Stan and JAGS tricks

**JAGS**

1. JAGS using step and equals, for controlling
2. Storing values in a matrix, then summing these to handle cumulative sums:

for (i in 1:NTotal) {

for (j in 1:30)

{

for (k in 1:36)

{

A[i,j,k] <- equals(k,d[villageID[i]])\*step(Tp[villageID[i]]-j)\*(Tp[villageID[i]]-j+1)\*rain[captureDays[i]-j+1-d[villageID[i]]]

}

}

captureNumber[i] ~ dpois(nu[i])

nu[i] <- 0.04\*roomsSampled[villageID[i]]\*(lambda[villageID[i]]\*(2/(Tp[villageID[i]]\*(Tp[villageID[i]]+1)))\*sum(A[i,,])

+ nBase[villageID[i]])

}

1. How to make a discrete distribution over any support using the dcat(), an index variable and a probability density:

for (j in 1:NVillages){

indD[j] ~ dcat(punif[])

d[j] <- xD[indD[j]]

}

for (k in 1:35)

{

punif[k] <- 1

xD[k] <- k + 4

}

1. Illustrate what is actually meant by a for loop, given that it is not a procedural language.

**Stan**

1. Generated quantities part of code to sample parameters, things of interest.
2. Log\_sum\_exp explanation for marginalising parameters: 1D from manual, and 2D from FourVillagesExample.
3. Increment\_log\_prob: illustrate bias with simulated data.
4. Order of parameter declaration. It seems to be that you can only define parameters in blocks.
5. Show how to generate samples from any distribution (without any data).
6. Supply priors information/anything you want to change frequently in the data. This saves the Stan model having to be recompiled each time.
7. Supply functions for diagnosis: looking at the nDivergent, nLeapFrog and nTreeDepth
8. Show how to carry out PPCs via generated quantities
9. Include the table in ‘*stan-blocks-good-reference’* paper, which shows the locality of variables, and the number of times each block is called.
10. Include function to find cases (for meta-data) where the p values are less than 0.05, or greater than 0.95. (Perhaps adjust these to allow the user to specify the percentage).
11. Not so much a Stan point, but should illustrate PPCs for time series. Use Gelman’s dogs paper as a reference.
12. Centralised parameterisations vs non-central for speeding up Stan simulations. Reference Neals’s funnel and the paper Pppppss (Greek name). Chapter 20 in Stan manual.