THE UNIVERSITY  OF HONG KONG

Department of Mathematics

Numerical Mathematics and Applied Analysis Group Seminar (NMAA)

A Control Model for Markovian Genetic Regulatory Networks

Miss Zhang Shuqin

Department of Mathematics, HKU

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Abstract

In this talk, we study a control model for gene intervention in a genetic regulatory network. At each time step, a finite number of controls are allowed to drive to some target states (i.e., some specific genes are on, and some specific genes are off) of a genetic network. We are interested in determining a minimum amount of control cost on a genetic network over a certain period of time such that the probabilities of obtaining such target states are as large as possible. This problem can be formulated as a stochastic dynamic programming model. However, when the number of genes is *n*, the number of possible states is exponentially increasing with n, and the computational cost of solving such stochastic dynamic programming model would be very huge. The main objective of our work is to approximate the above control problem and formulate as a minimization problem with integer variables and continuous variables using dynamics of states probability distribution of genes. Our experimental results show that our proposed formulation is efficient and quite effective for solving control gene intervention in a genetic network.

All are welcome