

Master thesis No. 962

Multi-Layer Network Encodings for Genetic Algorithms



Methods

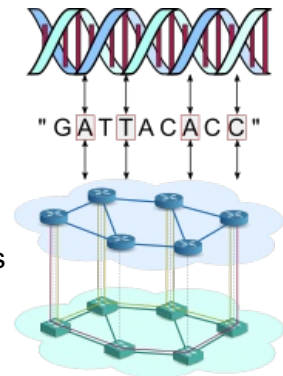
Programming in Java
Performance Evaluation

Topics

Multi-layer networks
Optical networks

Background

Novel and higher-quality Internet services fuel an exponential growth of traffic in internet service providers' multi-layer transport networks. This leads to a significant increase in resource demand with large variations over time thus requiring more efficient and dynamic operation of future networks. The Software-Defined Networking (SDN) paradigm enables an efficient and dynamic (re)configuration of multi-layer transport networks. Finding such a network configuration, is a complex graph optimization problem which can be solved by the use of optimization heuristics such as genetic algorithms (GA). GAs utilize concepts of naturally occurring evolution such as mutation and recombination of genetic codes to determine a solution.



Task

In this project you will design, implement and evaluate methods that translate a multi-layer network into a genetic encoding. The encoding and its properties have a decisive impact on the solubility of the reconfiguration problem and the performance of the genetic algorithm. This necessitates a precise formulation and analysis as well as an efficient implementation of the encoding methods. The methods developed will be integrated into an existing software tool for the simulation of the dynamic reconfiguration of multi-layer networks. This project involves the following tasks:

- Familiarization with basics of genetic algorithms
- Theoretical analysis and development of genetic encodings of multi-layer networks
- Implementation of the developed encodings and adaptation of evolutionary operators
- Comparative studies of different encodings and simulative performance evaluation

Acquired Knowledge and Skills

You will learn to identify a solution approach for a specific problem in literature, to adapt and to implement it. Furthermore you learn how to evaluate a complex system through simulation. You will gain insight into multi-layer networks and heuristic algorithms. In addition, you will gain experience in using an extensive, modular, object-oriented software framework.

Requirements

Programming Experience in Java

Desirable knowledge

Basic knowledge of communication networks
Communication Networks II

Contact

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