Research Group Artificial Intelligence

Bachelor Theses

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University of Basel

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AI Research Group

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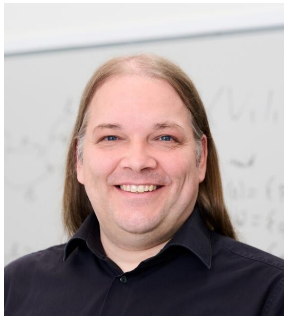
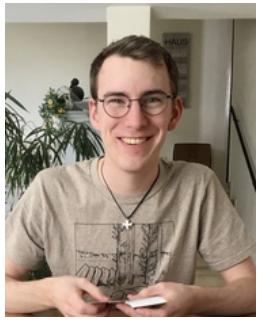


Malte Helmert

Gabi Röger

Florian Pommerening

Salomé Eriksson



Clemens Büchner

Remo Christen

Simon Dold

Claudia Grundke

Tanja Schindler

David Speck

Travis Rivera Petit

Research Focus

our main research areas:

- classical action planning
- heuristic search

Teaching

Teaching

autumn semester 2024:

- Discrete Mathematics in CS (Bachelor, 1st semester)
- Planning and Optimization (Master, 1st semester)

spring semester 2025:

- Algorithms and Data Structures (Bachelor, 2nd semester)
- Theory of Computer Science (Bachelor, 4th semester)
- Foundations of Artificial Intelligence (Bachelor, 6th semester)

Lecture: Foundations of Artificial Intelligence (Spring 2025)

- lecture, Bachelor, 8 CP
- lecturers: Malte Helmert
- target audience: Bachelor students in 6th semester

contents:

- introduction and historical development of AI
- rational agents
- problem solving and search
- constraint satisfaction problems
- formal logic
- automated planning
- board games

Theses

Bachelor and Master's Theses

- completed: 72 Bachelor theses, 40 Master's theses
  ⇝ `https://ai.dmi.unibas.ch/theses.html`
- ongoing: 4 Bachelor theses, 3 Master's theses
- interested? get in touch!
  ⇝ email to `malte.helmert@unibas.ch` or talk to me

Thesis Life Cycle

- T_0: you contact me about interest in B.Sc. thesis
- $T_0 + 1$ week: initial meeting
  - you, me and potential supervisor
  - we suggest 3 topics to choose from
  - discuss possible starting date for thesis
- $T_0 + 3$ weeks: topic decision
  - you select a topic (or decline)
  - set up learning contract with official starting date T_1
- $[T_1, T_1 + 3$ months$]$: work on thesis
  - 4 months possible if other commitments exist
  - weekly meetings with supervisor
  - ends with submission of thesis
- $\sim$2 weeks later: thesis presentation
  - you are done, congratulations!

Bachelor's Thesis Example

Sebastian Schlachter (2022)

Encoding Diverse Sudoku Variants as SAT Problems

(supervised by Augusto Blaas Corrêa)

- Study Sudoku variants from YouTube channel "Cracking the Cryptic"
- Model complex problem constraints as logical formulas
- Compare efficiency of solvers on resulting models

Bachelor's Thesis Example

Esther Mugdan (2022)

Optimality Certificates for Classical Planning

(supervised by Salomé Eriksson and Remo Christen)

- Theoretical framework for computer-verifiable proofs of optimality for solutions to shortest-path problems
- Integration with classical planning algorithms
- Implementation in the Fast Downward planner
- Evaluation of different algorithm variants and parameters

Bachelor's Thesis Example

Benedikt Heuser (2024)

Solving the Sliding Tile Puzzle with Post-Hoc Optimization

(supervised by Florian Pommerening)

- Adapting a general idea for state-space search heuristics to a specific problem
- Implementation in HOG2 codebase (University of Alberta)
- Evaluation of different algorithm variants and parameters

The End