

# Time\_series.R

Dipanjan Chowdhury

Tue May 08 19:57:41 2018

```
data("AirPassengers")
class(AirPassengers)
```

```
## [1] "ts"
```

```
start(AirPassengers)
```

```
## [1] 1949    1
```

```
end(AirPassengers)
```

```
## [1] 1960   12
```

```
str(AirPassengers)
```

```
## Time-Series [1:144] from 1949 to 1961: 112 118 132 129 121 135 148 148 136 119 ...
```

```
summary(AirPassengers)
```

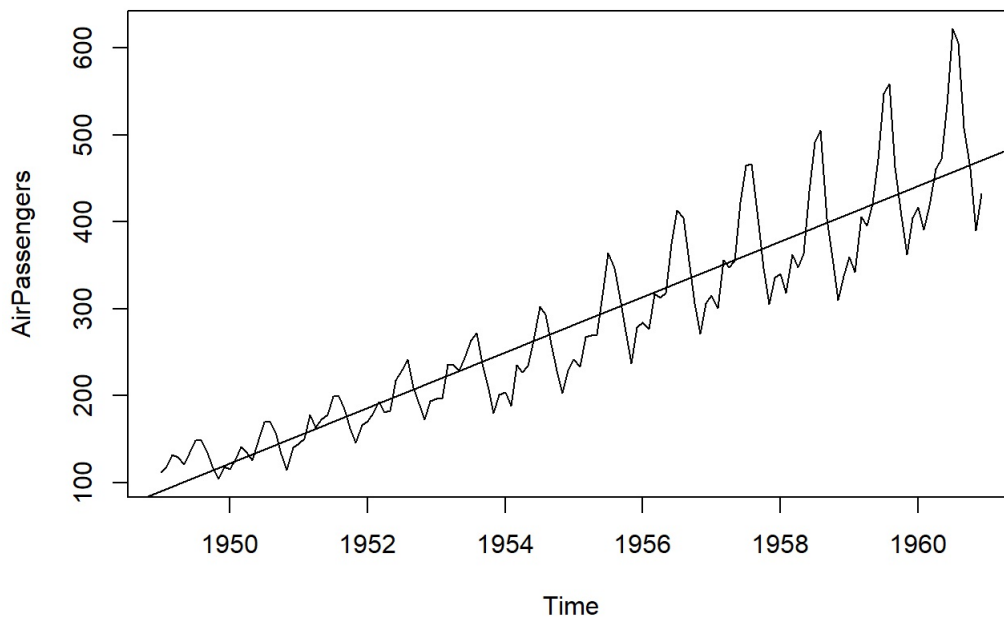
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  104.0   180.0   265.5   280.3   360.5   622.0
```

```
plot(AirPassengers)
```

```
#this will plot the time series
reg=lm(AirPassengers~time(AirPassengers))
summary(reg)
```

```
##
## Call:
## lm(formula = AirPassengers ~ time(AirPassengers))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -93.858 -30.727  -5.757   24.489  164.999
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -62055.907    2166.077   -28.65  <2e-16 ***
## time(AirPassengers)    31.886      1.108    28.78  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 46.06 on 142 degrees of freedom
## Multiple R-squared:  0.8536, Adjusted R-squared:  0.8526
## F-statistic: 828.2 on 1 and 142 DF,  p-value: < 2.2e-16
```

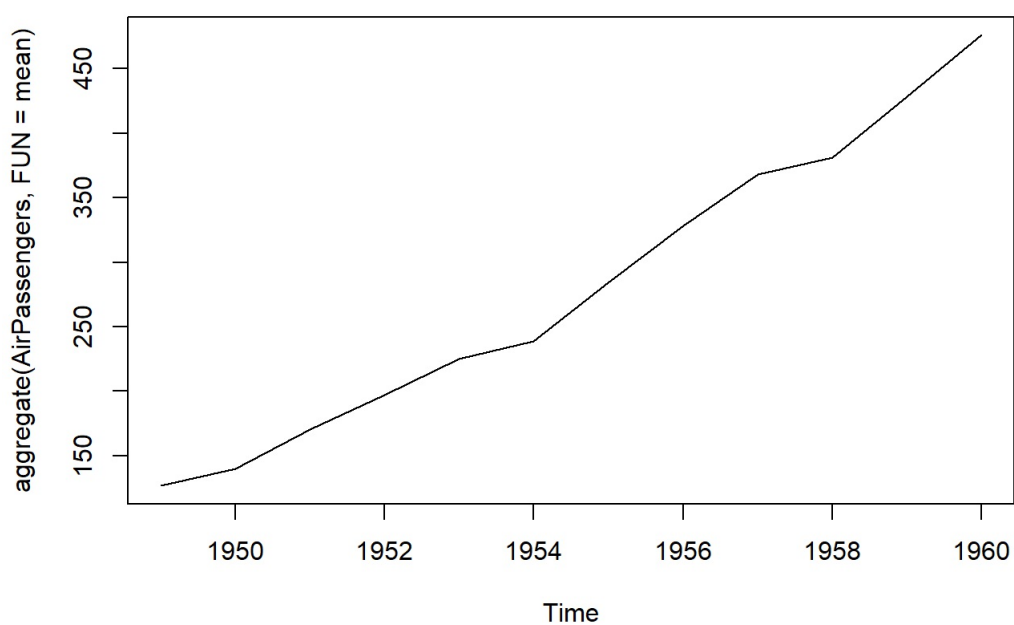
```
abline(reg)
```



