

Practice 4 R: Exponential smoothing and Holt-Winters forecasting

1. Generate an IID noise of length n and find its exponential smoothing series. The following code generates the Holt Winters smoothing for stationary series with no trend and nor seasonality.

- `n<-100`
- `x<-rnorm(n)`
- `plot(x)`
- `a<-0.1`
- `y<-HoltWinters(x,alpha=a,beta=F,gamma=F)`
- `plot(y)`

Change n . Change parameter “ a ” between 0 and 1. Simulate other IID noises with other laws. If do not prefix “ a ” the parameter is estimated.

2. Apply Holt Winters smoothing to real data with trend and seasonality.

- `x<-AirPassengers`
- `a<-0.2`
- `b<-0.3`
- `c<-0.8`
- `y<-HoltWinters(x,alpha=a,beta=b, gamma=c)`
- `plot(y)`

Change the series and use for example `log(x)`, `diff(log(x))`, `diff(x,12)`, etc.
Change the values of parameters a , b and c

3. Holt Winters prediction:

Do

- `x<-AirPassengers`
- `a<-0.3`
- `b<-0.1`
- `c<-0.8`
- `y<-HoltWinters(x,alpha=a,beta=b,gamma=c)`
- `plot(y)`
- `z<-predict(y,n.ahead=4*12)`
- `plot(y,z,lty=1:2)`

4. If a, b, c are not prefixed we can do

- `x<-AirPassengers`
- `y<-HoltWinters(x)`
- `y$alpha`
- `y$beta`
- `y$gamma`
- `plot(y)`
- `z<-predict(y,n.ahead=4*12)`
- `plot(y,z,lty=1:2)`

Observe the estimations are $a=0.248$, $b=0.034$ and $c=1$.

5. Another example: wine sales in Australia.

- `library(forecast)`
- `x<-wineind`
- `y<-HoltWinters(x)`
- `plot(x)`
- `y$alpha`
- `y$beta`
- `y$gamma`
- `plot(y)`
- `z<-predict(y,n.ahead=4*12)`
- `plot(y,z,lty=1:2)`

Do the same for other examples.