
SAMANEH GHOLAMI, Ryerson University

Simplifying Stochastic Discrete Models of Biochemical Networks

Recently, stochastic modelling and simulation of biochemical networks have been the subject of intense research.

Biochemical systems have critical practical applications, in particular to the study of key cellular processes.

In many cases, stochastic cellular dynamics is modelled using jump Markov processes,

whose probability distributions evolve according to the Chemical Master Equation.

These models of biochemical systems depend on a set of kinetic parameters, whose values are sometimes unknown or poorly estimated.

We propose a model reduction technique for the Chemical Master Equation, based on sensitivity analysis.

For sensitivity analysis we apply some existing finite-difference sensitivity estimators, such as the coupled finite-difference or the

coupled random number strategies. The new technique is successfully applied on some complex biochemical networks arising in applications..

The behaviour of the reduced system is in excellent agreement with that of the full system.

This is joint work with S. Ilie.