Time Series Assignment 2

Kshitij Mittal

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Importing Libraries

```
#install.packages('tseries')
#install.packages('fpp')
#install.packages('ggplot2')
#install.packages('forecast')

library(tseries)
```

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

```
library(fpp)
```

```
## Loading required package: forecast
```

```
## Loading required package: fma
```

```
## Loading required package: expsmooth
```

```
## Loading required package: lmtest
```

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

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

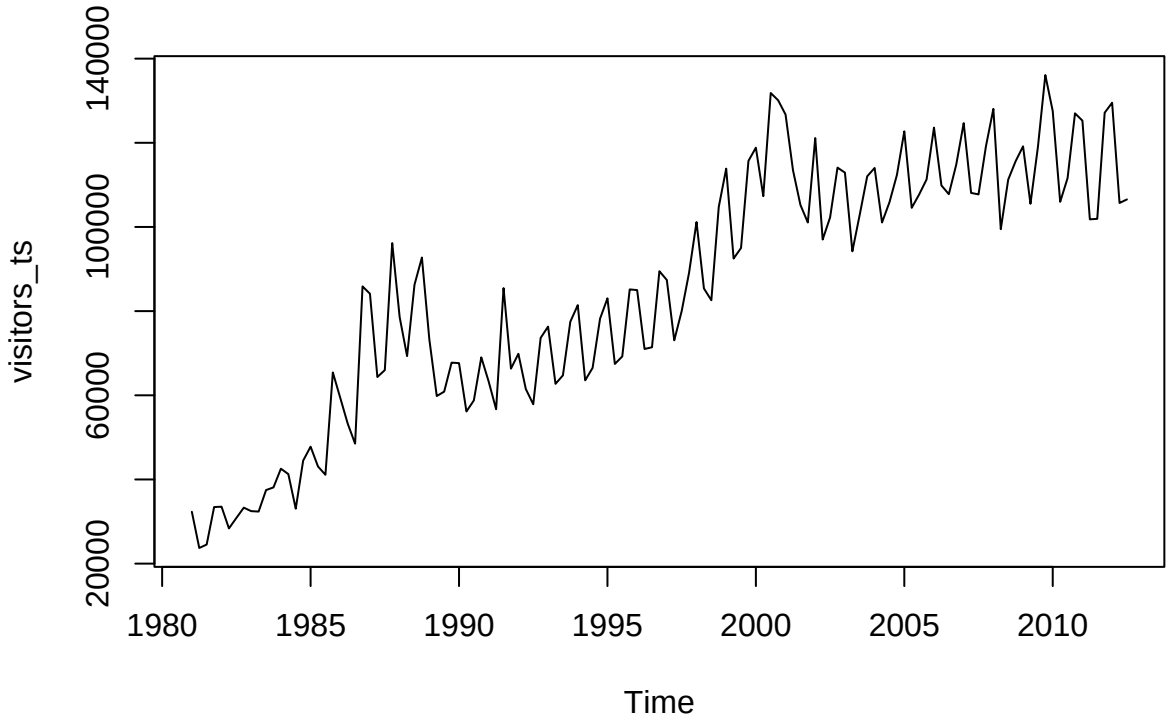
```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
library(ggplot2)
library(forecast)
```

