data=read.csv(file.choose(),header = TRUE,stringsAsFactors = FALSE)

data$date=as.Date(data$date,format = "%d-%m-%Y")

data$date

library(plyr)

count(data$date)

newframe=count(data$date)

library(xts)

library(zoo)

library(tseries)

library(forecast)

library(fpp)

timeseries=xts(newframe$freq,order.by = as.POSIXct(newframe$x),strptime(newframe$x))

timeseries=ts(newframe$freq,start = 1,end = 1+(60/365),frequency = 365)

frequency(timeseries)

class(timeseries)

plot(timeseries,main="Plot of dataset as Time-series",xlab="Date",ylab="Number of emails",col="blue",lwd=3)

#Stationarity check parameters

plot(diff(log(timeseries)),lwd=3, col="blue",main="Stationary Time series")

kpss.test(diff(log(timeseries)))

adf.test(diff(log(timeseries)))

#ARIMA Model

p=pacf(diff(log(timeseries)))

q=acf(diff(log(timeseries)))

plot(q,main="Auto Correlation Function plot",col="red",lwd=3)

plot(p,main="Partial Auto Correlation Function plot",col="red",lwd=3)

model=Arima(log(timeseries),c(2,1,0))

Arimaforecast=predict(model,n.ahead = 15,level=95)

Arimaforecast=2.718^Arimaforecast$pred

Arimaforecast

autoplot(timeseries,lwd=2,col="blue",main = "Forecasted time series for 15 days using ARIMA")+forecast::autolayer(Arimaforecast,lwd=2)

#Auto Arima function

arima=auto.arima(timeseries,approximation=FALSE,stepwise = FALSE)

arima

arimaforecast=forecast(arima,h=15,level = 95)

arimaforecast

plot(arimaforecast,main="Forecasted time series for 15 days at 95% CI",lwd=3,col="blue")

accuracy(arimaforecast)

Box.test(arimaforecast$residuals,type = "Ljung-Box")

#Holt Winters

Holt\_Winters=HoltWinters(timeseries,beta = FALSE,gamma = FALSE)

Holt\_WintersPred=forecast(Holt\_Winters,h=15,level = 95)

Holt\_WintersPred

plot(Holt\_WintersPred,lwd=3,main="Forecasted time for 15 days at 95%CI using Exponential Smoothing",col="blue")

accuracy(Holt\_WintersPred)

shapiro.test(Holt\_WintersPred$residuals)

Box.test(Holt\_WintersPred$residuals,type = "Ljung-Box")

#Trend

Trend=HoltWinters(timeseries,gamma = F)

PredTrend=forecast(Trend,h=15)

plot(PredTrend)

accuracy(PredTrend)