ภาคผนวก

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โปรแกรมคอมพิวเตอร์ที่ใช้ในงานวิจัย

การจำลองและการประมวลผลข้อมูลทำได้โดยการใช้โปรแกรมสำเร็จรูป R เวอร์ชัน 2.10.1

<u>คำสั่งในเขียนโปรแกรม R ของการแจกแจงปกติสองตัวแปร</u>

```
library(MSBVAR)
fix(ratio)
ratio=function(n)
{
M=1000
N=1000
count=rep(0,M)
count1=rep(0,M)
for (g in 1:3)
{
for(h in 1:2)
{
for (i in 5:8)
{
rho= 0.1*i*(-1)^(h-1)
cv=0.2+0.3*(g-1)
# กำหนดค่าเฉลี่ยประชากรของตัวแปรช่วย คือ 600
mu_x=600
sigma_x=cv*mu_x
var_x= sigma_x* sigma_x
# กำหนดค่าเฉลี่ยประชากรของตัวแปรเป้าหมาย คือ 600
mu_y=600
```

```
sigma_y=cv*mu_y
var_y= sigma_y* sigma_y
cov<-rho*sqrt(var_x * var_y)
t= rmultnorm(N, matrix(c(mu_x, mu_y),2,1), vmat=matrix(c(var_x, cov, cov,
sigma_y),2,2))
{
for (j in 1:M)
{
k=seq(1:N)
l=sample(k,n)
x=t[l,1]
y=t[l,2]
x_bar=mean(x)
r_true=mean(t[,2])/mean(t[,1])
r_sample=mean(y)/mean(x)
r_ratio=mean(y/x)
#********** ratio  of  mean **********
diff=y-(r_sample*x)
diff_2=diff^2
sr_2=(1/(n-1))*sum(diff_2)
varhat_r=((N-n)/(N*(( x_bar)^2)))*((sr_2)/n)
if  (n <= 30 )
{
z=qt(0.975,n-1)
r_lower=r_sample-z*sqrt(varhat_r)
r_upper=r_sample+z*sqrt(varhat_r)
if ( (r_lower<r_true)&(r_true<r_upper))  count[j]=1
else count[j]=0
}
```

```
else
{
z=qnorm(0.975)
r_lower=r_sample-z*sqrt(varhat_r)
r_upper=r_sample+z*sqrt(varhat_r)
if ( (r_lower<r_true)&(r_true<r_upper))  count[j]=1
else count[j]=0
}
#********** mean of  ratio**********
dif= (y/x) - r_ratio
dif_2=dif^2
sr2_2=(1/(n-1))*sum(dif_2)
varhat2_r=((N-n)/N)*((sr2_2)/n)
if  (n <= 30 )
{
z=qt(0.975,n-1)
r2_lower= r_ratio -z*sqrt(varhat2_r)
r2_upper= r_ratio +z*sqrt(varhat2_r)
if ( (r2_lower<r_true)&(r_true<r2_upper))  count1[j]=1
else count1[j]=0
}
else
{
z=qnorm(0.975)
r2_lower= r_ratio -z*sqrt(varhat2_r)
r2_upper= r_ratio +z*sqrt(varhat2_r)
if ( (r2_lower<r_true)&(r_true<r2_upper))  count1[j]=1
else count1[j]=0
}
```

```
}
cat(" open the statistics table is ")
cat(z)
cat(" cv = ")
cat(cv)
cat("  rho = ")
cat(rho)
cat(" \n ")
cat(" ratio of mean  ")
cat(mean(count))
cat("     ")
cat(" mean of ratio  ")
cat(mean(count1))
cat("     ")
cat(" \n ")
cat(" \n ")
}
}
}
}
}
ratio(10)
ratio(100)
ratio(200)
```

