TimeSeriesLabC

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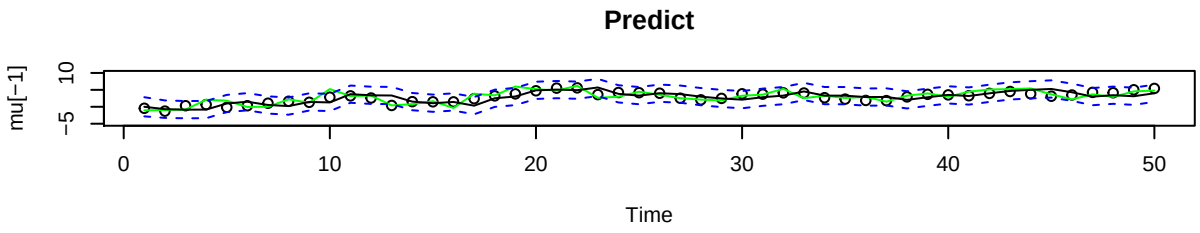
Contents

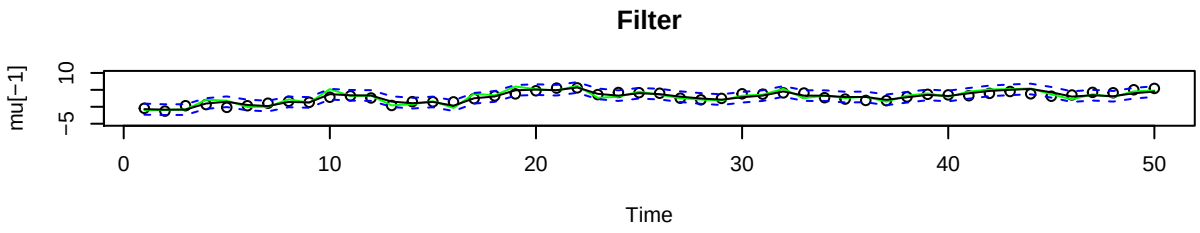
Assignment 1

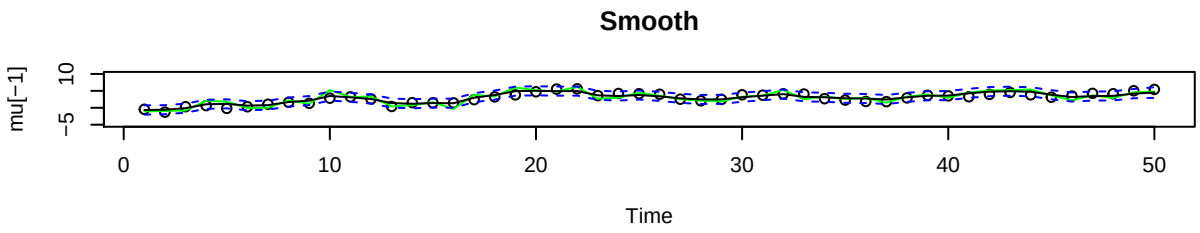
a

```
library(astsa)
```

```
# generate data
set.seed(1); num = 50
w = rnorm(num+1,0,1); v = rnorm(num,0,1)
mu = cumsum(w) # state: mu[0], mu[1],..., mu[50]
y = mu[-1] + v # obs: y[1],..., y[50]
# filter and smooth (Ksmooth0 does both)
ks = Ksmooth0(num, y, A=1, mu0=0, Sigma0=1, Phi=1, cQ=1, cR=1) # start figure
par(mfrow=c(3,1)); Time = 1:num
plot(Time, mu[-1], main='Predict', ylim=c(-5,10))
lines(Time,y,col="green")
lines(ks$xp)
lines(ks$xp+2*sqrt(ks$Pp), lty=2, col=4)
lines(ks$xp-2*sqrt(ks$Pp), lty=2, col=4)
plot(Time, mu[-1], main='Filter', ylim=c(-5,10))
lines(Time,y,col="green")
lines(ks$xf)
lines(ks$xf+2*sqrt(ks$Pf), lty=2, col=4)
lines(ks$xf-2*sqrt(ks$Pf), lty=2, col=4)
plot(Time, mu[-1], main='Smooth', ylim=c(-5,10))
lines(Time,y,col="green")
lines(ks$xs)
lines(ks$xs+2*sqrt(ks$Ps), lty=2, col=4)
lines(ks$xs-2*sqrt(ks$Ps), lty=2, col=4)
```








```
mu[1]; ks$x0n; sqrt(ks$P0n) # initial value info
```

```
## [1] -0.6264538
```

