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Modeling
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Homework 5

1.

https://discourse.mc-stan.org/t/creating-a-shifted-gamma-distribution-divergent-transitions/2503
This thread talks about how to create a shifted gamma distribution, and how to constrain the shift. Creating this shifted-gamma distribution may be very helpful for examining my data because I want to look at how much carbon each plant treatment is contributing to the soil. Typically the gamma distribution starts at zero, but this will allow me to start at the baseline carbon level, and then all additional plant added C will be looked at after.

2.

Are foraging animals Bayesians?

Yes, I would say that foraging animals are Bayesians. Foraging animals use prior information to assess habitat quality, food availability and even predatory threat. This prior information can be obtained from the animals previous history, from social exchanges with other animals, and/or from assessing the signals given by other animals. Using this prior information, the foraging animals can assess the different habitat qualities and then make a decision based on the habitat that will most likely generate the best food with lowest risk of predatory threat. The choice to enter a habitat does not appear to be random by foraging animals, but instead a calculated decision where they use their previous history (priors) to make choices on habitat to forage based off the chances they have to find good food or low threat of predation (posteriors).

3. Water Cover

Knowns

Earth 0.3 land
Mars 1.0 land
0.5 pixel comes from earth
0.5 pixel comes from mars
P(Earth/Land) = 0.23
H=earth, D=land

Math

0.23= (.3)*(0.5) / ((.3+1) /2)
=(.15) /(.65)
=0.23

4. Panda

Species A has twins 0.1
Species B has twins 0.2

A) Probability that panda is species A given first birth is twins

P(speciesA/twins)= (0.1)*(0.5)/ ((0.2+.1)/2)
P(speciesA/twins)= 0.05/0.15
P(speciesA/twins)= 0.33

B) Probability that panda is species A given second birth is singleton (first birth twins)

P(Species A/twins than singleton) = (0.1*0.9) * (0.5) / ((0.1*0.9)+(0.2*0.8))/2
P(Species A/twins than singleton)= 0.045/ 0.125
P(Species A/twins than singleton)= 0.36

C) Correctly identifies species A is 0.8
Correctly identifies species B is 0.65

P(Species A/Tests positive for species A)
=(0.8)*(0.5) / ((0.8+0.35)/2)
=0.4/0.575
=0.695

P(Species A, test + for A / Species A, twin and singleton)
=(0.8*0.36)*(0.69) / 0.36
=0.1987 / 0.36
=0.55