คำสั่งในเขียนโปรแกรม R ของการแจกแจงปัวซงล็อกนอร์มัลสองตัวแปร

```
library(poilog)
fix(ratio)
ratio=function(n)
{
M=1000
N=1000
count=rep(0,M)
count1=rep(0,M)
for (g in 1:3)
{
for(h in 1:2)
{
for (i in 5:8)
{
rho= 0.1*i*(-1)^(h-1)
cv=0.2+0.3*(g-1)
m=100
mu1=log(m)
mu2= log(m)
sigma=sqrt(log(cv^2+1))
sig1=sigma
sig2=sigma
t= rbipoilog(N, mu1, mu2, sig1, sig2, rho, nu1=1, nu2=1,condS=FALSE, keep0=FALSE)
{
for (j in 1:M)
{
k=seq(1:N)
l=sample(k,n)
```

```
x=t[l,1]
y=t[l,2]
x_bar=mean(x)
r_true=mean(t[,2])/mean(t[,1])
r_sample=mean(y)/mean(x)
r_ratio=mean(y/x)
#********** ratio  of  mean **********
diff=y-(r_sample*x)
diff_2=diff^2
sr_2=(1/(n-1))*sum(diff_2)
varhat_r=((N-n)/(N*(( x_bar)^2)))*((sr_2)/n)
if  (n <= 30 )
{
z=qt(0.975,n-1)
r_lower=r_sample-z*sqrt(varhat_r)
r_upper=r_sample+z*sqrt(varhat_r)
if ( (r_lower<r_true)&(r_true<r_upper))  count[j]=1
else count[j]=0
}
else
{
z=qnorm(0.975)
r_lower=r_sample-z*sqrt(varhat_r)
r_upper=r_sample+z*sqrt(varhat_r)
if ( (r_lower<r_true)&(r_true<r_upper))  count[j]=1
else count[j]=0
}
#********** mean of  ratio**********
dif= (y/x) - r_ratio
```

```
dif_2=dif^2
sr2_2=(1/(n-1))*sum(dif_2)
varhat2_r=((N-n)/N)*((sr2_2)/n)
if  (n <= 30 )
{
z=qt(0.975,n-1)
r2_lower= r_ratio -z*sqrt(varhat2_r)
r2_upper= r_ratio +z*sqrt(varhat2_r)
if ( (r2_lower<r_true)&(r_true<r2_upper))  count1[j]=1
else count1[j]=0
}
else
{
z=qnorm(0.975)
r2_lower= r_ratio -z*sqrt(varhat2_r)
r2_upper= r_ratio +z*sqrt(varhat2_r)
if ( (r2_lower<r_true)&(r_true<r2_upper))  count1[j]=1
else count1[j]=0
}
}
cat(" open the statistics table is ")
cat(z)
cat(" cv = ")
cat(cv)
cat("  rho = ")
cat(rho)
cat(" \n ")
cat(" ratio of mean  ")
cat(mean(count))
```

```
cat("     ")
cat(" mean of ratio  ")
cat(mean(count1))
cat("     ")
cat(" \n ")
cat(" \n ")
}
}
}
}
}
ratio(10)
ratio(100)
ratio(200)
```

คำสั่งในเขียนโปรแกรม R ของการแจกแจงโคชีสองตัวแปร

```
library(fMultivar)
fix(ratio)
ratio=function(n)
{
M=1000
N=1000
count=rep(0,M)
count1=rep(0,M)
for(h in 1:2)
{
for (i in 5:8)
{
rho= 0.1*i*(-1)^(h-1)
t= rcauchy2d(N, rho)
{
for (j in 1:M)
{
k=seq(1:N)
l=sample(k,n)
x=t[l,1]
y=t[l,2]
x_bar=mean(x)
r_true=mean(t[,2])/mean(t[,1])
r_sample=mean(y)/mean(x)
r_ratio=mean(y/x)
#********** ratio  of  mean **********
diff=y-(r_sample*x)
diff_2=diff^2
```

```
sr_2=(1/(n-1))*sum(diff_2)
varhat_r=((N-n)/(N*(( x_bar)^2)))*((sr_2)/n)
if  (n <= 30 )
{
z=qt(0.975,n-1)
r_lower=r_sample-z*sqrt(varhat_r)
r_upper=r_sample+z*sqrt(varhat_r)
if ( (r_lower<r_true)&(r_true<r_upper))  count[j]=1
else count[j]=0
}
else
{
z=qnorm(0.975)
r_lower=r_sample-z*sqrt(varhat_r)
r_upper=r_sample+z*sqrt(varhat_r)
if ( (r_lower<r_true)&(r_true<r_upper))  count[j]=1
else count[j]=0
}
#********** mean of  ratio**********
dif= (y/x) - r_ratio
dif_2=dif^2
sr2_2=(1/(n-1))*sum(dif_2)
varhat2_r=((N-n)/N)*((sr2_2)/n)
if  (n <= 30 )
{
z=qt(0.975,n-1)
r2_lower= r_ratio -z*sqrt(varhat2_r)
r2_upper= r_ratio +z*sqrt(varhat2_r)
if ( (r2_lower<r_true)&(r_true<r2_upper))  count1[j]=1
```

```
else count1[j]=0
}
else
{
z=qnorm(0.975)
r2_lower= r_ratio -z*sqrt(varhat2_r)
r2_upper= r_ratio +z*sqrt(varhat2_r)
if ( (r2_lower<r_true)&(r_true<r2_upper))  count1[j]=1
else count1[j]=0
}
}
cat(" open the statistics table is ")
cat(z)
cat("  rho = ")
cat(rho)
cat(" \n ")
cat(" ratio of mean  ")
cat(mean(count))
cat("     ")
cat(" mean of ratio  ")
cat(mean(count1))
cat("     ")
cat(" \n ")
cat(" \n ")
}
}
}
}
ratio(10)
```

ratio(100)

ratio(200)