University of Florence

PhD in Smart Computing
XXXII cycle

Progress Report

first year

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Research topics: Model-based quantitative analysis for on-line diagnosis, prediction, scheduling and compliance evaluation in partially observable systems
Advisor: Prof. Enrico Vicario
Supervisory committee: Dr. Mieke Massink, Prof. Mirco Tribastone

Research and results

In this section, the main research conducted and the most relevant results will be shown. The main topic of the PhD research is that of model-based quantitative analysis, especially in the scenario of partially observable systems.

Before the start of the first year of the PhD, a period of five months as a Research Fellow at University of Florence has been conducted, during which, under the supervision of Prof. Enrico Vicario, research activity has been started, following the same topics. In particular, during this period we produced the conference paper [5], which focused on the performance evaluation of a mutual exclusion protocol (the Fischer's protocol) exploiting a technique for steady-state evaluation of Markov Regenerative Processes (MRP) [4]. Part of this work was also the implementation of the steady-state technique for MRPs described in [4] exploiting the APIs of the Oris tool [3].

The PhD period started with the investigation and implementation of a technique for the transient analysis of MRPs under *enabling restriction*, which characterises all those MRPs that have, at any given time, at most one GEN (GENerally distributed transition)

Courses attended

The following section reports a list of exams passed, seminars, tutorials, or summer schools attended. The Smart Computing PhD programme requires at least 9 credits by the end of the first year and at least 18 credits at the end of the second year.

Exams

- **GPU Programming Basics** (Marco Bertini, UniFi): 3 credits
- **Fuzzy Logic & Fuzzy Systems** (Beatrice Lazzerini, UniPi): 3 credits

Seminars

- **ProPPA: Probabilistic Programming Process Algebra** (Anastatis Georgoulas, IMT Lucca): ??? credits
- **Modelling, analysis and design of cyber-physical systems** (Ezio Bartocci, UniFi): 0.5 credits

Summer schools

- **Summer School on Optimization, Big Data and Applications (OBA)** (Veroli, Italy): 5 credits

Current total credits

The number of current total credits achieved by the end of the first year of PhD is 11.5.

Publications

The followings are all the published papers:

- **Title:** Performance Evaluation of Fischer's Protocol through Steady-State Analysis of Markov Regenerative Processes [5]
  Authors: Stefano Martina, Marco Paolieri, Tommaso Papini, Enrico Vicario
  Conference: Modeling, Analysis and Simulation of Computer and Telecommunication Systems, MASCOTS 2016

- **Title:** Exploiting Non-deterministic Analysis in the Integration of Transient Solution Techniques for Markov Regenerative Processes [1]
  Authors: Marco Biagi, Laura Carnevali, Marco Paolieri, Tommaso Papini, Enrico Vicario
  Conference: International Conference on Quantitative Evaluation of Systems, QEST 2017

- **Title:** An Inspection-Based Compositional Approach to the Quantitative Evaluation of Assembly Lines [2]
  Authors: Marco Biagi, Laura Carnevali, Tommaso Papini, Kumiko Tadano, Enrico Vicario
  Conference: European Workshop on Performance Engineering, EPEW 2017

Conferences and workshops

The followings are all the conferences and workshops attended:

- **International Conference on Quantitative Evaluation of Systems** (QEST 2017), Berlin (Germany), September 5-7 2017
- **European Workshop on Performance Engineering** (EPEW 2017), Berlin (Germany), September 7-8 2017
- **International Workshop on Practical Applications of Stochastic Modelling** (PASM 2017), Berlin (Germany), September 9 2017

Research visits to external institutions

Research plan for the next year

References

[1] Biagi, M., Carnevali, L., Paolieri, M., Papini, T., and Vicario, E. Exploiting Non-deterministic Analysis in the Integration of Transient Solution Techniques for Markov Regenerative Processes. In *International Conference on Quantitative Evaluation of Systems* (2017), Springer, pp. 20–35.

[2] Biagi, M., Carnevali, L., Papini, T., Tadano, K., and Vicario, E. An Inspection-Based Compositional Approach to the Quantitative Evaluation of Assembly Lines. In *European Workshop on Performance Engineering* (2017), Springer, pp. 152–166.

[3] Bucci, G., Carnevali, L., Ridi, L., and Vicario, E. Oris: a tool for modeling, verification and evaluation of real-time systems. *International Journal on Software Tools for Technology Transfer (STTT) 12*, 5 (2010), 391–403.

[4] Logothetis, D., Trivedi, K. S., and Puliafito, A. Markov regenerative models. In *Computer Performance and Dependability Symposium, 1995. Proceedings., International* (1995), IEEE, pp. 134–142.

[5] Martina, S., Paolieri, M., Papini, T., and Vicario, E. Performance Evaluation of Fischer's Protocol through Steady-State Analysis of Markov Regenerative Processes. In *Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS), 2016 IEEE 24th International Symposium on* (2016), IEEE, pp. 355–360.