```
#prints cycle across the years
cycle(AirPassengers)
```

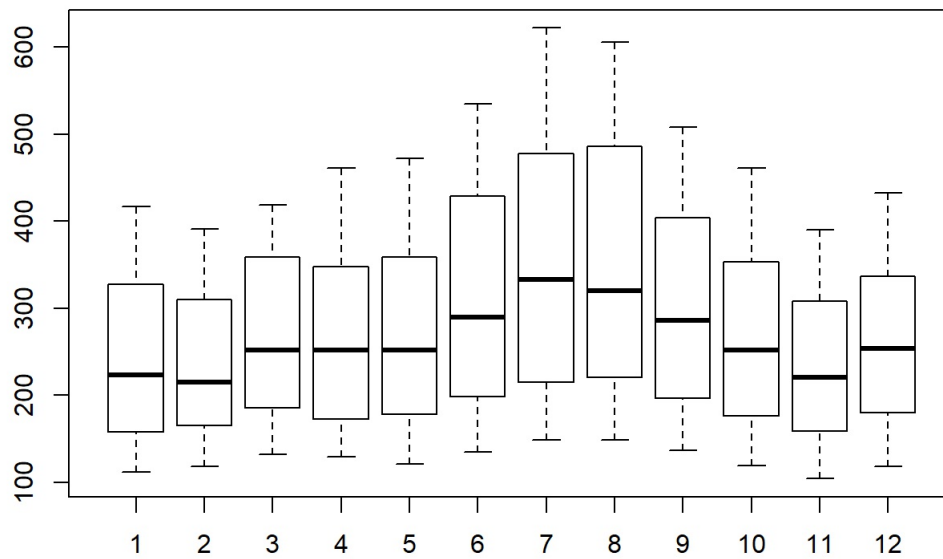
```
##      Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
## 1949   1   2   3   4   5   6   7   8   9  10  11  12
## 1950   1   2   3   4   5   6   7   8   9  10  11  12
## 1951   1   2   3   4   5   6   7   8   9  10  11  12
## 1952   1   2   3   4   5   6   7   8   9  10  11  12
## 1953   1   2   3   4   5   6   7   8   9  10  11  12
## 1954   1   2   3   4   5   6   7   8   9  10  11  12
## 1955   1   2   3   4   5   6   7   8   9  10  11  12
## 1956   1   2   3   4   5   6   7   8   9  10  11  12
## 1957   1   2   3   4   5   6   7   8   9  10  11  12
## 1958   1   2   3   4   5   6   7   8   9  10  11  12
## 1959   1   2   3   4   5   6   7   8   9  10  11  12
## 1960   1   2   3   4   5   6   7   8   9  10  11  12
```

```
#plotting of mean aggregates
plot(aggregate(AirPassengers,FUN = mean))
```



```
#plotting sessional effect i.e across the cycle with air passengers  
boxplot(AirPassengers~cycle(AirPassengers))
```

