MA 471: Lab Assignment 05

Due on Tuesday, September 12, 2017

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Contents

Problem 1

R Code :

```
############Ques 1######################
cat("\t\t\t\tQuestion 1\n\n")
N_ar<-array(c(10,20,100,500,1000))
size_ar<-array(c(20,50,100,500,1000))
#N_ar<-array(c(10,100,1000,5000,10000))
#size_ar<-array(c(20,50,100,500,1000))   ######### given in question
p_seed<-.4                              ######### just a random value
conf_seed<-95                           ######### 95% confidence interval
z_up<-qchisq(conf_seed/100,1)          ##########  quantile point



coveragep_ar<-array(dim=c(length(size_ar),2))
p_ar<-seq(0,1,by = .01)
for(k_v in 1:length(N_ar)){
N<-N_ar[k_v]
for(j in 1:length(size_ar)){
     counterp<-0
     for(i in 1:N){
          sample_ar<-rbinom(size_ar[j],1,p_seed)
          samp_mean<-mean(sample_ar)
          samp_sum<-sum(sample_ar)
          Likelihood_mle<-(log(samp_mean)*samp_sum)+(log(1-samp_mean)*(size_ar[j]-samp
              _sum))
          Likelihood_p<-(log(p_ar)*samp_sum)+(log(1-p_ar)*(size_ar[j]-samp_sum))
          p_final<-2*(Likelihood_mle-Likelihood_p)<z_up
          ci_low<-min(p_ar[p_final])
          ci_high<-max(p_ar[p_final])
          #cat(paste("The confidence interval is\t\t[",ci_low,",",ci_high,"]\n"))
          if(ci_high!=Inf && ci_low!=Inf && ci_low!=-Inf)
               if((p_seed<=ci_high)&&(p_seed>=ci_low))
                    counterp<-counterp+1

     }
     coveragep_ar[j,1]<-size_ar[j]
     coveragep_ar[j,2]<-counterp/N
}
cat(paste("\n_____________________________________________________________\n"))
cat(paste("\nN value is ",N,"\n"))
#print(coveragep_ar)
cat(paste("The theoretical coverage probability is ",conf_seed/100,"\n\n"))

for(i in 1:length(size_ar)){
     cat(paste("Size=",coveragep_ar[i,1],",\nThe calculated coverage probability is \t
         \t\t",coveragep_ar[i,2],"\n\n"))
}

}
```

Problem 1 continued on next page. . .

```
The confidence interval is : [0.33,0.38]
```

```
N value is  10
The theoretical coverage probability is  0.95

Size= 20 ,
The calculated coverage probability is            1

Size= 50 ,
The calculated coverage probability is            1

Size= 100 ,
The calculated coverage probability is            1

Size= 500 ,
The calculated coverage probability is            1

Size= 1000 ,
The calculated coverage probability is            1
```

```
N value is  20
The theoretical coverage probability is  0.95

Size= 20 ,
The calculated coverage probability is            0.95

Size= 50 ,
The calculated coverage probability is            0.95

Size= 100 ,
The calculated coverage probability is            1

Size= 500 ,
The calculated coverage probability is            0.95

Size= 1000 ,
The calculated coverage probability is            0.95
```

```
N value is  100
The theoretical coverage probability is  0.95

Size= 20 ,
The calculated coverage probability is            0.95

Size= 50 ,
The calculated coverage probability is            0.92

Size= 100 ,
The calculated coverage probability is            0.95

Size= 500 ,
The calculated coverage probability is            0.96
```

Problem 1 continued on next page. . .

```
Size= 1000 ,
The calculated coverage probability is           0.97
```

```
N value is  500
The theoretical coverage probability is  0.95

Size= 20 ,
The calculated coverage probability is           0.966

Size= 50 ,
The calculated coverage probability is           0.94

Size= 100 ,
The calculated coverage probability is           0.944

Size= 500 ,
The calculated coverage probability is           0.962

Size= 1000 ,
The calculated coverage probability is           0.95
```

```
N value is  1000
The theoretical coverage probability is  0.95

Size= 20 ,
The calculated coverage probability is           0.967

Size= 50 ,
The calculated coverage probability is           0.947

Size= 100 ,
The calculated coverage probability is           0.947

Size= 500 ,
The calculated coverage probability is           0.943

Size= 1000 ,
The calculated coverage probability is           0.934
```

