

Principles of AI Planning

Suggestions for Thesis and Project Topics

Robert Mattmüller

Research Group Foundations of Artificial Intelligence
Faculty of Engineering
Department of Computer Science
University of Freiburg

February 7th, 2012

Planning

- **Nondeterministic** planning and **heuristics**
 - Strong planning, strong cyclic planning (you know that from the lecture)
 - Relaxation heuristics, abstraction heuristics (you know that from the lecture as well)
- **Temporal** planning
- **Search techniques** for planning
- Other techniques (SAT planning, BDDs, ...)

Verification

- **Model checking** and **synthesis**
 - Planning techniques
(e.g. heuristic search in Directed Model Checking)
 - Timed Game solving
 - Abstraction refinement
- All that is relevant to the **AVACS** project, in particular subprojects R3 and S1 (cf. www.avacs.org)

Possible research directions

Some interesting ideas (no completely elaborated topics, though)



Principles of
AI Planning

Robert
Mattmüller

Overview

Thesis topics

Procedure

Planning

- **Partial observability** in nondeterministic planning
- Topics at the intersection between planning and verification
 - **Symmetry reduction**
 - **Partial-order reduction**
 - **Abstraction refinement**
 - ...

Possible research directions

Some interesting ideas (no completely elaborated topics, though)



Principles of
AI Planning

Robert
Mattmüller

Overview

Thesis topics

Procedure

Verification

- **Partial observability** in verification
- PDB techniques
(pattern selection, families of patterns, ...)
- Advanced search techniques for Directed Model Checking
(pruning, parallel transitions, Monte-Carlo tree search, ...)
- Improved abstraction refinement in Timed Game solving

Possible research directions

Some interesting ideas (no completely elaborated topics, though)



Principles of
AI Planning

Robert
Mattmüller

Overview

Thesis topics

Procedure

Somewhat unrelated

- General Game Playing
(a thesis topic in that area would likely be co-supervised by Stefan Wöfl woelfl@informatik.uni-freiburg.de)
 - Search techniques
 - Search guidance
 - ...

How do we proceed?



Principles of
AI Planning

Robert
Mattmüller

Overview

Thesis topics

Procedure

If you are interested in a topic ...

- ...drop me a line:
`mattmuel@informatik.uni-freiburg.de`
- or see me in my office (052-00-045).
- We will meet and agree on the scope of your thesis, project, practical,
- Later: regular meetings to talk about ideas, code, literature etc.