Homework-4

Capstone - Yuhua

1. Read Section 34 (mainly the first part of 34.3) and Section 36.1.

2. Implement Algorithm 23 (Thomson Sampling) with different initial prior for the two settings from Homework-2. Plot the expected regret and the variance of the regret. Compare the performance of Thomson Sampling and write down your observation. (Hint: Run at least 10^3 simulations for each μ_2. You can have a coarse mesh on μ_2 to save the computational time, e.g. try 20 different values of μ_2 instead of 100.)

   - For normal reward: try the following 5 prior measures:

$$\begin{cases} \mu_1 \sim N(0,1) \\ \mu_2 \sim N(0,1) \end{cases}; \quad \begin{cases} \mu_1 \sim N(0,1) \\ \mu_2 \sim N(1/2,1) \end{cases}; \quad \begin{cases} \mu_1 \sim N(1/2,1) \\ \mu_2 \sim N(0,1) \end{cases}; \tag{1}$$

$$\begin{cases} \mu_1 \sim N(0,0.1) \\ \mu_2 \sim N(1/2,0.1) \end{cases}; \quad \begin{cases} \mu_1 \sim N(1/2,0.1) \\ \mu_2 \sim N(0,0.1) \end{cases}; \tag{2}$$

   - For Bernoulli reward: try the following 4 prior measures:

$$\begin{cases} \mu_1 \sim \text{Beta}(1,1) \\ \mu_2 \sim \text{Beta}(1,1) \end{cases}; \quad \begin{cases} \mu_1 \sim \text{Beta}(1,1) \\ \mu_2 \sim \text{Beta}(1,3) \end{cases}; \tag{3}$$

$$\begin{cases} \mu_1 \sim \text{Beta}(10,10) \\ \mu_2 \sim \text{Beta}(10,10) \end{cases}; \quad \begin{cases} \mu_1 \sim \text{Beta}(10,10) \\ \mu_2 \sim \text{Beta}(10,30) \end{cases}; \tag{4}$$

3. **Please submit the homework 30 mins before the class**, through slack. It should a pdf file including 4 figures and your observation from the comparison.