

Introduction

Regions have been defined about 20 years ago by Andrzej Ehrenfeucht and Grzegorz Rozenberg as sets of nodes of a finite transition system that correspond to potential conditions that enable or disable transition occurrences in a corresponding elementary net system. Thus, regions have been the essential concept for synthesis of elementary net systems from its “anonymous” state graph (states are unknown but transitions between states are known). Since that time, many generalizations and variants of the synthesis problem of Petri nets from behavioural descriptions have been studied, including synthesis of more general Petri net classes, synthesis from languages, synthesis from partially ordered runs and synthesis from incomplete behavioural descriptions. All this work has in common that the transition names are given more or less directly by the behavioural description. The places of the net to be synthesized always correspond to regions which are defined in many different ways, depending on the form of the behavioural description. A major issue in this research is the study of regions, whence we call the entire research direction *Region Theory*.

Region Theory was applied in many different areas such as:

- hardware synthesis from precise specifications (synthesis from transition systems)
- visualization of concurrent hardware behaviour (synthesis from logic circuit models, transition systems and partial orders)
- GALS synthesis and desynchronisation based on synthesis (synthesis from step transition systems and re-synthesis from Petri nets)
- synthesis of control and policies for discrete event systems (synthesis from both languages and transition systems)
- modelling biological (membrane) systems with localities (synthesis from step transition systems)
- generation of specifications from incomplete specifications (mining from transition systems)
- model generation from examples (specification from (partial) languages)
- mining of process descriptions (mining from languages)

The aim of the ART workshop series was to bring together people working in these or other application areas of region theory, to exchange ideas and concepts and to work on common workshop results.

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