Open Thesis (SA,DA,MA)

Modelling, analysis and simulation of biological dynamical systems

Description:
One standard approach of Systems Biology is the use of parametrized ordinary differential equation (ODE) models, in the form $\dot{x} = f(x, \theta)$, to describe the time-variations of the concentrations of the biochemical agents taking part in a signalling network. One interesting example of study is the MAPK signalling cascade (see picture). The system is provided with feedback interconnections, which consist in positive or negative regulations among the reactants. In this thesis we want to analyze general properties of the system (e.g. stability, parameter sensitivity, identifiability, bifurcation analysis...) and investigate, with the help of theoretical approaches of systems and control theory, the effects of the feedback interconnections contained in complex signalling networks. Further details and the exact goal of this thesis should be evaluated in a personal discussion. Eventually, also a topic for a Bsc thesis can be discussed.

Prerequisites:
Knowledge of:
- modelling approaches of dynamical systems (state space description, differential equations systems...);
- probability theory and stochastic processes;
- MATLAB.

Supervisor:
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Area:
Systems Biology
Systems Theory

Properties:
Type: SA,DA,MA
30% literature/ theory
35% analysis
35% implementation/ simulation

Beginning:
any time

Weitere Informationen: www.ist.uni-stuttgart.de/education/sada

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