Nimble or JAGS code for Model ii, working version (not optimized)

mcode <- nimbleCode(

{

for (i in 1:N)

{

px0[i,1]<-0.6

px0[i,2]<-0.3

px0[i,3]<-0.1

alive[i,First[i]] ~ dcat(px0[i,1:3])

for (j in First[i]:(Years-1))

{

px[1,i,j,1] <- phiPB[i,j] \* (1-psiPBB[i,j])

px[1,i,j,2] <- phiPB[i,j] \* psiPBB[i,j]

px[1,i,j,3] <- 0

px[1,i,j,4] <- 1-phiPB[i,j]

px[2,i,j,1] <- 0

px[2,i,j,2] <- phiB \* (1-psiBNB)

px[2,i,j,3] <- phiB \* psiBNB

px[2,i,j,4] <- 1-phiB

px[3,i,j,1] <- 0

px[3,i,j,2] <- phiNB \* psiNBB

px[3,i,j,3] <- phiNB \* (1-psiNBB)

px[3,i,j,4] <- 1-phiNB

px[4,i,j,1] <- 0

px[4,i,j,2] <- 0

px[4,i,j,3] <- 0

px[4,i,j,4] <- 1

logit(psiPBB[i,j])<-mean.psiPBB\*equals(sx[i],0)\*equals(ag[i,j],4)+equals(ag[i,j],1)\*equals(sx[i],0)\*beta.psiPBB1+equals(ag[i,j],2)\*equals(sx[i],0)\*beta.psiPBB2+equals(ag[i,j],3)\*equals(sx[i],0)\*beta.psiPBB3+equals(ag[i,j],6)\*equals(sx[i],0)\*beta.psiPBB6+equals(ag[i,j],5)\*equals(sx[i],0)\*beta.psiPBB5+beta.psiPBBSX\*equals(ag[i,j],4)\*equals(sx[i],1)+equals(ag[i,j],1)\*equals(sx[i],1)\*int.psiPBB1+equals(ag[i,j],2)\*equals(sx[i],1)\*int.psiPBB2+equals(ag[i,j],3)\*equals(sx[i],1)\*int.psiPBB3+equals(ag[i,j],6)\*equals(sx[i],1)\*int.psiPBB6+equals(ag[i,j],5)\*equals(sx[i],1)\*int.psiPBB5

logit(phiPB[i,j])<-mean.phiPB+equals(ags[i,j],2)\*beta.phiPB2+equals(ags[i,j],3)\*beta.phiPB3+equals(ags[i,j],6)\*beta.phiPB6+equals(ags[i,j],5)\*beta.phiPB5+beta.phiPBSX\*sx[i]

}

for (j in (First[i]+1):Years)

{

po[1,i,j,1] <- 1-pPB[i,j]

po[1,i,j,2] <- pPB[i,j]

po[1,i,j,3] <- 0

po[1,i,j,4] <- 0

po[2,i,j,1] <- 1-pB

po[2,i,j,2] <- 0

po[2,i,j,3] <- pB

po[2,i,j,4] <- 0

po[3,i,j,1] <- 1-pNB

po[3,i,j,2] <- 0

po[3,i,j,3] <- 0

po[3,i,j,4] <- pNB

po[4,i,j,1] <- 1

po[4,i,j,2] <- 0

po[4,i,j,3] <- 0

po[4,i,j,4] <- 0

pPB[i,j]<-beta.pPB[ag0[i,j]]

#pPB[i,j]<-mean.pPB

alive[i,j] ~ dcat(px[alive[i,j-1],i,j-1,1:4])

obs[i,j] ~ dcat(po[alive[i,j],i,j,1:4])

}

}

beta.phiPBSX~dnorm(0,0.000001)

beta.psiPBBSX~dnorm(0,0.000001)

beta.psiPBB1~dnorm(0,0.000001)

beta.psiPBB2~dnorm(0,0.000001)

beta.psiPBB3~dnorm(0,0.000001)

beta.psiPBB6~dnorm(0,0.000001)

beta.psiPBB5~dnorm(0,0.000001)

int.psiPBB1~dnorm(0,0.000001)

int.psiPBB2~dnorm(0,0.000001)

int.psiPBB3~dnorm(0,0.000001)

int.psiPBB6~dnorm(0,0.000001)

int.psiPBB5~dnorm(0,0.000001)

beta.phiPB2~dnorm(0,0.000001)

beta.phiPB3~dnorm(0,0.000001)

beta.phiPB6~dnorm(0,0.000001)

beta.phiPB5~dnorm(0,0.000001)

for (old0 in 1:maxag0){

beta.pPB[old0]~dunif(0,1)

