

# Design

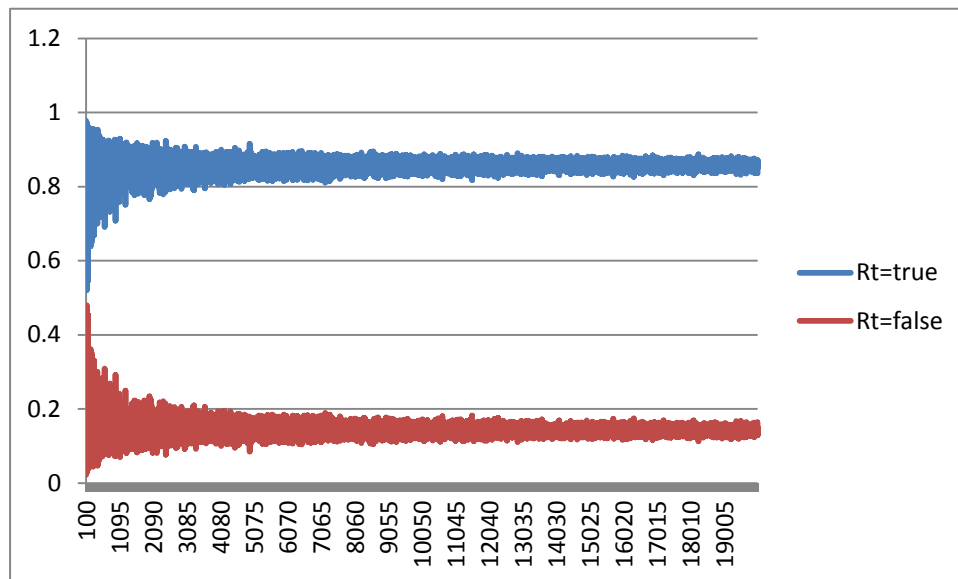
Student ID: 1698774 Name: Qianyi Lu

First of all, create a function to randomly create a sample which only contains the weather. This function use rand function to get random value between  $[0,1]$  and compare with identified probabilities to random choose every day's weather. This function will also calculate the probability of getting the condition in this sample.

For likelihood weighted sampling method, use the function above to get a sample. Calculate the probability of reaching the  $U_0-t$  from this sample. If the last weather of this sample is rain, add this probability to the sum of  $P_{R_t=\text{true}}$ . Otherwise add it to the sum of  $P_{R_t=\text{false}}$ . Repeat these steps for  $n$  times when  $n$  is the iteration number. Finally calculate  $a(\text{sum}(P_{R_t=\text{true}}), \text{sum}(P_{R_t=\text{false}}))$ .

For Gibbs sampling method, create a random sample for initialization. From  $x \in [0,t]$ , randomly choose  $R_x$ 's value by the probability calculated from  $R_{x-1}$ ,  $U_x$ ,  $R_{x+1}$  if they exist. Repeat these steps for  $n$  times when  $n$  is the iteration number. Ignore the first  $n/2$  samples got in this way. From  $n/2$  to  $n$ , pick one sample every 5 samples and record it's  $R_t$ . Finally calculate  $a(\text{sum}(R_t=\text{true}), \text{sum}(R_t=\text{false}))$ .

This is the figure for likelihood weighted sampling method of observation2:



This is the figure for Gibbs sampling method of observation2:

