Lab 5

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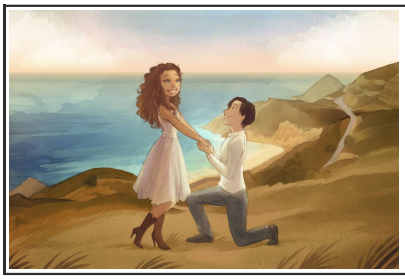
All Sections



$$\alpha_{ij} = min\{1, \frac{h_j}{h_i}\}$$
$$p_{ij} = \alpha_{ij} q_j$$

# Coin-die MCMC simulation

This lab introduces the student to the next big idea in this course. Understanding this will allow you to better understand the rest of what we hope to accomplish in 5403.

The first point to understand is that the coin die simulation is redundant for the particular problem at hand since the Bayes box is completely determined. However, we will demonstrate the principles of sampling with this example.

A virtually COMPLETE description of this technique is shown in the PRIMUS article starting in section 5: **Lab Exercise 5**

I would advise you all to read it (won't take long) -- there are more resources for this lab in the **modules**.

In this problem, we have a coin that is tossed a number of times with theta (P(H)) unknown. (The coin in the experiment is different from the proposal coin). We will assume only 2 possible states for the value of theta and then construct a Bayes box (**see Lab 4**). Our objective is to create the posterior P(theta|X) and summarize it. In the case at hand, we will not only fill the Bayes box we will also simulate posterior values of theta. HOW?????

ANSWER: We will use a proposal (THE COIN) and an acceptance set provided by the DIE. We will need a starting value (s). The details are in the PRIMUS paper section 5 **https://canvas.ou.edu/courses/231426/modules/items/3870124** or simply go to the modules lab 5 and read "Tactile Simulation ..." linked there.

The coin will propose a theta value it is accepted by determining the ratio of the h values (these are the prior * Likelihood values in the Bayes' box). This ratio is translated into an acceptance and rejection set using the die. The toss of the die will determine whether the proposed theta is accepted or rejected.


***Figure 2.*** Tactile simulation in action.

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