SCM223-0789/2018;CHRISTINE EYINDA

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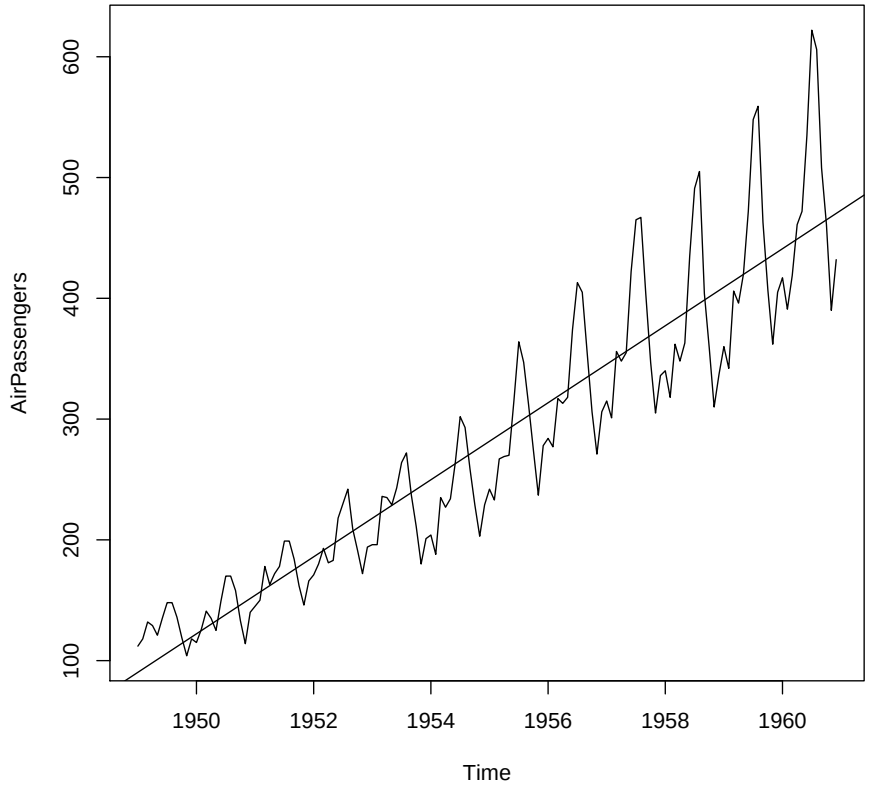
```
# Loading the data-inbuilt R dataset
data(AirPassengers)
class(AirPassengers)

## [1] "ts"
```

1 Visualizing the time series plot

```
#starting point of the time series
start(AirPassengers)

## [1] 1949    1

#end point of the time series
end(AirPassengers)

## [1] 1960   12

#frequency of the time series
frequency(AirPassengers)

## [1] 12

#plotting the time series plot
plot(AirPassengers)
abline(reg=lm(AirPassengers~time(AirPassengers)))
```



2 Testing for stationarity

-Checking for stationarity using the augmented Dickey Fuller test:

```
library(tseries)

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

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

## Warning in adf.test(AirPassengers, alternative = "stationary", k
= 0):  p-value smaller than printed p-value

##
```