}

mean.psiPBB~dnorm(0,0.000001)

mean.phiPB ~ dnorm(0,0.000001)

pNB ~ dunif(0,1)

pB ~ dunif(0,1)

phiB ~ dunif(0,1)

phiNB ~ dunif(0,1)

psiBNB ~ dunif(0,1)

psiNBB ~ dunif(0,1)

})

Nimble or JAGS code for model i.b, working version (not optimized)

mcode <- nimbleCode(

{

for (i in 1:N)

{

px0[i,1]<-0.6

px0[i,2]<-0.3

px0[i,3]<-0.1

alive[i,First[i]] ~ dcat(px0[i,1:3])

for (j in First[i]:(Years-1))

{

px[1,i,j,1] <- phiPB[i,j] \* (1-psiPBB[i,j])

px[1,i,j,2] <- phiPB[i,j] \* psiPBB[i,j]

px[1,i,j,3] <- 0

px[1,i,j,4] <- 1-phiPB[i,j]

px[2,i,j,1] <- 0

px[2,i,j,2] <- phiB \* (1-psiBNB)

px[2,i,j,3] <- phiB \* psiBNB

px[2,i,j,4] <- 1-phiB

px[3,i,j,1] <- 0

px[3,i,j,2] <- phiNB \* psiNBB

px[3,i,j,3] <- phiNB \* (1-psiNBB)

px[3,i,j,4] <- 1-phiNB

px[4,i,j,1] <- 0

px[4,i,j,2] <- 0

px[4,i,j,3] <- 0

px[4,i,j,4] <- 1

logit(psiPBB[i,j])<-mean.psiPBB+equals(ag[i,j],1)\*beta.psiPBB1+equals(ag[i,j],2)\*beta.psiPBB2+equals(ag[i,j],3)\*beta.psiPBB3+equals(ag[i,j],6)\*beta.psiPBB6+equals(ag[i,j],5)\*beta.psiPBB5+beta.psiPBBSX\*sx[i]

logit(phiPB[i,j])<-mean.phiPB+equals(ags[i,j],2)\*beta.phiPB2+equals(ags[i,j],3)\*beta.phiPB3+equals(ags[i,j],6)\*beta.phiPB6+equals(ags[i,j],5)\*beta.phiPB5+beta.phiPBSX\*sx[i]

}

for (j in (First[i]+1):Years)

{

po[1,i,j,1] <- 1-pPB[i,j]

po[1,i,j,2] <- pPB[i,j]

po[1,i,j,3] <- 0

po[1,i,j,4] <- 0

po[2,i,j,1] <- 1-pB

po[2,i,j,2] <- 0

po[2,i,j,3] <- pB

po[2,i,j,4] <- 0

po[3,i,j,1] <- 1-pNB

po[3,i,j,2] <- 0

po[3,i,j,3] <- 0

po[3,i,j,4] <- pNB

po[4,i,j,1] <- 1

po[4,i,j,2] <- 0

po[4,i,j,3] <- 0

po[4,i,j,4] <- 0

pPB[i,j]<-beta.pPB[ag0[i,j]]

alive[i,j] ~ dcat(px[alive[i,j-1],i,j-1,1:4])

obs[i,j] ~ dcat(po[alive[i,j],i,j,1:4])

}

}

beta.phiPBSX~dnorm(0,0.000001)

beta.psiPBBSX~dnorm(0,0.000001)

beta.psiPBB1~dnorm(0,0.000001)

beta.psiPBB2~dnorm(0,0.000001)

beta.psiPBB3~dnorm(0,0.000001)

beta.psiPBB6~dnorm(0,0.000001)

beta.psiPBB5~dnorm(0,0.000001)

beta.phiPB2~dnorm(0,0.000001)

beta.phiPB3~dnorm(0,0.000001)

beta.phiPB6~dnorm(0,0.000001)

beta.phiPB5~dnorm(0,0.000001)

for (old0 in 1:maxag0){

beta.pPB[old0]~dunif(0,1)

}

mean.psiPBB~dnorm(0,0.000001)

mean.phiPB ~ dnorm(0,0.000001)

pNB ~ dunif(0,1)

pB ~ dunif(0,1)

phiB ~ dunif(0,1)

phiNB ~ dunif(0,1)

psiBNB ~ dunif(0,1)

psiNBB ~ dunif(0,1)

})