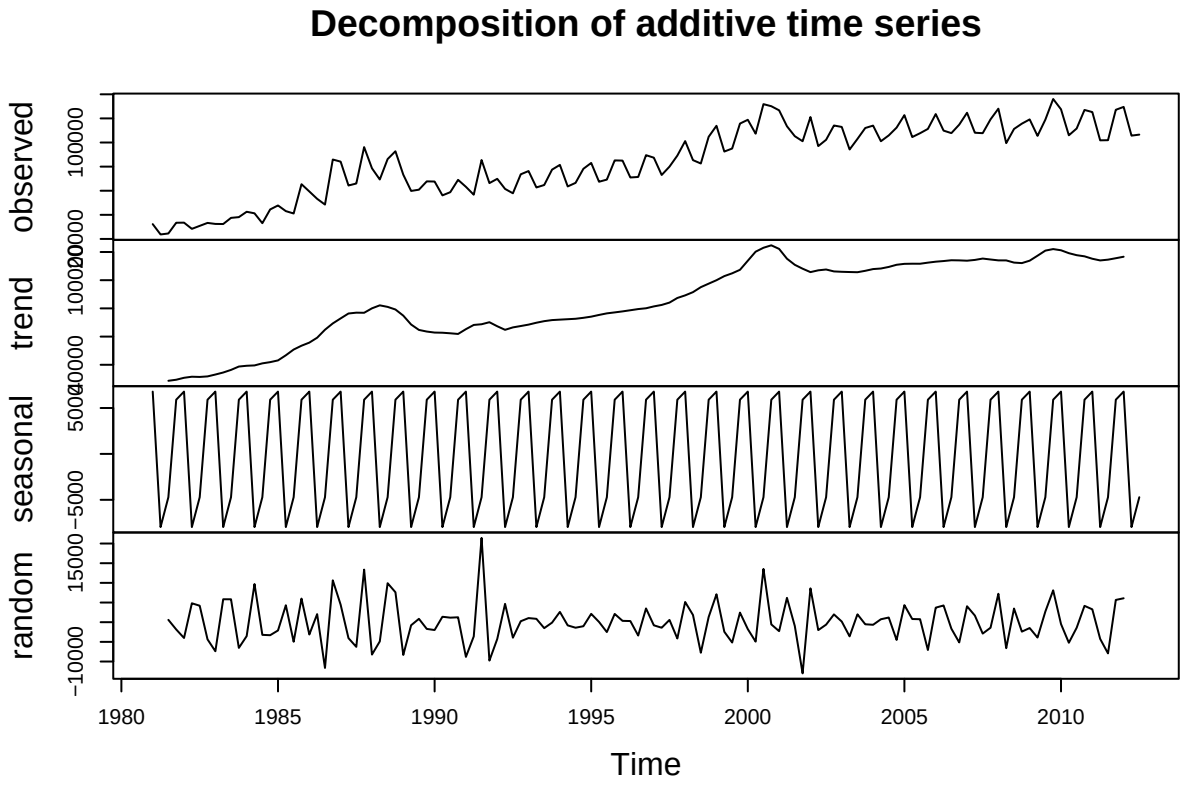
For this exercise, use the Quarterly international arrivals to Australia from the US. 1981Q1 - 2012Q3 dataset. (Dataset Name: visitors.rda) (4 points) Question 1:

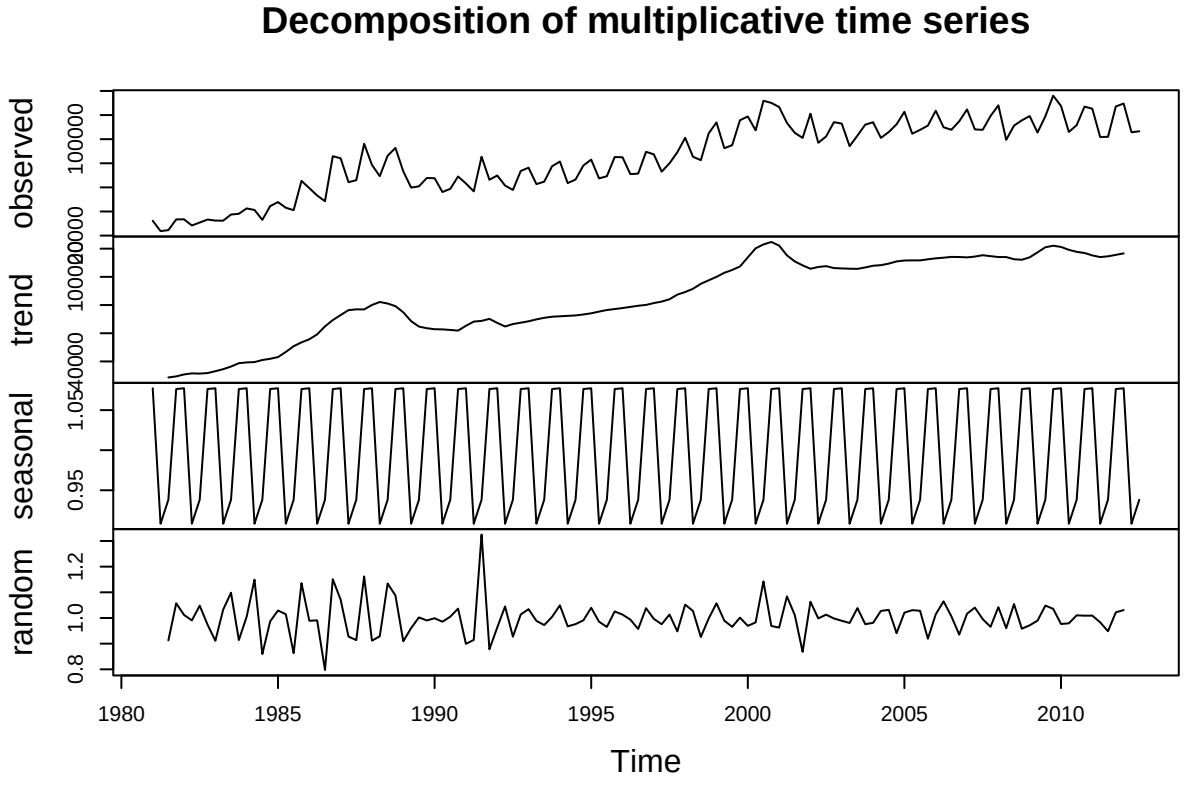
Q1

```
# Load the visitors.rda dataset, make a time plot of your data and describe the main features of the se

load('/Users/kshitijmittal/Documents/UChicago Acad/uchicago_codebase/08_TimeSeries/02 TS Decomposition/
visitors_ts <- ts(data=visitors, frequency=4, start=c(1981,1), end = c(2012,3))
visitors_ts = visitors_ts[, "Arrivals"]
plot(visitors_ts)
```