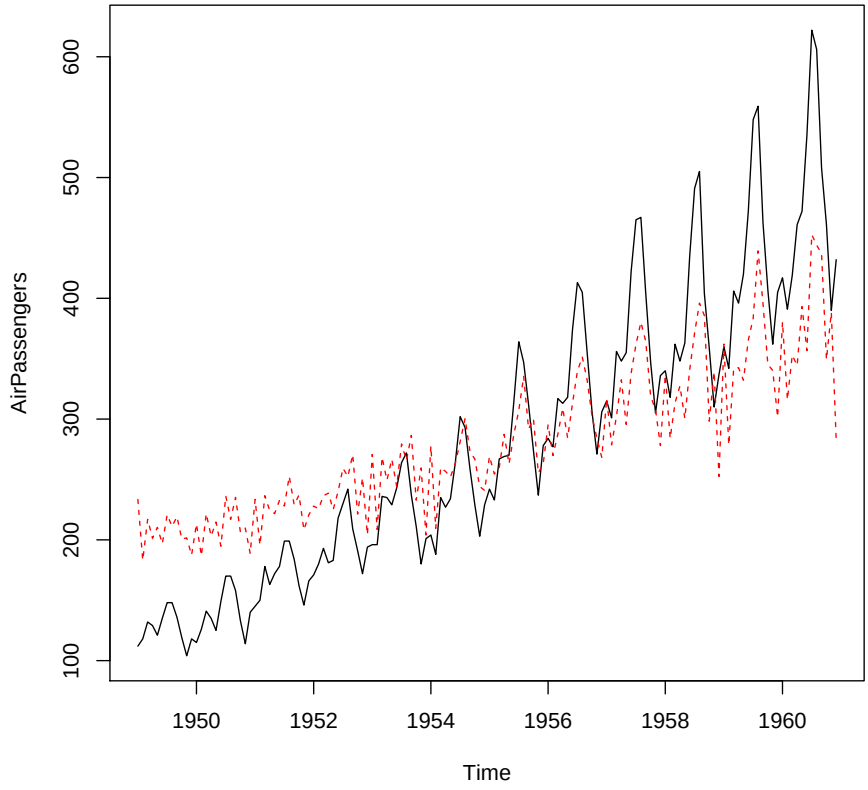
```
##  Augmented Dickey-Fuller Test
##
## data:  AirPassengers
## Dickey-Fuller = -4.6392, Lag order = 0, p-value = 0.01
## alternative hypothesis: stationary
```

P-value=0.01 which is less than 0.05,thus we reject the null hypothesis.Implying our time series is stationary.

3 Fitting the MA model to AirPassengers

```
MA<-arima(AirPassengers,order=c(0,0,1))
print(MA)

##
## Call:
## arima(x = AirPassengers, order = c(0, 0, 1))
##
## Coefficients:
##          ma1  intercept
##       0.9642   280.6464
## s.e.  0.0214    10.5788
##
## sigma^2 estimated as 4205:  log likelihood = -806.43,  aic = 1618.86
```

```
#plotting the series along with the MA fitted values

ts.plot(AirPassengers)
MA_fit <- AirPassengers - resid(MA)
points(MA_fit, type = "l", col = 2, lty = 2)
```

