

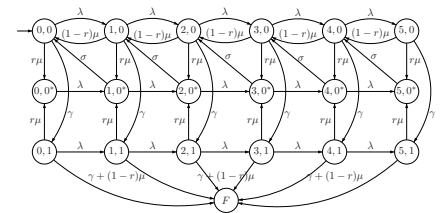
- Diploma / Master / Bachelor Thesis -

KISS — Keep It Smart and Safe

Parameter Synthesis of Probabilistic Systems

What is it all about?

In the early design phases, it is usually hard to get the exact system parameters, e.g., timing, temperature, costs and so forth, which are crucial for the correctness of the system. Can we guess or even compute those parameters in a **smart** way such that the obtained system is guaranteed to be **safe**? The goal of **parameter synthesis** is to find all possible values of parameters (forming a safe region) under which certain properties (e.g., deadlock-free) hold in the system. Parameter synthesis has wide applications in e.g., **synthetic biology** (what the temperature range is to ensure the growth rate of the pathogen), **telecommunication systems** (how long a caller should wait before being served) and **actuarial sciences** (how much a policy holder should be charged), etc.



A storage system with error checking

What is to be done?

Goals of this thesis are:

1. **Development** and **implementation** of parameter synthesis algorithms.
2. Answering **theoretical questions** that arise during the development.
3. **Graphical visualisation** of the synthesised parameter values (see the attached figures) with integration into a small **tool**.
4. Search for **case studies** from synthetic biology, telecommunication systems or actuarial sciences.

The extent and emphases of the thesis can be easily adjusted with respect to the degree aimed at (Diploma, Master, Bachelor).

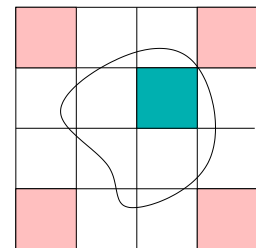
Requirements

- Continuous motivation and persistence.
- Basic knowledge in modeling probabilistic systems.
- Programming experience (in the language of your choice).

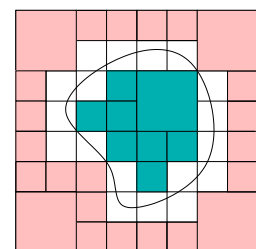
Contact

For additional information, please contact us:

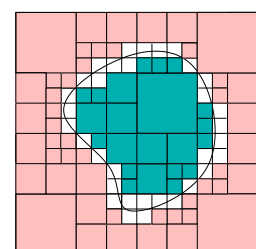
- Prof. Dr. Ir. Joost-Pieter Katoen, katoen@cs.rwth-aachen.de
- Tingting Han, tingting.han@cs.rwth-aachen.de
- Alexandru Mereacre, mereacre@cs.rwth-aachen.de



Finding region boundary — first phase



Finding region boundary — 2nd phase



Finding region boundary — final phase