



Master thesis No. 1022

Traffic Prediction on Backbone Networks Using Gaussian Processes



Methods

Gaussian Processes
Bayesian statistics

Topics

Traffic modeling
Traffic prediction

Background

Modern networking is starting to be highly demanding on covering QoS (Quality of Service) requirements. At the same time and due to cost reasons the network operator needs to find a way to efficiently operate the network, minimizing operational expenses (OpEx) from one side and maximizing equipment usability (so that no new equipment is needed) from the other. Usually, such a task is very difficult and strongly depends on the future scenario. Thus a better knowledge of the traffic demands and the ability to predict such future demands is of vital importance in order to find the optimal operation strategy.

Gaussian Processes (GPs) is a technique, often included in the Machine Learning umbrella, that models a stochastic process using multivariate normal distributions in the Bayesian framework. GPs are powerful because they provide a comprehensive way to quantify uncertainty and can be used in many disciplines.



Problem Description

In the context of this thesis, you are called to use GPs to model the core network traffic demands. More specifically, the thesis consists of the following steps:

- getting familiar with GPs and related julia packages
- investigation of network traffic patterns
- implementing GPs for modeling the backbone network traffic
- evaluation of the model based on existing data

Acquired Knowledge and Skills

In this thesis you will enrich your knowledge on GPs and probabilistic inference, a methodology gaining growing focus. You will also experiment with the scientific programming language Julia. Finally, you will get a great insight into core networking and network services.

Requirements

Communication Networks Architecture and Design
Programming Experience

Desirable knowledge

Kommunikationsnetze I
Programming Experience in Julia

Contact

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