

VE414 Assignment 3

Due 11/7/2021

Problem 1

Consider a distribution

$$f_{Y|X} \propto \exp\left(-\frac{(X - Y)^2}{2}\right) \times \frac{1}{1 + Y^2}$$

- (a) Implement a grid approximation for the above problem.
- (b) Complete the following table using your grid approximation.

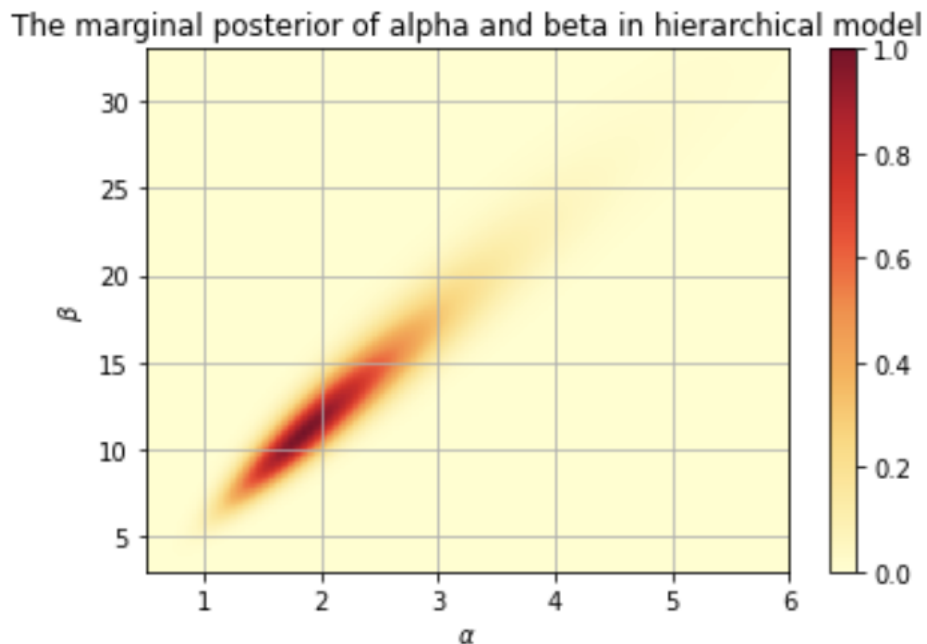
Grid size n	50	250	500	1000
$E[Y X = 0.5]$				

- (c) Implement a direct sampling scheme using your grid approximation.
- (d) Complete the following table using your grid approximation.

Grid size n	50		250		500		1000	
Sample size k	100	1000	100	1000	100	1000	100	1000
$E[Y X = 0.5]$								

Problem 2

Recall the demonstration we performed in class (Chapter5.ipynb under week 6 on canvas) We have shown the generation of posterior of α and β in hierarchical model using grid sampling and jittering.



In this homework, you will explore other sampling methods to draw posterior samples of α and β

- (a) Please attach the code and specify the name of sampling method
- (b) Plot the posterior samples (at least 1000 points) and the corresponding density contour (similar to what we have done with grid sampling)

Problem 3

Discuss in what sense is Gibbs sampling a special case of Metropolis-Hastings algorithm.

Problem 4

Question 5.2 from BDA

Problem 5

Question 5.5 from BDA