

Time Series Analysis: Second laboratory

5 de febrero de 2020

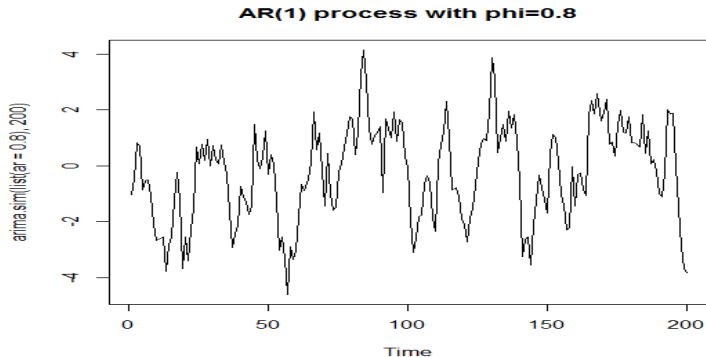
Second Laboratory contents.

- Simulation of an $AR(p)$ processes.
- Effects on ACF and PACF of changes in specifications of the $AR(1)$
- Simulation of a $MA(q)$ processes
- Effects on ACF and PACF of changes in specifications of the $MA(1)$
- Tentative identification of ARMA models for series in data market.

Simulation of an AR(p) models.

Codigo en R for an AR(1)

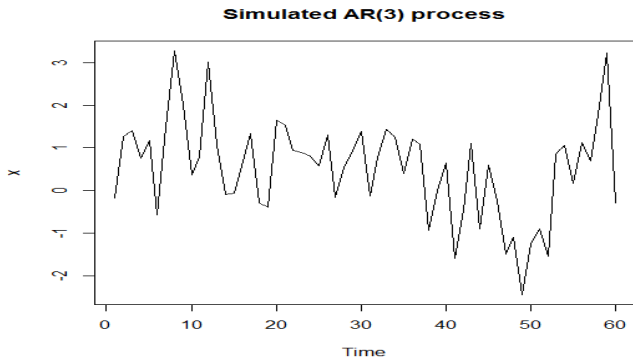
```
x<-arima.sim(list(ar=0.8),n=200, rand.gen=rnorm)
```



Simulation of an AR(p) models.

Codigo en R for an AR(3)

```
x<-arima.sim(list(ar=c(0.4,-0.2,0.3)),n=200)
```



Effects on ACF and PACF of changes in specifications of the AR(1).

```
arfun<-function(N,n,phi,s,c){
#simulates N AR(p) processes with n observations,parameter phi standard deviation of a=s
M=matrix(ncol=N,nrow=n)
for (i in 1:N){
x=arima.sim(list(ar=phi),sd=s,n)
M[,i]=x+c
}
#Computes the variance ACF and PACF
variance=matrix(ncol=N,nrow=1)
m=matrix(ncol=N,nrow=1)
rho=matrix(ncol=N,nrow=25)
pi=matrix(ncol=N,nrow=24)
for(i in 1:N){
variance[i]=var(M[,i])
m[i]=mean(M[,i])
r=acf(M[,i], lag.max=24,plot=FALSE)
rho[,i]=r$acf
pr=acf(M[,i],lag.max=24,type="partial",plot=FALSE)
pi[,i]=pr$acf
}
#boxplots for the ACF and PACF of lags 1 to 4

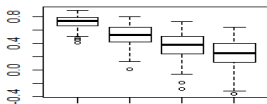
par(mfrow=c(2,2))
boxplot(rho[2,],rho[3,],rho[4,],rho[5,], main="ACF coefficients for lags 1 to 4")
boxplot(pi[1,],pi[2,],pi[3,],pi[4,], main="PACF coefficients for lags 1 to 4")
plot(variance[1:N],type="l", main="Variance of the generated processes")
plot(m[1:N],type="l", main="Mean of the generated processes")
```

Effects on ACF and PACF of changes in specifications of the AR(1).

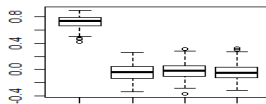
Codigo en R for simulated AR(1) processes

```
arfun(200,60,0.8,1,0)
```

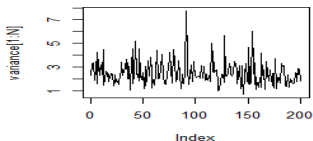
ACF coefficients for lags 1 to 4



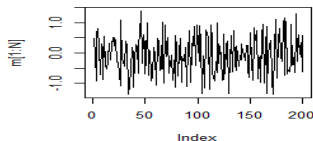
PACF coefficients for lags 1 to 4



Variance of the generated process:



Mean of the generated processes



Assignment.Deadline Feb, 13th.

Use the function `arfun` to discuss changes in the unconditional mean and variances, and in the ACF and PACF coefficients when:

- The parameter N =number of simulated processes changes.
- The parameter n =number of observations for each process changes.
- The parameter ϕ changes.
- The parameter c =constant of the process changes.
- The parameter σ_a^2 changes.