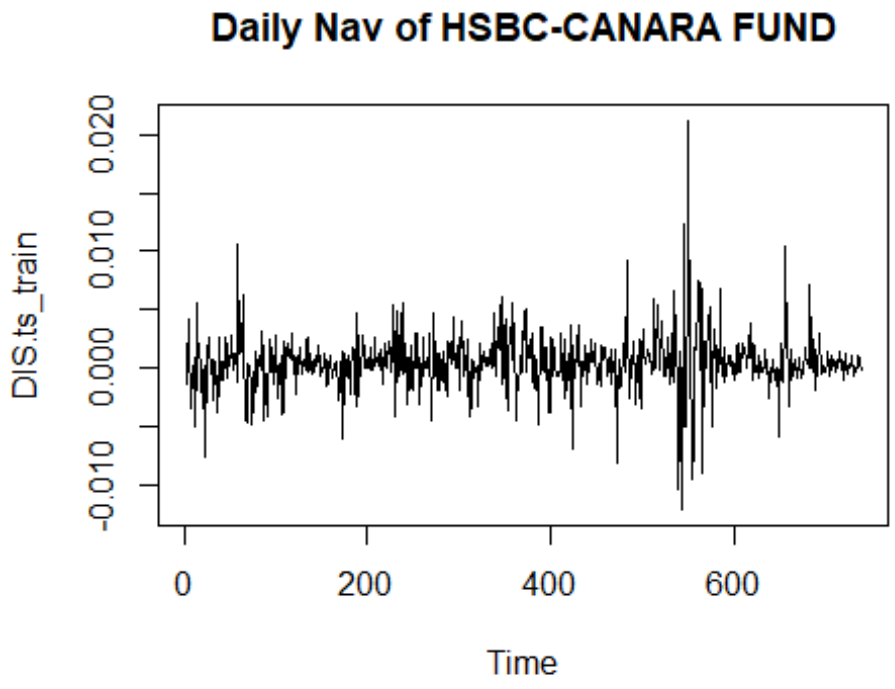
R Notebook

```
library(forecast)

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

library(tseries)

library(readxl)
DIS <- read_excel("C:/Users/mvpra/OneDrive/Desktop/prac2/dis.xlsx")

## New names:
## * `` -> ...8

dis.t<-DIS$Returns
DIS_train <- window(dis.t, start=2, end=739) #train data
DIS_test  <- window(dis.t, start=740) #test data
DIS.ts <- ts(DIS$Returns) #converting to time series data

DIS.ts_train <- window(DIS.ts, start=2, end=739)
DIS.ts_test  <- window(DIS.ts, start=740)

plot.ts(DIS.ts_train ,main="Daily Nav of HSBC-CANARA FUND")
```

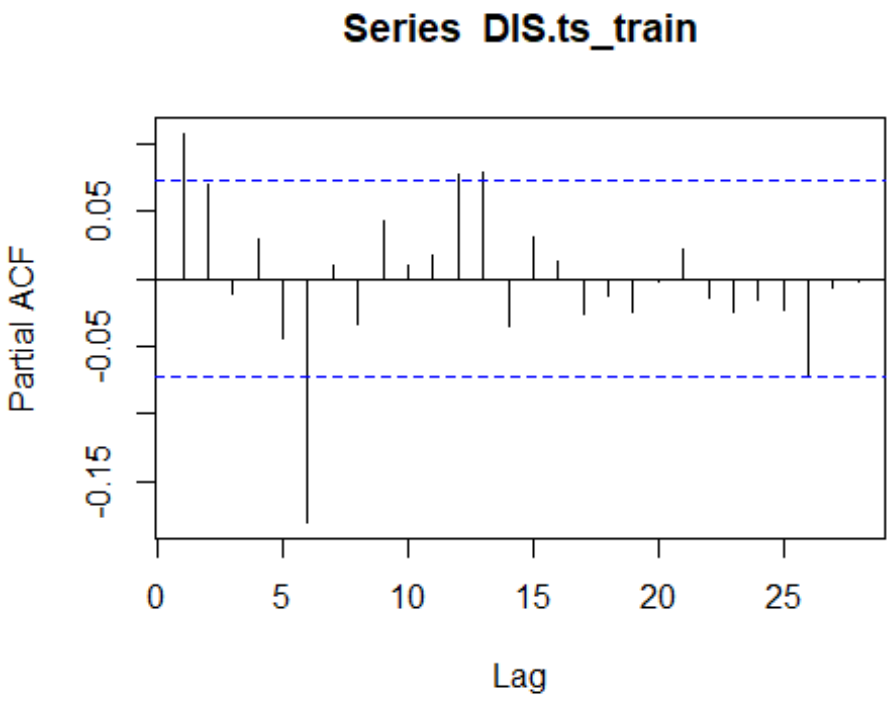


```
adf.test(DIS.ts_train )# series is stationary
```

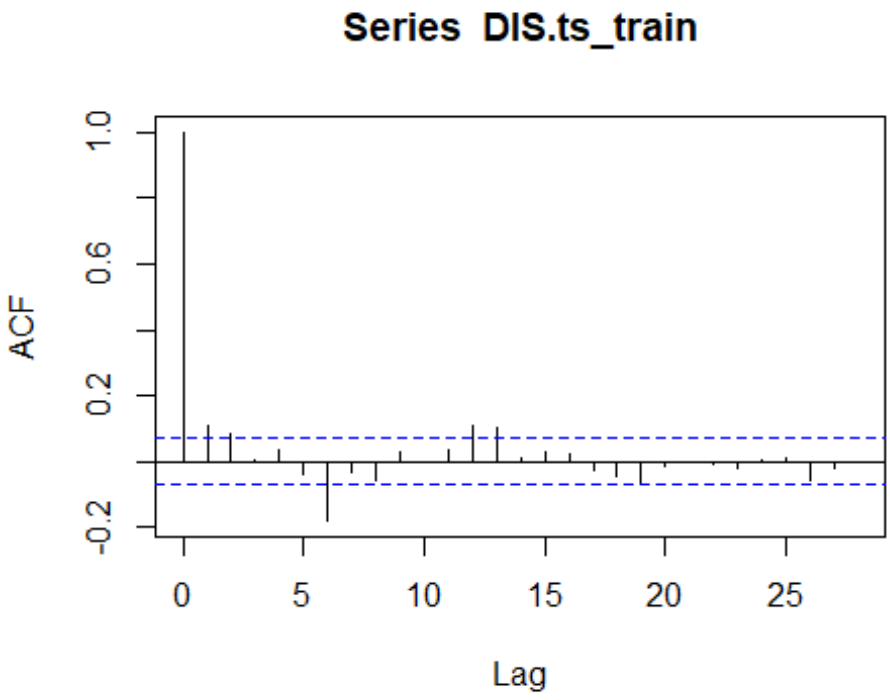
```
## Warning in adf.test(DIS.ts_train): p-value smaller than printed p-value
```

```