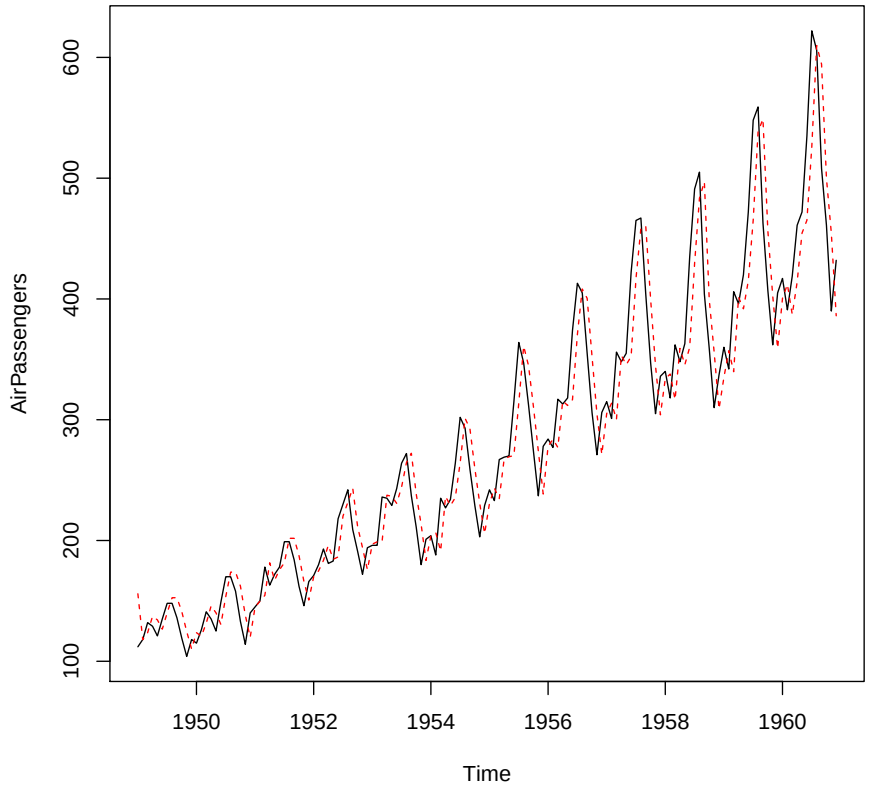


4 Fitting the AR model to AirPassengers

```
AR <- arima(AirPassengers, order = c(1,0,0))
print(AR)
```

```
##
## Call:
## arima(x = AirPassengers, order = c(1, 0, 0))
##
## Coefficients:
##          ar1  intercept
##       0.9646   278.4649
## s.e.  0.0214    67.1141
##
## sigma^2 estimated as 1119:  log likelihood = -711.09,  aic = 1428.18
```

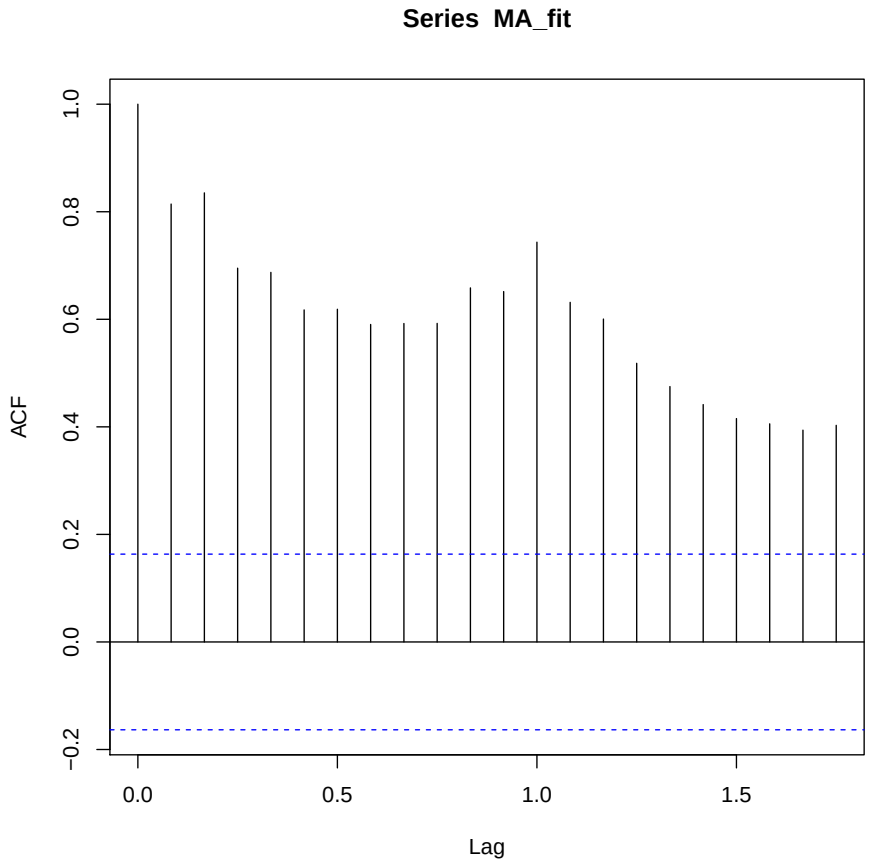
```r
#plotting the series along with the fitted values
ts.plot(AirPassengers)
AR_fit <- AirPassengers - residuals(AR)
points(AR_fit, type = "l", col = 2, lty = 2)
```