Q2

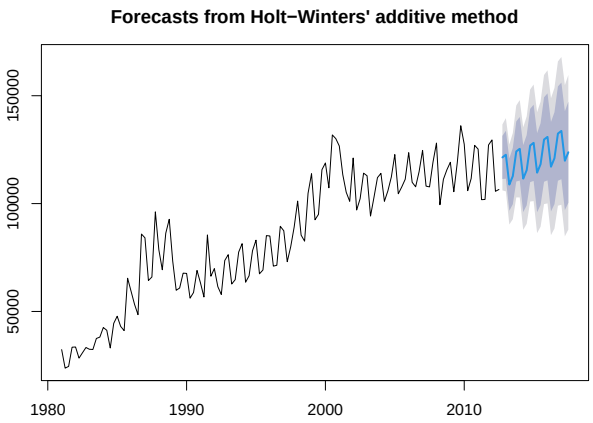

Decomposition of additive time series
observed
trend
seasonal
random
100000
120000
140000
5000
−5000
15000
−10000
1980
1985
1990
1995
2000
2005
2010
Time

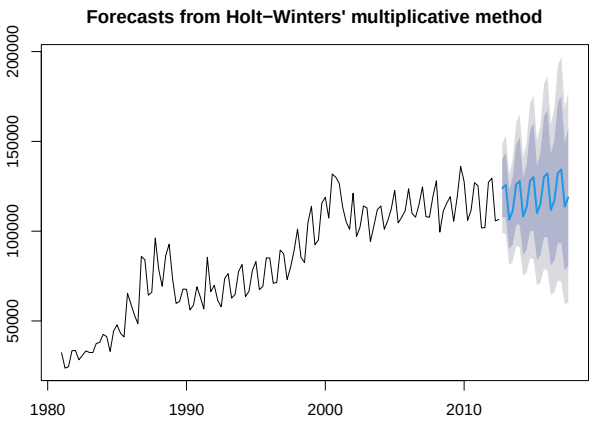

Decomposition of multiplicative time series
observed
trend
seasonal
random
100000
120000
140000
1.05
0.95
1.2
1.0
0.8
1980
1985
1990
1995
2000
2005
2010
Time

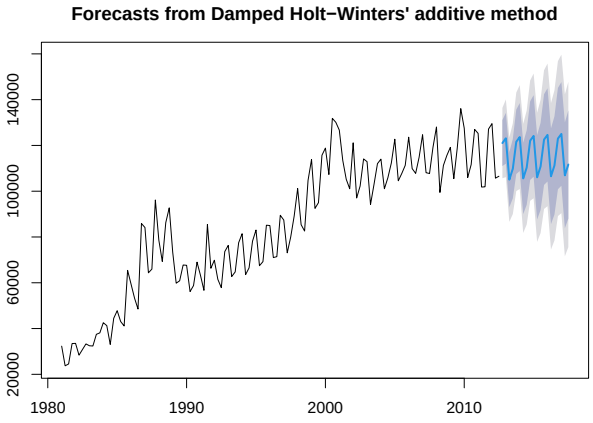
Both Additive and Multiplicative models perform almost equally while inspecting the random noise. But for multiplicative the variation in random is less, and we will use this model for the first round

