FORECASTING FUTURE VALUES OF MICROSOFT STOCKS

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INTRODUCTION

If you have a time series that can be described using an additive model with increasing or decreasing trend and no seasonality, you can use Holt's exponential smoothing to make short-term forecasts.

Holt's exponential smoothing estimates the level and slope at the current time point. Smoothing is controlled by two parameters, alpha, for the estimate of the level at the current time point, and beta for the estimate of the slope beta of the trend component at the current time point.

The parameters alpha and beta have values between 0 and 1.

The values that are closer to 0 means that little weight is placed on the most recent observations when making forecasts of future values.

AIM

The aim of this experiment is to use Holts exponential smoothing to forecast future values of a suitable dataset.

ABOUT THE DATASET

The dataset 'p3_2' gives information about the stock information of Microsoft from 04/01/2015 to 04/01/2016

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PROCEDURE

Calling the ‘astsa’ library and the dataset

```
library(astsa)

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

p4<-read.csv("p3_2.csv")
head(p4)

##    High
## 1 40.76
## 2 40.74
## 3 41.78
## 4 41.91
## 5 41.69
## 6 41.62
```

Plotting using the ‘ts.plot’ function

```
ts.plot(p4, main="Microsoft Stock")
```

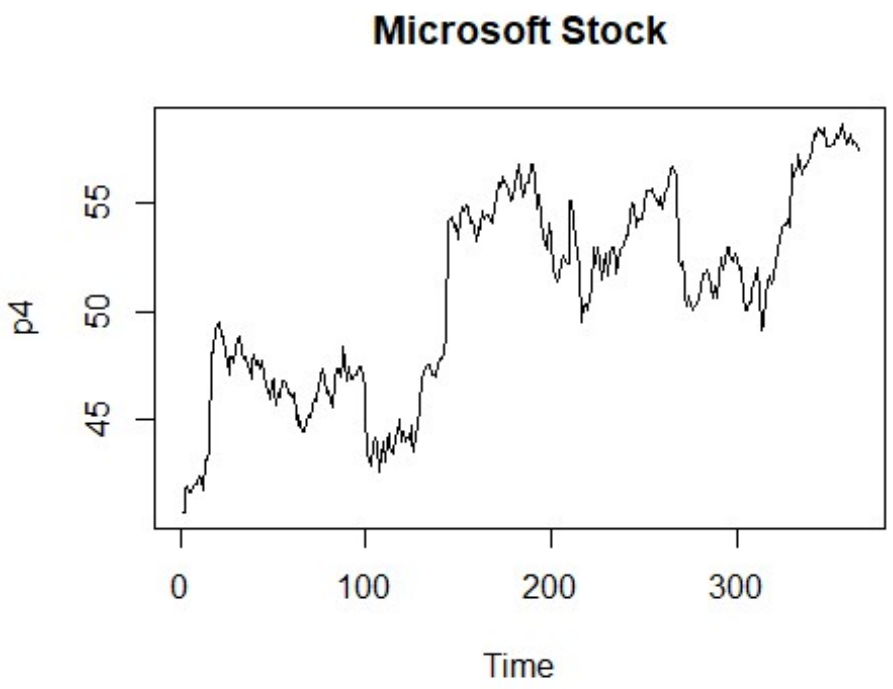

Figure 1: Plot for the Microsoft Stock

Using HoltWinters() to forecast the future values

```
p4forecast<-HoltWinters(p4, gamma=F)
head(p4forecast$fitted)

##          xhat level       trend
## [1,] 40.72000 40.74 -0.02000000
## [2,] 41.76252 41.78 -0.01747745
## [3,] 41.89287 41.91 -0.01712649
## [4,] 41.67239 41.69 -0.01760928
## [5,] 41.60227 41.62 -0.01773395
## [6,] 41.93309 41.95 -0.01690643

plot(p4forecast)

library(forecast)

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

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

##
## Attaching package: 'forecast'

## The following object is masked from 'package:astsa':
##
##     gas
```

