

UNIVERSITY OF KOBLENZ - AG SOFTLANG

DATA SCIENCE

Assignment 8: MCMC

FOR THE SUBMISSION DEADLINE SEE OLAT

December 22, 2021

Question 8.1: Metropolis–Hastings

Comparable to assignment 5.1, we have the data Y with 0, 0, 1, 2, 0, 2, 2, 1 and 1. It follows a Poisson distribution. We can define a simple model for estimating the λ parameter of the Poisson distribution as:

$$\begin{array}{ll} Y \sim \text{Poisson}(\lambda) & \text{[likelihood]} \\ \lambda \sim \text{Uniform}(0, 4) & \text{[prior]} \end{array}$$

Accordingly, we can define the posterior function, where $dunif$ is the PDF of the uniform distribution, and $dpois$ the PDF of the Poisson distribution, as:

$$dunif(\lambda, 0, 4) \cdot \prod_{y \in Y} dpois(y, \lambda)$$

Approximate the posterior for λ by samples drawn running Metropolis–Hastings algorithm. Provide us with the code and 2000 samples.

Hint: You may double-check your results, comparing the histogram of the sampled λ parameters with the solution computed by a grid approximation