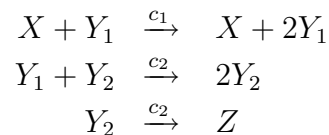


SGN-6156 Computational Systems Biology II

Exercise 4, May 2, 2008, at 14:15-16:00, in class TC415

This exercise will familiarize you with stochastic simulation methods and Bayesian network learning methods using Matlab. Exercises can be done in class (during the exercise session).

1. Simulate the Lotka-Volterra reactions



using the stochastic simulation algorithm (SSA). This is implemented in a Matlab demo 'lotkavolterra.m.' Note that this model can be considered as a simple predator-prey model. Go through the m-file step-by-step. Study the effects of e.g. stochasticity, different initial values and reaction rates.

2. Try to get familiar with Bayesian networks (including parameter and structure learning). A Bayesian network toolbox for Matlab is written by Kevin Murphy and is available at:

<http://www.cs.ubc.ca/~murphyk/Software/BNT/bnt.html>

Download the toolbox from:

<http://www.cs.ubc.ca/~murphyk/Software/BNT/FullBNT-1.0.4.zip>

Unzip the file and follow the simple installation procedure:

<http://www.cs.ubc.ca/~murphyk/Software/BNT/install.html>

Then, follow the how-to-use demo:

<http://www.cs.ubc.ca/~murphyk/Software/BNT/usage.html>

Of the how-to-use demo, go through sections:

- 'Creating your first Bayes net'
 - 'Creating a model by hand'
- 'Parameter Learning'
 - 'Maximum likelihood parameter estimation from complete data'
- 'Structure learning'
 - 'Exhaustive search'
 - 'K2'
 - 'MCMC'