##
##  Augmented Dickey-Fuller Test
##
## data:  DIS.ts_train
## Dickey-Fuller = -9.0867, Lag order = 9, p-value = 0.01
## alternative hypothesis: stationary
```

```
pacf(DIS.ts_train) # 2 majorly significant spikes
```




```
acf(DIS.ts_train) # no significant spikes
```




```
auto.arima(DIS.ts_train) #fetching parameters for arima model
```

```
## Series: DIS.ts_train
## ARIMA(2,0,0) with non-zero mean
##
## Coefficients:
##          ar1     ar2   mean
##       0.0995  0.0701  4e-04
## s.e.  0.0367  0.0367  1e-04
##
## sigma^2 estimated as 5.873e-06:  log likelihood=3398.95
## AIC=-6789.91   AICc=-6789.85   BIC=-6771.49
```

```
#fitting the arima model for above obtained parameters
DIS.ARIMA <- Arima(DIS.ts_train, order = c(2,0,0))
summary(DIS.ARIMA)
```

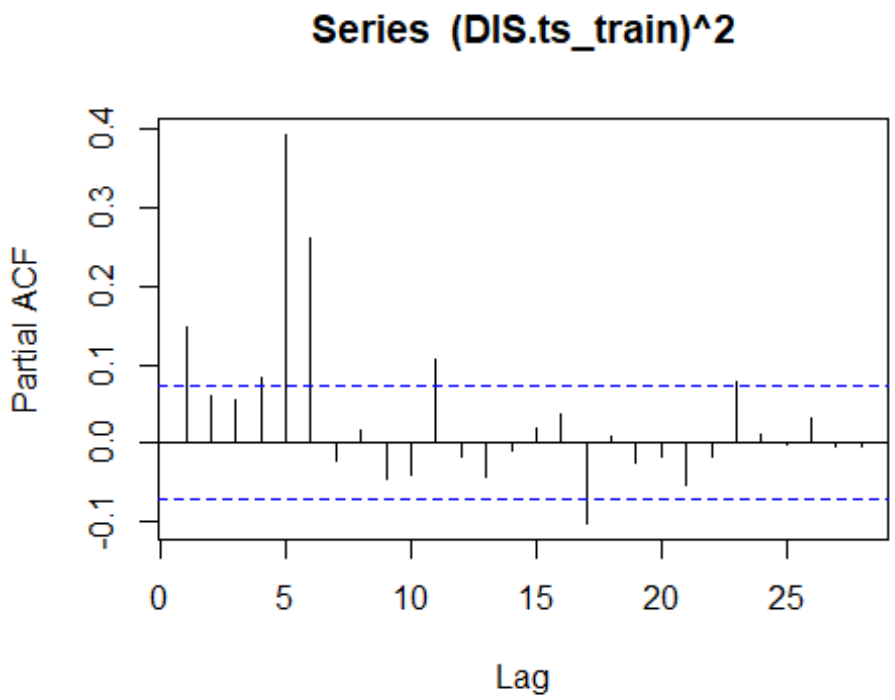
```