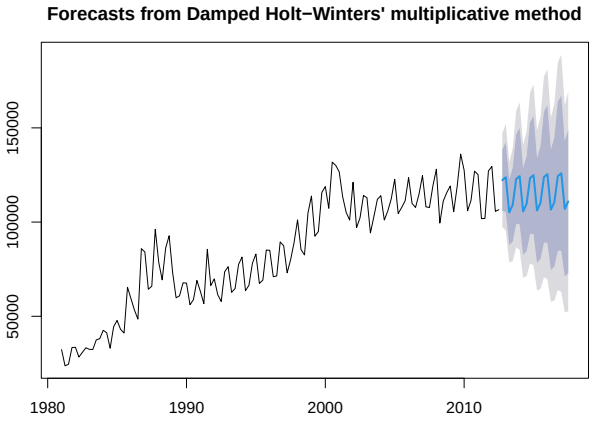
Q3

```
vis_f_add <- hw(visitors_ts,seasonal = "additive",h=20)
vis_f_multi <- hw(visitors_ts,seasonal = "multiplicative",h=20)

vis_f_Damped_add <- hw(visitors_ts,seasonal = "additive",h=20, damped = TRUE)
vis_f_Damped_multi <- hw(visitors_ts,seasonal = "multiplicative",h=20, damped = TRUE)

par(mar=c(2,2,3,2))
plot(vis_f_add)
plot(vis_f_multi)
plot(vis_f_Damped_add)
plot(vis_f_Damped_multi)
```



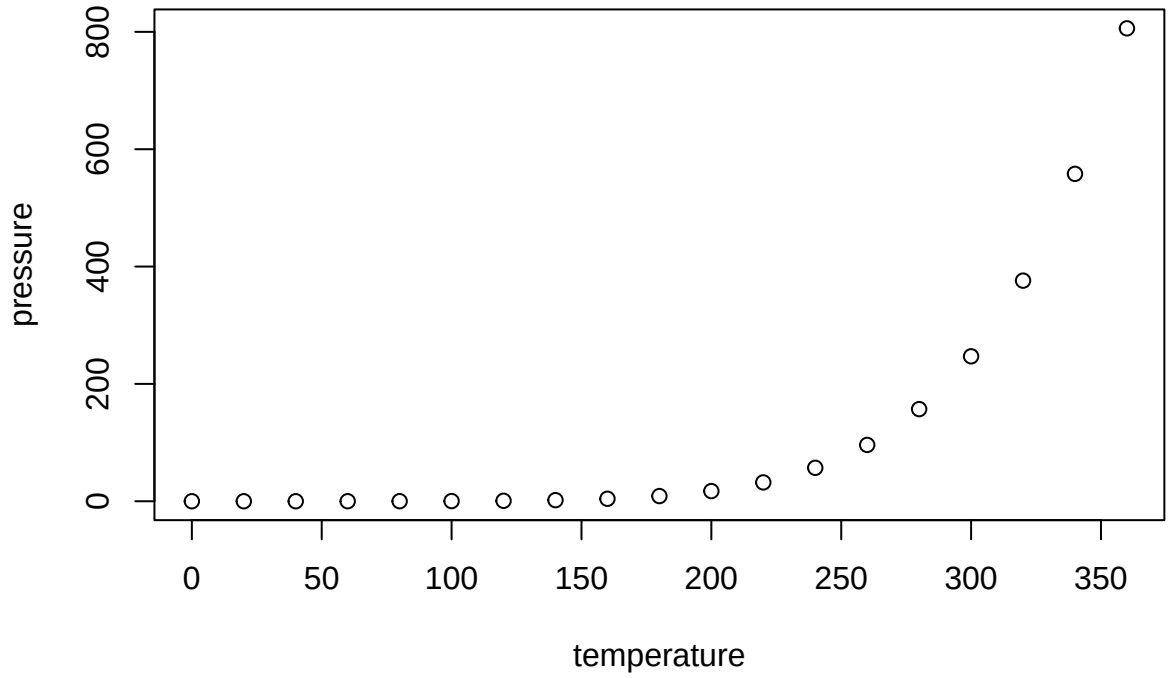






Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.