Topics for Practical Works

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August 6, 2014

Here are some topics for the practical works ("Praktika"). Some of the described topics may require more work than a single "Praktikum"

1 Solvers and Benchmarks

1. Collect benchmark problems from AI, formal methods, etc. and put them into a repository. Develop tools which allow to run tests on problems from the repository in an easy way (necessary conversions of the problem format, automatize the tests and comparison of results, distribute the tests on different machines, etc.).

2. Apply one or more of our solvers to the benchmarks from the repository. Report your findings on the experiments.

3. In the context of a project on argumentation, different available answer-set programming tools shall be applied to different problems and encodings. The results of the comparison have to be documented.

4. Try incremental DepQBF and compare it with the non-icremental version.

2 Path Planning: Tools and Algorithms

There has been some effort by a student team headed by R. Kogelnig to reimplement the motion strategy library MSL. In order to consolidate and extend the implementation, further work has to be done. Most of the topics below can (and should) be combined with a seminar; many of them can be extended to a master thesis. Have a look at the book by S. M. LaValle for a broad overview on path planning.

1. Implementation of planners based on different methods. Take planners from the literature and implement them into the MSL framework. Run benchmarks, compare the solver with others on large number of different problems and document the results.

2. Implement (black box) components of a planner (like sampling methods, collision detection engines, nearest neighbor computations, etc.). Try different implementations of one component and compare using benchmarks.

3. Software engineering support: Implement a framework to perform automated (unit) tests (including the generation of error reports).

4. Implement importer for 3D formats like maya, 3dmax, blender to allow more realistic 3D simulations of the computed solution.

5. Build a repository of benchmarks (like box folding problems, construction problems, etc.) for pathfinding problems. Extend the repository by randomly generated solvable test examples.

3   DepQBF: Extensions and Implementation

There are plenty of task in the context of our solver DepQBF for quantified Boolean formulas. We have incremental and parallel verions available. Contact Florian Lonsing for further details.