```
library(tseries)
```



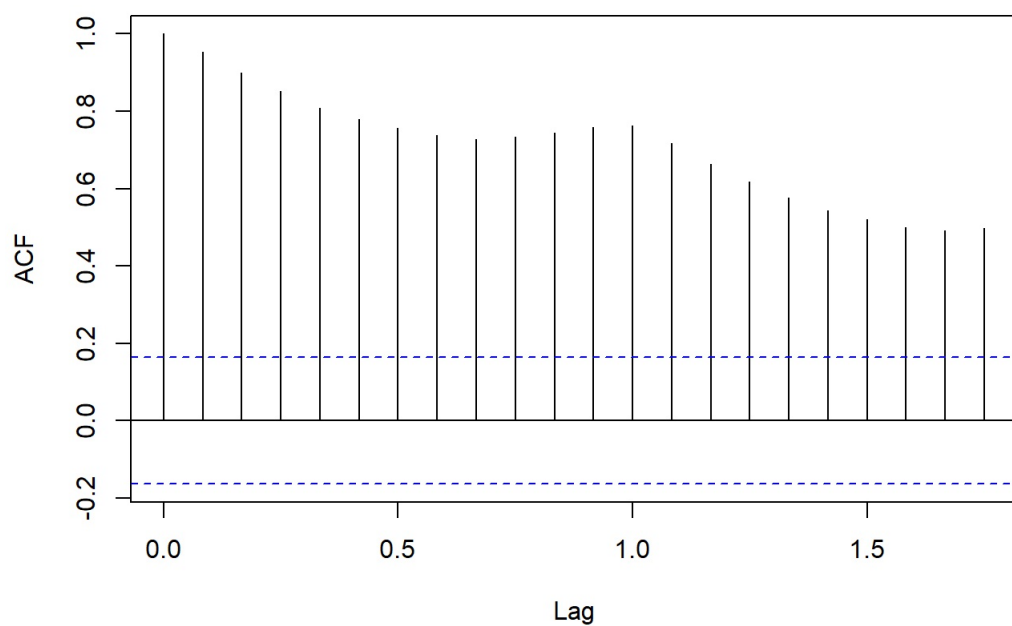
```
adf.test(diff(log(AirPassengers)),alternative = "stationary",k=0)
```

```
## Warning in adf.test(diff(log(AirPassengers)), alternative = "stationary", :  
## p-value smaller than printed p-value
```

