**Submitted code**

rm(list=ls(all=TRUE))

library(MASS)

#Install package betareg

library(betareg)

library(robustbetareg)

#dt=read.csv(file.choose(),header=T)

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data("GasolineYield")

y=GasolineYield[,1]

xx=GasolineYield[,-1]

x=xx[,-5]

#x=scale(x, center = TRUE)

data=data.frame(y,x)

p=5

model<- betareg(y ~., data = data)

#data=data.frame(y,x1,x2,x3,x4,x5,x6)

#p=7

#model<- betareg(yield~.,data=GasolineYield)

summary(model)

be <- model$coefficients$mean

phi=model$coefficients$precision

xw=solve(vcov(model))[1:p,1:p]

lemda=eigen(xw)$values

alpha = (eigen(xw)$vectors)%\*%be

I=diag(1,p)

lemax=max(lemda)

almin=min(alpha^2)

almax=max(alpha^2)

lemin=min(lemda)

### Improved Shrinkage Estimators ###

k1=k1=phi/almin

k2=max(sqrt(phi/(alpha^2)))

k3=max(k1)

k4=(p\*phi)/(sum(alpha^2))

k4a=sqrt((p\*phi)/(sum(alpha^2)))

k5=(p\*phi)/(sum(lemda\*(alpha^2)))

k6=(abs(min(phi/(2\*alpha^2+phi/lemda)))) #k-lmin

kkl2=abs(max(phi/(2\*alpha^2+phi/lemda))) #k-lmax

### Completely new Shrinkage Estimators ###

q1=phi/almin

q2=max((phi/(alpha^2))\*lemda)

q3=mean((phi\*lemda)/(alpha^2))

#q4=max(1/q)

q5=1/k5

#q6=(sqrt(kkl2))^(1/4)

### Liu parameter

dls=abs(max(0,(((alpha^2))/((phi/lemda)+(alpha^2)))))

d=min(phi/(alpha^2))

d2=sqrt(d)

q6=sqrt(q5)

### BRR ###

RR1=solve(xw + (k1\*I))%\*%xw%\*%be

RR2=solve(xw + I)%\*%xw%\*%be

RR3=solve(xw + I)%\*%(xw + k5\*I)%\*%be

RR4=solve(xw + k6\*I)%\*%(xw - k6\*I)%\*%be

#library(robustbetareg)

robust1<-robustbetareg(y~., data=data, type = "MDPDE", alpha=0.09)

rr=robust1$coefficients$mean

robust2<-robustbetareg(y~., data=data, type = "SMLE", alpha=0.09)

rr2=robust2$coefficients$mean

robust3<-robustbetareg(y~., data=data, type = "LSMLE", alpha=0.09)

rr3=robust3$coefficients$mean

robust4<-robustbetareg(y~., data=data, type = "LMDPDE", alpha=0.09)

rr4=robust4$coefficients$mean

k1a=phi/min(rr^2)

k1b=phi/min(rr2^2)

k1c=phi/min(rr3^2)

k1d=phi/min(rr4^2)

#plotenvelope(rr3)

#plotenvelope(rr4)

e=lemda

msemle=sum(phi/e)

mseridge=phi\*sum((e+(k1^2)\*(be^2))/(e+k1)^2)

mseridge\_rr=phi\*sum((e+(k1^2)\*(rr^2))/(e+k1)^2)

mseridge\_rr2=phi\*sum((e+(k1^2)\*(rr2^2))/(e+k1)^2)

mseridge\_rr3=phi\*sum((e+(k1^2)\*(rr3^2))/(e+k1)^2)

mseridge\_rr4=phi\*sum((e+(k1^2)\*(rr4^2))/(e+k1)^2)

res=c(msemle,mseridge,mseridge\_rr,mseridge\_rr2,mseridge\_rr3,mseridge\_rr4)

res1=cbind(be,RR1,rr,rr2,rr3,rr4)

dat=rbind(res1,res)

colnames(dat)=c('BR','Ridge','Robust\_A','Robust\_B','Robust\_C','Robust\_D')

rownames(dat)=c('Intercept','X1','X2','X3','X4','MSE')

dat

library(car)

VIF=vif(model)

VIF

library(corrplot)

M = cor(x)

#corrplot(M, method = 'number') # colorful number

corrplot(M, method = 'number', mar = c(0, 0, 2, 0), tl.cex = 2)

plot(model)