require(jagsUI)

require(loo)

setwd("C:/R files BHMRA")

attach("DS\_9\_4.Rdata")

cat("model{for(i in 1:n){

F[i] ~dnorm( beta[1]\*x1[i] + beta[2]\*(x2[i]-mean(x2[]))+beta[3]\*(x3[i]-mean(x3[])),tau.F)

# 1st response

logit(Q1[i,1]) <- alpha1[1]-lam[1]\*F[i]

p1[i,1] <- Q1[i,1]

for(j in 2:4){ logit(Q1[i,j]) <- alpha1[j]-lam[1]\*F[i]

p1[i,j] <- Q1[i,j] - Q1[i,j-1]}

p1[i,5] <- 1 - Q1[i,4]

y1[i] ~ dcat(p1[i,])

LL[i,1] <- equals(y1[i],1)\*log(p1[i,1])+ equals(y1[i],2)\*log(p1[i,2])

+ equals(y1[i],3)\*log(p1[i,3])+ equals(y1[i],4)\*log(p1[i,4])+ equals(y1[i],5)\*log(p1[i,5])

# 2nd response

logit(Q2[i,1]) <- alpha2[1]-lam[2]\*F[i]

p2[i,1] <- Q2[i,1]

for(j in 2:4){ logit(Q2[i,j]) <- alpha2[j]-lam[2]\*F[i]

p2[i,j] <- Q2[i,j] - Q2[i,j-1]}

p2[i,5] <- 1 - Q2[i,4]

y2[i] ~ dcat(p2[i,])

LL[i,2] <- equals(y2[i],1)\*log(p2[i,1])+ equals(y2[i],2)\*log(p2[i,2])

+ equals(y2[i],3)\*log(p2[i,3])+ equals(y2[i],4)\*log(p2[i,4]) + equals(y2[i],5)\*log(p2[i,5])

# 3rd response

logit(Q3[i,1]) <- alpha3[1]-lam[3]\*F[i]

p3[i,1] <- Q3[i,1]

for(j in 2:4){ logit(Q3[i,j]) <- alpha3[j]-lam[3]\*F[i]

p3[i,j] <- Q3[i,j] - Q3[i,j-1]}

p3[i,5] <- 1 - Q3[i,4]

y3[i] ~ dcat(p3[i,])

LL[i,3] <- equals(y3[i],1)\*log(p3[i,1])+ equals(y3[i],2)\*log(p3[i,2])

+ equals(y3[i],3)\*log(p3[i,3])+ equals(y3[i],4)\*log(p3[i,4]) + equals(y3[i],5)\*log(p3[i,5])

# 4th response

logit(Q4[i,1]) <- alpha4[1]-lam[4]\*F[i]

p4[i,1] <- Q4[i,1]

for(j in 2:4){ logit(Q4[i,j]) <- alpha4[j]-lam[4]\*F[i]

p4[i,j] <- Q4[i,j] - Q4[i,j-1]}

p4[i,5] <- 1 - Q4[i,4]

y4[i] ~ dcat(p4[i,])

LL[i,4] <- equals(y4[i],1)\*log(p4[i,1])+ equals(y4[i],2)\*log(p4[i,2])

+ equals(y4[i],3)\*log(p4[i,3])+ equals(y4[i],4)\*log(p4[i,4]) + equals(y4[i],5)\*log(p4[i,5])}

lam[1] <- 1

for (j in 1:3) {lam[j+1] <- lambda[j]; lambda[j] ~ dnorm(0,1)}

## priors over thresholds

for(j in 1:4){ alpha1.p[j] ~ dnorm(0,0.1)

alpha2.p[j] ~ dnorm(0,0.1)

alpha3.p[j] ~ dnorm(0,0.1)

alpha4.p[j] ~ dnorm(0,0.1) }

alpha1 <- sort(alpha1.p)

alpha2 <- sort(alpha2.p)

alpha3 <- sort(alpha3.p)

alpha4 <- sort(alpha4.p)

for(j in 1:r){beta[j] ~ dnorm(0,0.1)}

tau.F ~ dgamma(1,0.001)}

", file="model.jag")

# ESTIMATION

inits1 <- list(alpha1.p=c(-2,-0.5, 1, 3), alpha2.p=c(-4,-1.5, 0.5,2),alpha3.p=c(-2,-0.5, 1.5, 3.5),

alpha4.p=c(-2,-0.5, 0.5, 2),beta=c(-0.25,0,0.2), lambda=c(1,1,0),tau.F=0.8)

inits2 <- list(alpha1.p = c(-2.5, 0, 1.25,3.5), alpha2.p = c(-3.5, -2, 0,2.5), alpha3.p = c(-2.5, 0, 1.75,3), alpha4.p = c(-2.5, -1, 0,1.5),beta=c(-0.3,0,0.25) , lambda=c(0.8,0.8,-0.1),tau.F=0.7)

inits=list(inits1,inits2)

pars=c("beta","alpha1","alpha2","alpha3","alpha4","lambda","tau.F","LL")

R = autojags(DS\_9\_4, inits, pars,model.file="model.jag",2,iter.increment=1000, n.burnin=100,Rhat.limit=1.1, max.iter=5000, seed=1234, codaOnly= c('LL'))

R$summary

LLsamps=as.array(R$sims.list$LL)

**# LOO by ordinal response**

LOO1=loo(LLsamps[,,1])

LOO2=loo(LLsamps[,,2])

LOO3=loo(LLsamps[,,3])

LOO4=loo(LLsamps[,,4])

loocase=c()

loocase[1:871]= as.vector(LOO1$pointwise[,3])

loocase[872:1742]= as.vector(LOO2$pointwise[,3])

loocase[1743:2613]= as.vector(LOO3$pointwise[,3])

loocase[2614:3484]= as.vector(LOO4$pointwise[,3])

indx=rep(1:4, each = 871)

subj=rep(seq(1:871), 4)

**# EXTREME SUBJECT-INDICATOR LOO**

list.loocase = data.frame(loocase,indx,subj)

list.loocase=list.loocase[order(-list.loocase$loocase),]

head(list.loocase,20)

**# SUBJECT LEVEL LOO-IC**

loosubj=tapply(loocase, subj, FUN=sum)

subjn=seq(1:871)

df=data.frame(loosubj,subjn)

df=df[order(-df$loosubj),]

head(df,10)