## Series: DIS.ts_train
## ARIMA(2,0,0) with non-zero mean
##
## Coefficients:
##          ar1     ar2   mean
##       0.0995  0.0701  4e-04
## s.e.  0.0367  0.0367  1e-04
##
## sigma^2 estimated as 5.873e-06:  log likelihood=3398.95
## AIC=-6789.91   AICc=-6789.85   BIC=-6771.49
```

```
##
## Training set error measures:
##                         ME        RMSE         MAE  MPE MAPE      MASE
## Training set -4.066249e-07 0.002418562 0.001546895 -Inf  Inf 0.7305014
##                      ACF1
## Training set 0.0009933569
```

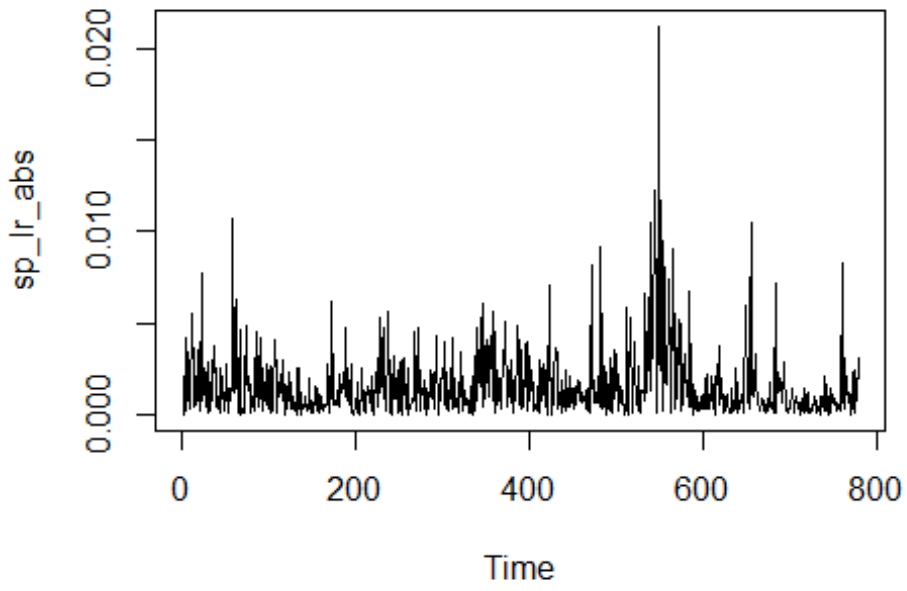
```
accuracy(forecast(DIS.ARIMA,h=40), DIS.ts_test)
```

```
##                         ME        RMSE         MAE      MPE    MAPE
MASE
## Training set -4.066249e-07 0.002418562 0.001546895     -Inf     Inf
0.7305014
## Test set     -8.761420e-04 0.002085143 0.001286377 14.99974 137.091
0.6074748
