Evolutionary Optimization of Paradigm Transformation Sequences

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An important and complex task in dynamic coordination is to find an appropriate sequence of transformations which orchestrate a migration coordination scenario between an initial and a target state. Those transformations have to fulfill predefined sets of constraints and can be quite complex. Therefore, finding such a sequence of transformations is a difficult task.

The idea of this project is to investigate the potential of evolutionary algorithms for solving this problem and deriving such transformations automatically. Roughly speaking, the approach would optimize a constraint-preserving sequence of transformation rules, and rely on the coordination language Paradigm for evaluating every intermediate model.

The research involves steps such as:

- Definition of the task.
- Definition of an appropriate representation and evolutionary operators.
- Incorporation of heuristics regarding applicable transformation rules and constraint handling.
- Implementation of the approach.
- Definition of a suite of test problems.
- Systematic testing and evaluation of the results.

The ideal candidate has knowledge both of coordination and self-adaptation (or, behavior behavior) and of evolutionary computation.

As a preparatory step, you can do a research project involving literature work (paradigm, coordination, evolutionary computation on transformation rules) and the preparation of a report.

A preliminary prototype implementation addressing certain aspects of the task can be done as a software project. For example, evolutionary computation for grammatical evolution can be implemented within a software project.

The project is certainly exotic, as it combines two fields that have not had much overlap yet. At the same time, it is an exciting new step with the opportunity to publish results at international conferences.

Interested?

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