```
##  
## Augmented Dickey-Fuller Test  
##  
## data: diff(log(AirPassengers))  
## Dickey-Fuller = -9.6003, Lag order = 0, p-value = 0.01  
## alternative hypothesis: stationary
```

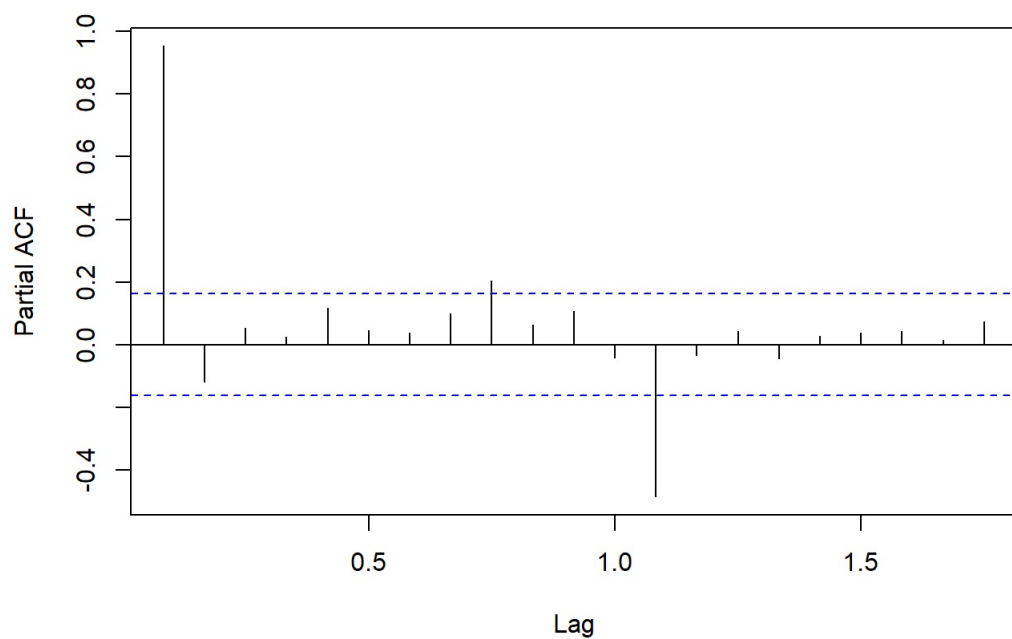
```
acf(log(AirPassengers))
```

Series  $\log(\text{AirPassengers})$



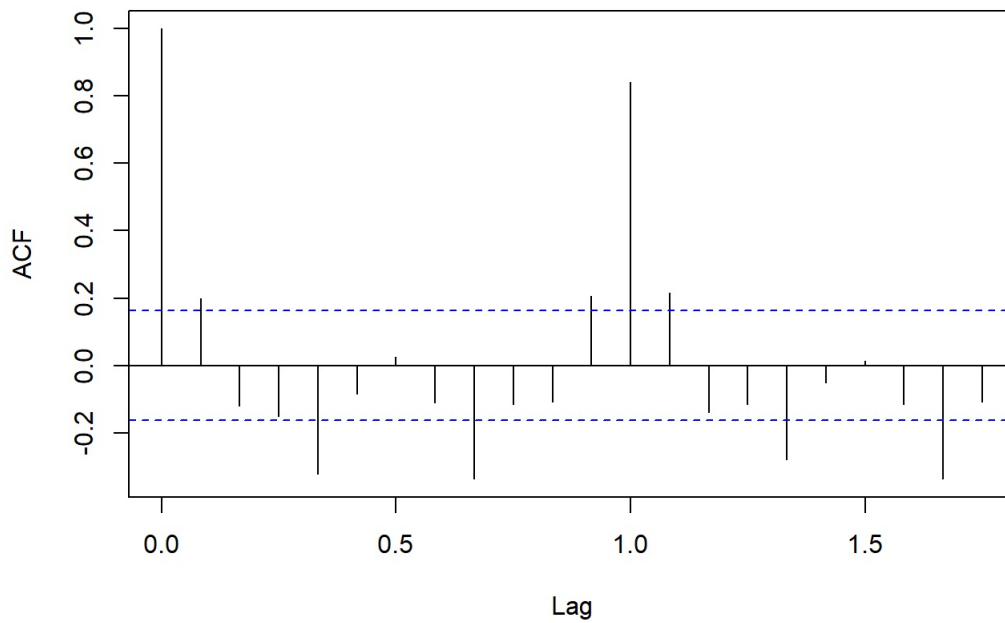
```
pacf(log(AirPassengers))
```

Series  $\log(\text{AirPassengers})$



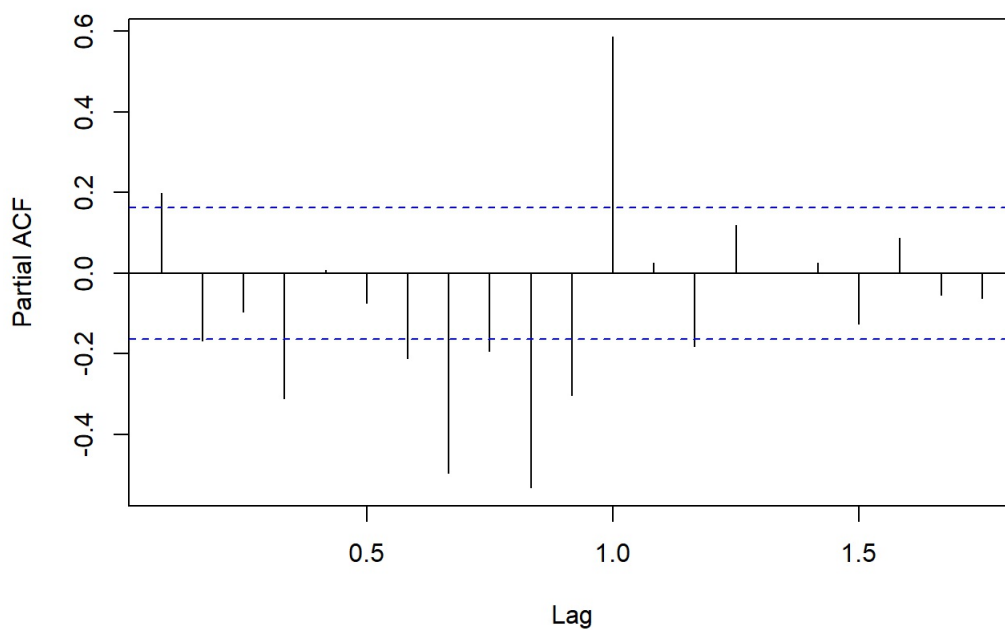
```
acf(diff(log(AirPassengers)))
```

### Series `diff(log(AirPassengers))`



```
pacf(diff(log(AirPassengers)))
```

### Series `diff(log(AirPassengers))`



```
fit<-arima(log(AirPassengers),order=c(0,1,1),seasonal = list(order=c(0,1,1),period=12))
pred<-predict(fit,n.ahead = 10*12)
summary(pred)
```

```
##      Length Class Mode
## pred 120    ts    numeric
## se   120    ts    numeric
```

```
#lty=c(1,3) used for dashed line
#e=2.718
ts.plot(AirPassengers,2.718^pred$pred,log="y",lty=c(1,3))
```