##                      ACF1 Theil's U
## Training set 0.0009933569        NA
## Test set     0.2286898533 0.9250562
```

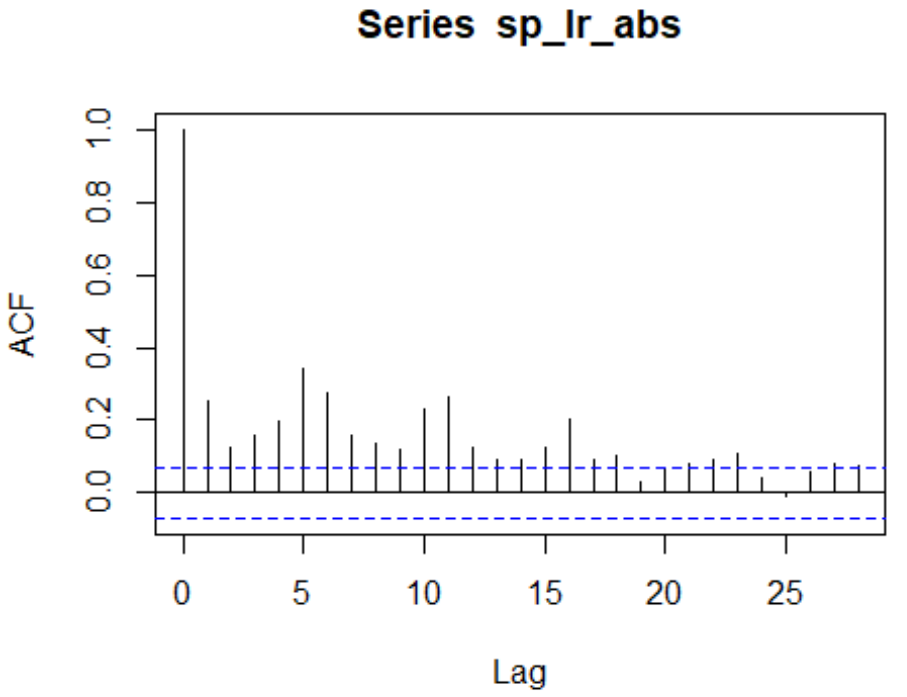
```
#plots for checking  volitality presence in the data
pacf((DIS.ts_train)^2)
```



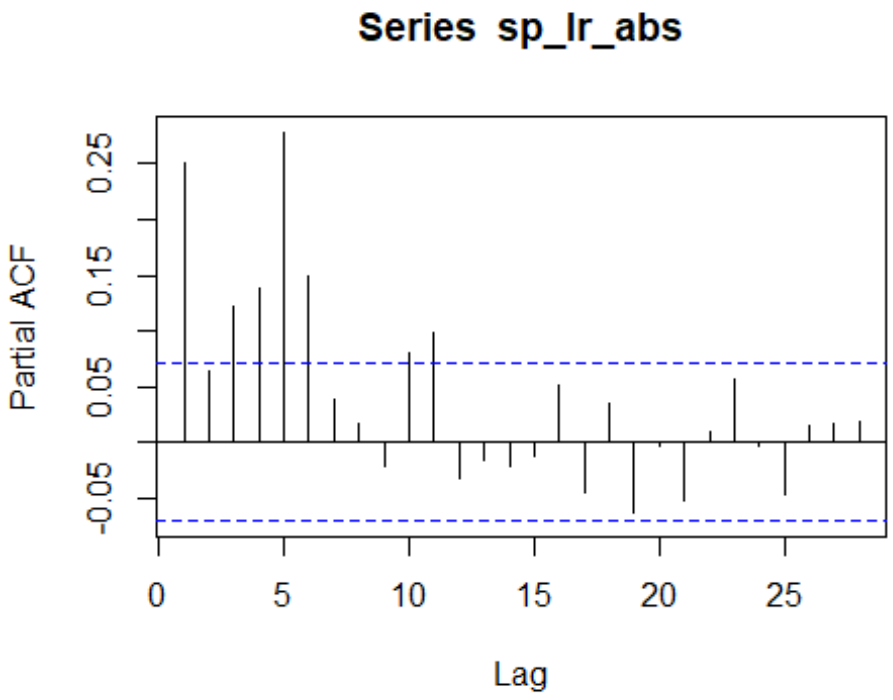

```
y_lr_abs <- abs(DIS$Returns[-1])
sp_lr_abs <- ts(y_lr_abs)
plot(sp_lr_abs)
```




```
acf(sp_lr_abs)
```

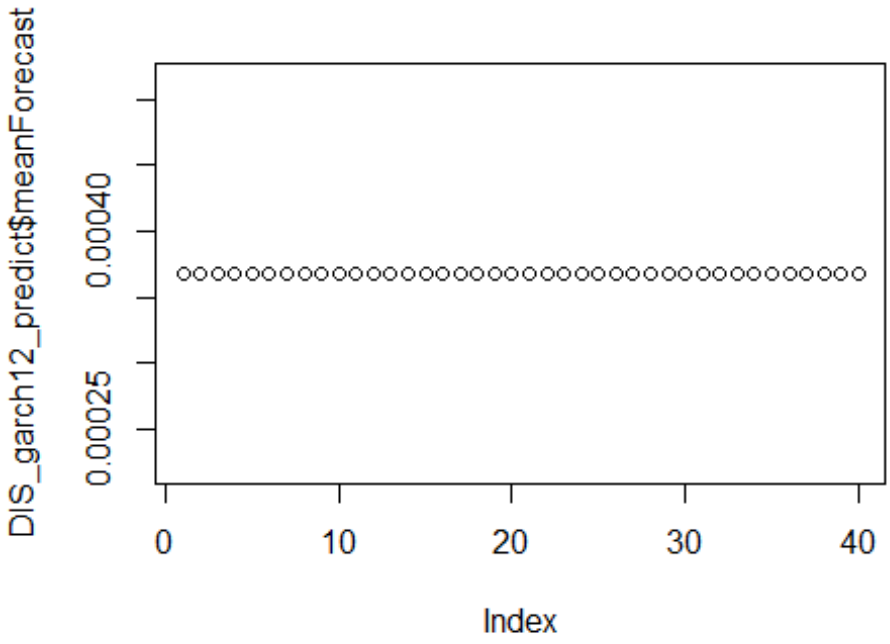



```
pacf(sp_lr_abs) #1 majorly significant spike
```




```
#checking the fit of arch

library(FinTS)

## Warning: package 'FinTS' was built under R version 4.0.5

## Loading required package: zoo

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

##
## Attaching package: 'FinTS'

## The following object is masked from 'package:forecast':
##
##     Acf

ArchTest(DIS.ts_train)

##
##  ARCH LM-test; Null hypothesis: no ARCH effects
##
```

```
## data:  DIS.ts_train
## Chi-squared = 183.52, df = 12, p-value < 2.2e-16

#arch effect present

# Build the GARCH model - 1, 2
library(fGarch)

## Warning: package 'fGarch' was built under R version 4.0.4

## Loading required package: timeDate

## Loading required package: timeSeries

## Warning: package 'timeSeries' was built under R version 4.0.4

##
## Attaching package: 'timeSeries'

## The following object is masked from 'package:zoo':
##
##     time<-

## Loading required package: fBasics

## Warning: package 'fBasics' was built under R version 4.0.4

library(FinTS)

DIS_garch12 = garchFit(~ garch(1,2), data = DIS.ts_train, trace = F)

## Warning: Using formula(x) is deprecated when x is a character vector of
length > 1.