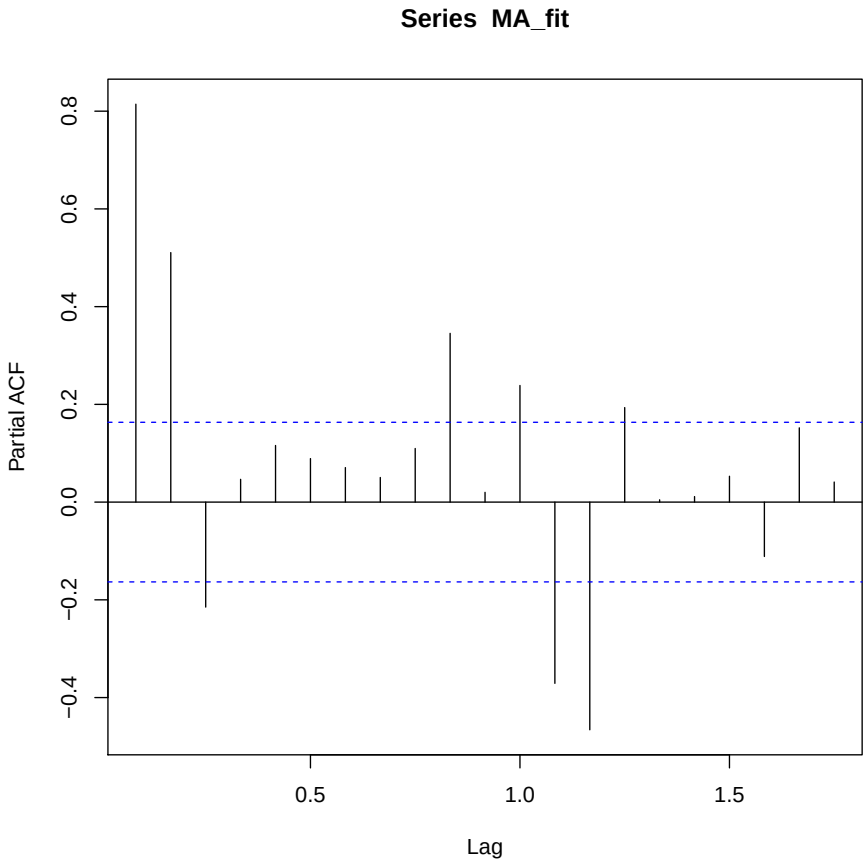
5 Choosing AR or MA model

5.1 ACF AND PACF plot of MA model.

```r
acf(MA_fit)
```

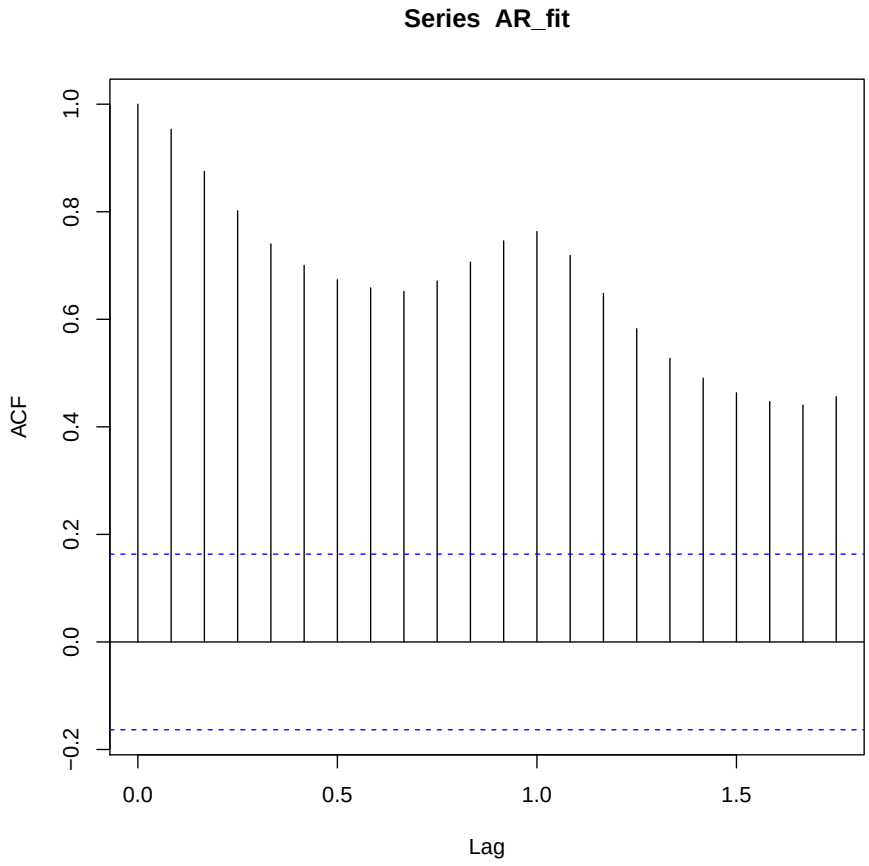



```
pacf(MA_fit)
```

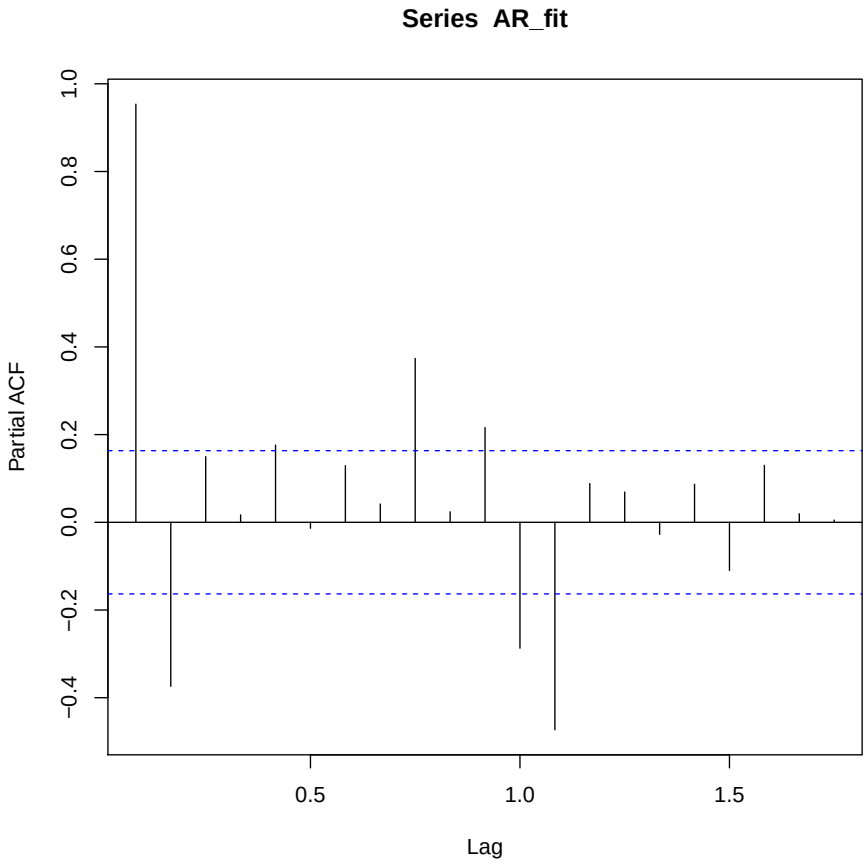


5.2 ACF and PACF plot for AR model.

```
acf(AR_fit)
```




```
pacf(AR_fit)
```



5.3 AIC and BIC for the MA model

```
AIC(MA)

## [1] 1618.863

BIC(MA)

## [1] 1627.772
```

5.4 AIC and BIC for the AR model

```r
AIC(AR)
```

```
## [1] 1428.179
```

```r
BIC(AR)
```

```
## [1] 1437.089
```

6 Conclusion

The AR model has a lower aic and bic compared to the MA model thus making the AR model appropriate for the time series analysis of the AirPassenger data.