

Mathematical Statistics Stockholm University Bachelor Thesis **2022:11** http://www.math.su.se

An Introduction to Markov Chain Monte Carlo Methods within Bayesian Statistics

Tom Pedersen^{*}

June 2022

Abstract

In this thesis we compared two Markov Chain Monte Carlo algorithms; the Random Walk Metropolis algorithm and the Adaptive Metropolis Algorithm. The latter can be viewed as an extension of the former and our aim was to see if its efficiency is improved by the alteration. To do this, we defined a Bayesian model for logistic regression on a simulated data set. The posterior inference was based on samples from the Random Walk Metropolis and Adaptive Metropolis algorithms. We also introduced methods for assessing convergence of the chains. In our analysis, the Adaptive Metropolis algorithm proved more efficient than the Random Walk Metropolis algorithm.

^{*}Postal address: Mathematical Statistics, Stockholm University, SE-106 91, Sweden. E-mail: pedersentom@me.com. Supervisor: Taras Bodnar, Michael Höhle.