Actualizacion de ecuaciones univariada

2022-07-25

```
#La base de datos freeny tiene la siguiente estructura:
head(freeny)
```

```
##             y lag.quarterly.revenue price.index income.level market
## 1962.25 8.792                 8.796       4.710        5.821
## 1962.5  8.791                 8.792       4.702        5.826
## 1962.75 8.815                 8.791       4.689        5.831
## 1963    8.813                 8.815       4.686        5.840
## 1963.25 8.908                 8.813       4.640        5.850
## 1963.5  8.937                 8.908       4.626        5.865
```

```
#A. Posterior en t=19
m19 <- c(8, 0.35, -0.27)
C19 <- matrix(c(0.00002, 0.00001, -0.00002, 0.00001, 0.00004, -0.00001
                -0.00001, 0.00005), ncol = 3)

#Valores conocidos de G20 y W20
G20 <- matrix(c(1.05, 0, 0, 0, 1.02, 0, 0, 0, 0.99), ncol=3)
W20 <- matrix(c(0.00001, 0, 0, 0, 0.0001, -0.00001, 0, -0.00001, 0.0000

#B. Priori de parámetros en t=20
a20 <- G20 %*% m19
R20 <- G20 %*% C19 %*% t(G20) + W20
a20
```

```
##         [,1]
## [1,]  8.4000
## [2,]  0.3570
## [3,] -0.2673
```

```
R20
```

```
##             [,1]       [,2]       [,3]
## [1,]  3.205e-05  1.071e-05 -2.079e-05
## [2,]  1.071e-05  1.416e-04 -2.010e-05
## [3,] -2.079e-05 -2.010e-05  9.901e-05
```

```r
freeny[20,]
```

```
##          y lag.quarterly.revenue price.index income.level market.po
## 1967 9.314                 9.284        4.51        6.061
```

```r
F20 <- c(1, 6.06093, 4.51018) #Variables explicativas en t=20. El 1 es
                              #agregar el intercepto
V20 <- 0.002

#C. Pronóstico a un periodo.
f20 <- t(F20) %*% a20
Q20 <- t(F20) %*% R20 %*% F20 + V20
f20
```

```
##       [,1]
## [1,] 9.358
```

```r
Q20
```

```
##           [,1]
## [1,] 0.008092
```

```r
c(qnorm(0.025, mean = f20, sd = sqrt(Q20)), qnorm(0.975, mean = f20,
                                                  sd = sqrt(Q20)))
```

```
## [1] 9.182 9.534
```

```r
#Valor observado de Y20:
Y20 <- 9.31378
#D. Posterior en t=20
A20 = R20 %*% F20 %*% solve(Q20)
e20 = Y20-f20
m20 = a20 + A20 %*% e20
C20 = R20 - A20 %*% Q20 %*% t(A20)
m20
```

```
##          [,1]
## [1,]  8.4000
## [2,]  0.3527
## [3,] -0.2690
```

```
C20
```

```
##             [,1]       [,2]       [,3]
## [1,]  3.205e-05  1.040e-05 -2.091e-05
## [2,]  1.040e-05  6.674e-05 -4.933e-05
## [3,] -2.091e-05 -4.933e-05  8.759e-05
```

Pronosticos

```
freeny[21,]
```

```
##             y lag.quarterly.revenue price.index income.level market.p
## 1967.25 9.35                 9.314       4.504        6.071
```

```
#Valores iniciales.
#m20 y C20 se definieron en el ejemplo pasado
a20_0 <- m20
R20_0 <- C20

#k = 1
#Valores conocidos de F21, G21, V21 y W21
F21 <- c(1, 6.071, 4.504)
G21 <- matrix(c(1.01, 0, 0, 0, 1, 0, 0, 0, 0.98), ncol=3)
V21 <- 0.001
W21 <- matrix(c(0.00001, 0, 0, 0, 0.0001, -0.00001, 0, -0.00001, 0.0000

#Distribución de estados en t=21
a20_1 <- G21 %*% a20_0
R20_1 <- G21 %*% R20_0 %*% t(G21) + W21

#Distribución de pronóstico de Y21
f20_1 <- t(F21) %*% a20_1
Q20_1 <- t(F21) %*% R20_1 %*% F21 + V21
f20_1
```

```
##       [,1]
## [1,] 9.438
```

```
Q20_1
```

```
##          [,1]
## [1,] 0.006659
```

```
freeny[22,]
```

```
##            y lag.quarterly.revenue price.index income.level market.p
## 1967.5 9.358                  9.35       4.494         6.08
```

```
#k = 2
#Valores conocidos de F22, G22, V22 y W22
F22 <- c(1, 6.08, 4.494)
G22 <- matrix(c(1, 0, 0, 0, 1, 0, 0, 0, 0.99), ncol=3)
V22 <- 0.002
W22 <- matrix(c(0.00002, 0, 0, 0, 0.0001, -0.00001, 0, -0.00001, 0.0000

#Distribución de estados en t=22
a20_2 <- G22 %*% a20_1
R20_2 <- G22 %*% R20_1 %*% t(G22) + W22

#Distribución de pronóstico de Y22
f20_2 <- t(F22) %*% a20_1
Q20_2 <- t(F22) %*% R20_1 %*% F22 + V22
f20_2
```

```
##       [,1]
## [1,] 9.444
```

```
Q20_2
```

```
##           [,1]
## [1,] 0.007668
```

```
#Covarianzas
C20_1_1 <- R20_1
C20_2_1 <- G22 %*% C20_1_1 #Covarianza entre theta22 y theta 21
cov_Y22_Y21 <- t(F22) %*% C20_2_1 %*% F21
cov_Y22_Y21
```

```
##           [,1]
## [1,] 0.005653
```