Problem 2

R Code :

```
############Ques 2######################
temp<-read.table("d-csp0108.txt",header=TRUE)
conf<-95      #######95% confidence interval


cat("\n\n\n\t\t\t\tQuestion 2\n\n")



C_ret=array(dim=c(dim(temp)[1],2))
n=dim(temp)[1]
C_ret[,1]=temp[,2]
C_ret[,2]=log(1+temp[,2])

C_mean=mean(C_ret[,2])
C_sd=sd(C_ret[,2])
C_skew=mean(((C_ret[,2]-C_mean)/C_sd)^3)
C_kurt=mean(((C_ret[,2]-C_mean)/C_sd)^4)

z=qnorm((1-(conf/100))/2)
C_low=C_skew+(z*sqrt(6/n))
C_high=C_skew-(z*sqrt(6/n))
cat(paste("Skewness of C data\t\t",C_skew,"\n",conf,"% Skewness interval of C\t [",C_low,",",C_high,"]\n"))
if((C_low<=0)&&(C_high>=0))
  cat(paste("\nSkewness measure of the log-returns for C data is zero.\n\n"))
if((C_low>=0)||(C_high<=0))
  cat(paste("\nSkewness measure of the log-returns for C data is not zero.\n\n"))
C_low=C_kurt+(z*sqrt(24/n))-3
C_high=C_kurt-(z*sqrt(24/n))-3
cat(paste("Excess Kurtosis of C data\t",C_kurt-3,"\n",conf,"% Kurtosis interval of C\t [",C_low,",",C_high,"]\n\n"))
if((C_low<=0)&&(C_high>=0))
  cat(paste("\nExcess Kurtosis measure of the log-returns for C data is zero.\n\n"))
if((C_low>=0)||(C_high<=0))
  cat(paste("\nExcess Kurtosis measure of the log-returns for C data is not zero.\n\n"))



SP_ret=array(dim=c(dim(temp)[1],2))
n=dim(temp)[1]
SP_ret[,1]=temp[,3]
SP_ret[,2]=log(1+temp[,3])

SP_mean=mean(SP_ret[,2])
SP_sd=sd(SP_ret[,2])
SP_skew=mean(((SP_ret[,2]-SP_mean)/SP_sd)^3)
SP_kurt=mean(((C_ret[,2]-C_mean)/C_sd)^4)
```

Problem 2 continued on next page. . .

```
z=qnorm((1-(conf/100))/2)
SP_low=SP_skew+(z*sqrt(6/n))
SP_high=SP_skew-(z*sqrt(6/n))
cat(paste("Skewness of SP data\t\t",SP_skew,"\n",conf,"% Skewness interval of SP\t [",
    SP_low,",",SP_high,"]\n"))
if((SP_low<=0)&&(SP_high>=0))
  cat(paste("\nSkewness measure of the log-returns for SP data is zero.\n\n"))
if((SP_low>=0)||(SP_high<=0))
  cat(paste("\nSkewness measure of the log-returns for SP data is not zero.\n\n"))
SP_low=SP_kurt+(z*sqrt(24/n))-3
SP_high=SP_kurt-(z*sqrt(24/n))-3
cat(paste("Excess Kurtosis of SP data\t",SP_kurt-3,"\n",conf,"% Kurtosis interval of
    SP\t [",SP_low,",",SP_high,"]\n"))
if((SP_low<=0)&&(SP_high>=0))
  cat(paste("\nExcess Kurtosis measure of the log-returns for SP data is zero.\n\n"))
if((SP_low>=0)||(SP_high<=0))
  cat(paste("\nExcess Kurtosis measure of the log-returns for SP data is not zero.\n\n
      "))
```

```
Skewness of C data        0.538381840463727
95 % Skewness interval of C    [ 0.431324196658865 , 0.645439484268588 ]
Skewness measure of the log-returns for C data is not zero.

Excess Kurtosis of C data      42.7373959533067
95 % Kurtosis interval of C    [ 42.523280665697 , 42.9515112409165 ]
Excess Kurtosis measure of the log-returns for C data is not zero.
```

```
Skewness of SP data       -0.140780246722619
95 % Skewness interval of SP   [ -0.247837890527481 , -0.0337226029177579 ]
Skewness measure of the log-returns for SP data is not zero.

Excess Kurtosis of SP data     42.7373959533067
95 % Kurtosis interval of SP   [ 42.523280665697 , 42.9515112409165 ]
Excess Kurtosis measure of the log-returns for SP data is not zero.
```