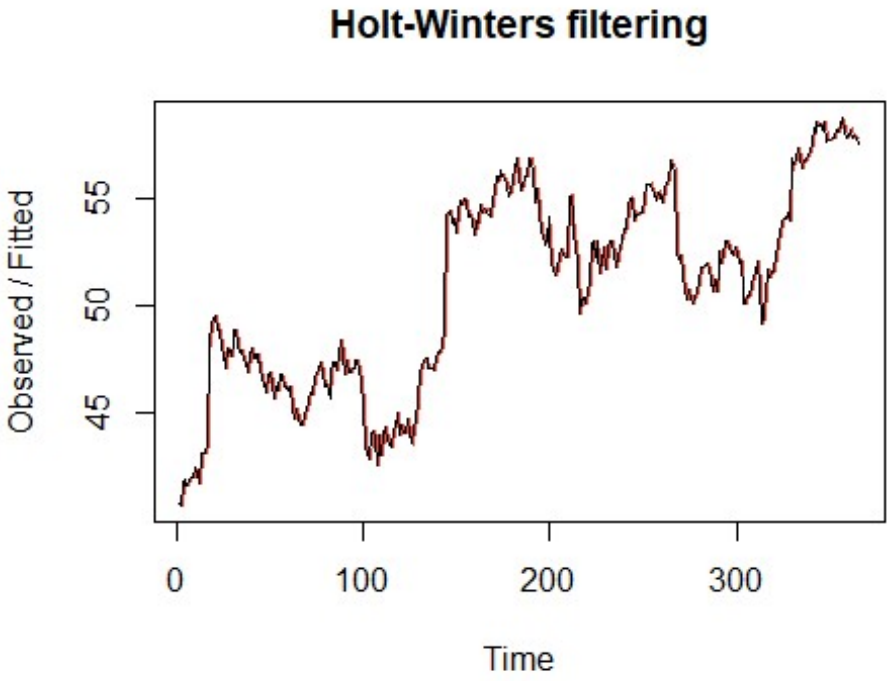

Figure 2: Graph after Holt-Winters filtering

Plotting the forecasted data

```
forecast_data<-forecast(p4forecast, h=5)
plot(forecast_data)
```

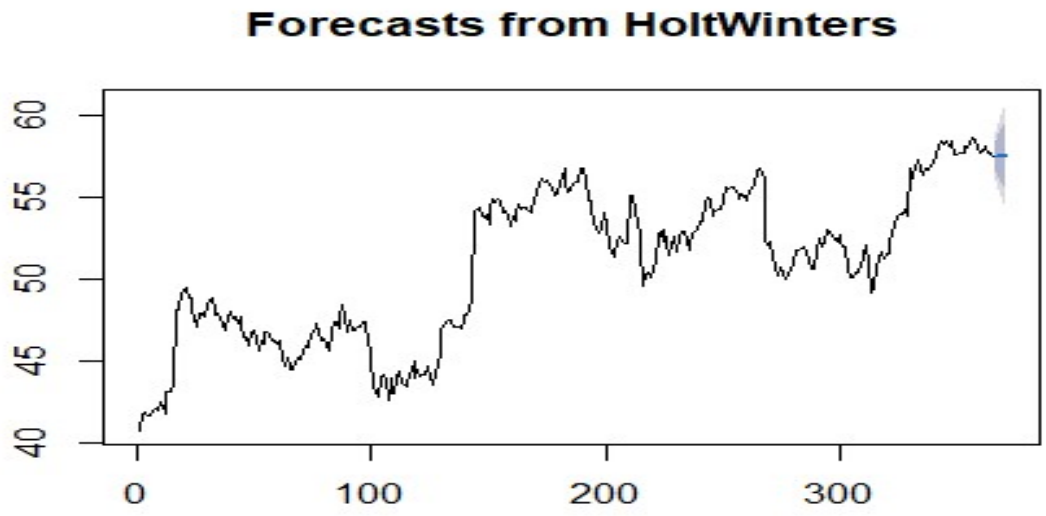

Figure 3: Forecasted data

CONCLUSION

From the above graph, we can conclude that the data remains stationary for the next five data points.