Bayesian Parameter Inference of Markov population model.
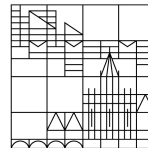
Master Thesis

by

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Contents

Abstract

- What: State the problem.

- Why: Applications?

- What: Structure of this thesis.

We study the parameter synthesis problem of parametric Discrete-Time Markov Chain. Markov Chain is a probabilistic model to formalize stochastic processes.

1 Introduction

- Brief introduction to Markov Chain

- Brief introduction to parameterization or Markov Chains

- Applications of parameter synthesis problem.

This thesis is structured as follow.

- **Chapter 1** introduces the problem and its applications.

- **Chapter 2** describes the most important definitions and theoretical background. In this chapter, we defines Discrete-Time Markov Chain formally. A brief introduction to Bayesian Inference is also included.

- **Chapter 3** presents

2 Preliminaries

- transition system

- markov property

- discrete-time markov chain and parametric dtmc

- continuous-time markov chain

- bayesian inference

- metropolis-hastings algorithm

2.1 Transition system

2.2 Discrete-Time Markov Chain

2.3 Probabilistic Model Checking

2.4 Bayesian Inference

2.4.1 Bayesian formula

2.4.2 Posterior conjugation

2.5 Metropolis-Hastings algorithm

2.6 Selection of prior distribution

The selection of prior distribution has strong effect on the result [what result specifically?] of a Bayesian inference.