##   Consider formula(paste(x, collapse = " ")) instead.

DIS_garch12_predict = predict(DIS_garch12, n.ahead = 40)
plot(DIS_garch12_predict$meanForecast)
```




```
DIS_garch12_predict.ts = ts(DIS_garch12_predict$meanForecast,start=740)
accuracy(DIS_garch12_predict.ts, DIS.ts_test)
```

```
##                       ME        RMSE         MAE      MPE     MAPE      ACF1
## Test set -0.0008821384 0.002085747 0.001286975 13.57984 138.2618 0.2274347
##          Theil's U
## Test set 0.9242422
```

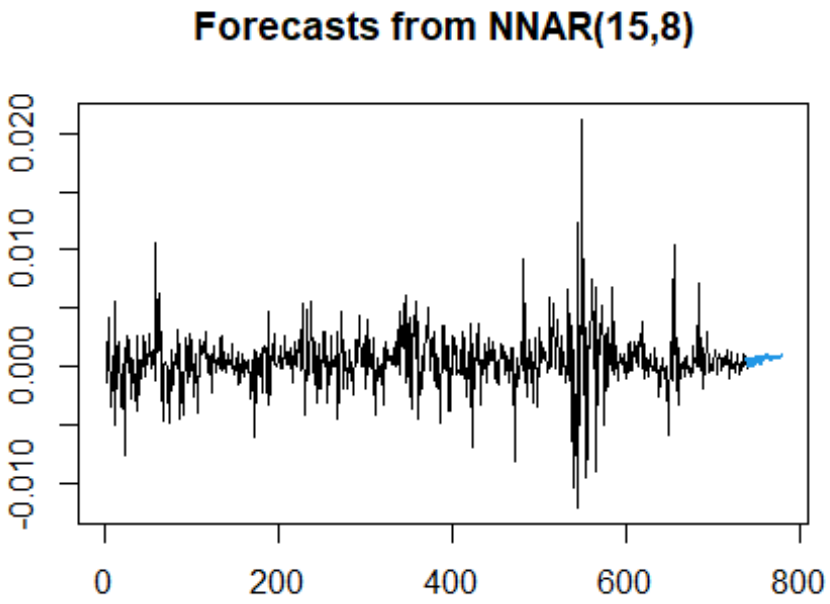
```
#NNAR

library(nnfor)
```

```
## Warning: package 'nnfor' was built under R version 4.0.4
```

```
nnetar(DIS.ts_train)
```

```
## Series: DIS.ts_train
## Model:  NNAR(6,4)
## Call:   nnetar(y = DIS.ts_train)
##
## Average of 20 networks, each of which is
## a 6-4-1 network with 33 weights
## options were - linear output units
##
## sigma^2 estimated as 4.065e-06
```

```
plot(forecast(nnetar(DIS.ts_train,p=15),h=40))
```


Forecasts from NNAR(15,8)
0.020
0.010
0.000
-0.010
0
200
400
600
800