

Czech Technical University in Prague
Faculty of Electrical Engineering

Department of Computer Science and Engineering

DIPLOMA THESIS ASSIGNMENT

Student: **Daniel Fišer**

Study programme: Open Informatics
Specialisation: Artificial Intelligence

Title of Diploma Thesis: **Inference of State Invariants for Domain-Independent Planning**

Guidelines:

During the Semester Project, the student studied and analysed existing methods for automatic inference of state invariants and implemented a classical planner using Multi-Valued Task representation. His Diploma work will continue in this direction.

- 1) Study literature in the area of state invariant inference for classical planning and application of the invariants in the planning process.
- 2) Design a new method for state invariant inference.
- 3) Prove soundness, completeness and complexity of the method under defined assumptions.
- 4) Implement the method.
- 5) Validate and verify the implementation in the already implemented classical planner.
- 6) Experimentally evaluate practical efficiency of the method and compare it to existing approaches on the standard planning benchmark set.

Bibliography/Sources:

- [1] Malik Ghallab, Dana S. Nau, Paolo Traverso: Automated planning - theory and practice. Elsevier 2004, ISBN 978-1-55860-856-6, pp. I-XXVIII, 1-635
- [2] Maria Fox, Derek Long: The Automatic Inference of State Invariants in TIM. J. Artif. Intell. Res. (JAIR) 9: 367-421 (1998)
- [3] Malte Helmert: Concise finite-domain representations for PDDL planning tasks. Artif. Intell. 173(5-6): 503-535 (2009)
- [4] Patrik Haslum: $hm(P) = h_1(P_m)$: Alternative Characterisations of the Generalisation From h_{max} To h_m . ICAPS 2009
- [5] Vidal Alcázar, Álvaro Torralba: A Reminder about the Importance of Computing and Exploiting Invariants in Planning. ICAPS 2015: 2-6

Diploma Thesis Supervisor: Ing. Antonín Komenda, Ph.D.

Valid until the end of the summer semester of academic year 2016/2017


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