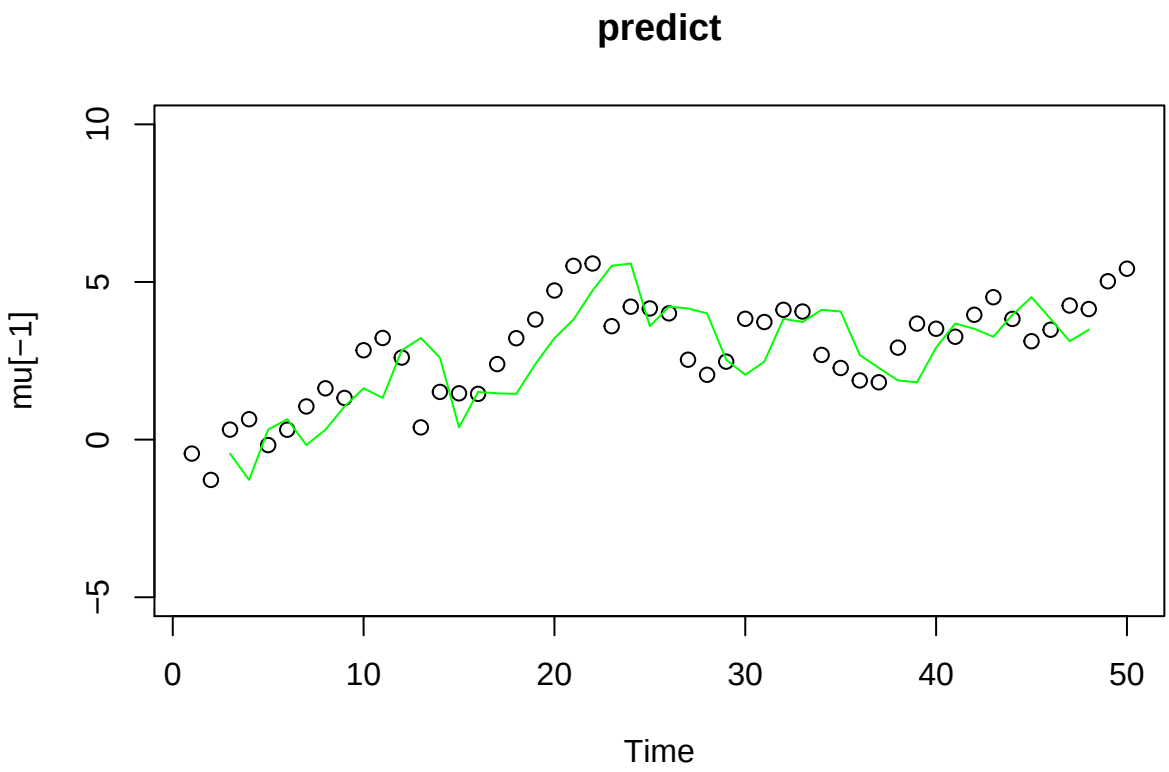
```
##             [,1]
## [1,] -0.3241541
```

```
##           [,1]
## [1,] 0.7861514
```

b

```
ts <- filter(mu[-1], filter = c(0,0,0,0,1), method = "convolution")

plot( Time, mu[-1], main ='predict', ylim =c(-5,10))
lines(Time, ts, col= "green")
```


predict
mu[−1]
10
5
0
−5
0
10
20
30
40
50
Time