Algorithms for prebisimilarity

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Motivation

- To create a software toolkit that is useful to anyone working with verification on timed automata.
- To incorporate therein the recent advances using pre-ordering approaches (specifically, prebisimilarity.)

Topics from previous presentations

- CCS and Labeled Transition Systems.
- Strong and weak bisimilarity on CCS, relevant algorithms (Kanellakis-Smolka, Fernandez).
- Timed automata.
- Timed and untimed bisimilarity on timed automata.
- Region graphs.
- Zone graphs.
- Code: Fernandez' algorithm, parsing timed automata.

Progress since last presentation

- Ocaml interface for UPPAAL DBM libraries.
- Generation of zone graphs.
- Untimed bisimilarity on zone graphs -> zone-valuation graphs.
- Generation of visual graphs depicting these relations.

Theoretical context

- Zone graphs offer a discrete abstraction over the continuous state space for TA.
- A state in a zone graph is always associated with a convex polyhedron in the time space.
- Zone-valuation graphs have the additional property of being minimal.
- Our implementation uses untimed bisimilarity (Fernandez' algorithm) for this minimisation.

Future work

In order of increasing immediacy:

1. Refine the implementation of zone-valuation graphs using abstractions. [?]
2. Use the zone-valuation graph to implement timed performance prebisimilarity checking. [?]
3. Implement time-abstracted bisimilarity relations using region graphs.[?]
4. Package up the tool for distribution.

References


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