Mikael Simon

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Time Series

Assignment 2

1,2,3)

install.packages("zoo")

install.packages("rdatamarket")

library(rdatamarket)

electricity <- dmseries("https://datamarket.com/data/set/22wj/the-total-generation-of-electricity-by-the-us-electric-industry-monthly-data-for-the-period-jan-1985-oct-1996-for-recent-data-click-here#!ds=22wj&display=line")

4)

plot(electricity)

acf(electricity)

acf(electricity, lag.max=60)

## yes there is positive seasonality at half a year lag, and 1 year lag. bc it is outside of the blue line.

5)

electric.hw <- HoltWinters(electricity)

plot(electric.hw)

6)

electric.new <- electricity[1:(12\*7)]

electric.new.hw <-HoltWinters(electric.new)

xhat <- forecast(electric.new.hw,1)$mean

allResiduals <- c()

for(t in 85:142){

allResiduals[t-84] <- electricity[t]-xhat

electric.new <- electricity[1:t]

electric.new.hw <- HoltWinters(electric.new)

xhat <- forecast(electric.new.hw,1)$mean

}

print(mean(allResiduals^2))

print(mean(abs(allResiduals)))

> print(mean(allResiduals^2))

[1] 42.37366

> print(mean(abs(allResiduals)))

[1] 4.797694

7)

electic.hw.m <- HoltWinters(electricity, seasonal= "multiplicative")

plot(electic.hw.m)

electric.new.hw.m <-HoltWinters(electric.new, seasonal="multiplicative")

xhat.m <- forecast(electric.new.hw.m,1)$mean

allResiduals <- c()

for(t in 85:142){

allResiduals[t-84] <- electricity[t]-xhat.m

electric.new <- electricity[1:t]

electric.new.hw.m <- HoltWinters(electric.new)

xhat <- forecast(electric.new.hw,1)$mean

}

print(mean(allResiduals^2))

print(mean(abs(allResiduals)))

8)

electric.hw$alpha

electric.hw$beta

electric.hw$gamma

> electric.hw$alpha

alpha

0.1579673

> electric.hw$beta

beta

0

> electric.hw$gamma

gamma

0.331934

|  |  |  |
| --- | --- | --- |
| **alpha, beta, gamma** | **MSE** | **MAD** |
| .1579673, 0, .331934 | 42.37366 | 4.797694 |
| .1557498, 0, 0 | 114.2796 | 8.100938 |
| .5,0,0 | 96.27439 | 7.707404 |
| .5, .5, .5 | 105.4001 | 8.148285 |
| 1, 1, 1 | 231.6275 | 12.33698 |

9) I would choose the alpha, beta, and gamma parameters that reduce the MSE and MAD, which are alpha=.1579673, beta=0, and gamma=.331934.

seasonality is appropriate.