# R Code – Exponential Smoothing and Holt-Winter Method

Motor.dat <- read.table("C:/MA\_TS/R/motororg.dat", header = T)

attach(Motor.dat)

Comp.ts <- ts(complaints,start = c(1996,1), freq = 12)

plot(Comp.ts, xlab = "TIme / months)", ylab = "complaints")

Comp.hw1 <- HoltWinters(complaints, beta = FALSE, gamma = FALSE)

plot(Comp.hw1)

Comp.hw1

Comp.hw1$SSE

Comp.hw2 <- HoltWinters(Comp.ts, alpha = 0.2, beta = FALSE, gamma = FALSE)

Comp.hw2

Comp.hw2$SSE

##-------------------------------------------------------------------------------------------------------

wine.dat <- read.table("C:/MA\_TS/R/wine.dat", header = T)

attach(wine.dat)

sweetw.ts <- ts(sweetw,start = c(1980,1), freq = 12)

plot(sweetw.ts, xlab = "TIme(months)", ylab = "sale(1000 litres)")

sweetw.hw <- HoltWinters(sweetw.ts, seasonal = "mult")

sweetw.hw

sweetw.hw$coef

sweetw.hw$SSE

sqrt(sweetw.hw$SSE/(length(sweetw)-12))

sd(sweetw)

#RMSE

ressweetw=sweetw.ts-sweetw.hw$fitted[,'xhat']

rmse=sqrt(sum(ressweetw^2)/length(ressweetw))

rmse

plot(sweetw.hw$fitted)

plot(sweetw.hw)

sweetw.predict <- predict(sweetw.hw, n.head = 4\*12)

sweetw.predict

ts.plot(sweetw.ts, sweetw.predict, lty = 1:2)

##-------------------------------------------------------------------------------------------------------

AP.hw <- HoltWinters(AP, seasonal = "mult")

plot(AP.hw)

AP.predict <- predict(AP.hw, n.ahead = 4\*12)

ts.plot(AP, AP.predict, lty = 1:2)

AP.hw$alpha

AP.hw$beta

AP.hw$gamma

AP.hw$coef

AP.predict

##-------------------------------------------------------------------------------------------------------

hwmjnj=HoltWinters(q.jnj,seasonal='multiplicative')

str(hwmjnj)

hwmjnj$fitted

plot(q.jnj,lwd=2)

lines(hwmjnj$fitted[,1],col='red',lwd=2)

tsjnj=as.ts(q.jnj)

reshwmjnj=tsjnj-hwmjnj$fitted[,'xhat']

rmse1=sqrt(sum(reshwmjnj^2)/length(reshwmjnj))

rmse1

plot(reshwmjnj,ylab='Residual')

p=predict(hwmjnj,n.ahead=20,prediction.interval=TRUE)

plot(hwmjnj,predicted.values=p)

hwajnj=HoltWinters(q.jnj,seasonal='additive')

str(hwajnj)

hwajnj$fitted

reshwajnj=tsjnj-hwajnj$fitted[,'xhat']

rmse2=sqrt(sum(reshwajnj^2)/length(reshwajnj))

rmse2

p=predict(hwajnj,n.ahead=20,prediction.interval=TRUE)

plot(hwajnj,predicted.values=p)