Augusto B. Corrêa

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Summary

Research scientist with expertise in **AI planning, heuristic search, algorithm design, and machine learning**. Creator of competition-winning planning systems in C++ and Python. Recent work on **LLM-augmented planning** (NeurIPS 2025) and **LLM fine-tuning for agent capabilities**. 17 peer-reviewed papers at top AI venues.

Experience

Junior Research Fellow 11/2024 – present
Christ Church, University of Oxford, UK

- Showed LLMs can generate heuristic functions outperforming the state-of-the-art (NeurIPS 2025); extended to HTN planning and property-guided synthesis (arXiv, 2026).
- Proved that iterative SFT on agent traces implements RL with an implicit reward function, with implications for AI safety.
- Co-organizer of the LM4Plan workshop (ICAPS 2025, ICAPS 2026, ICML 2026), bridging the planning and LLM communities.

Doctoral Researcher 01/2020 – 10/2024
University of Basel, Switzerland · Supervisor: Prof. Malte Helmert

- Built **Powerlifted**, the first competitive AI planner to operate on first-order (lifted) representations. Designed core algorithms from scratch: successor generation, heuristic functions, search strategies.
- **Won the International Planning Competition 2023** with two derivative systems (Scorpion Maidu, Levitron), beating all existing planners.
- Developed novel grounding techniques using tree decompositions from parameterized complexity (Best Student Paper Runner-Up, ICAPS 2023).
- Proved undecidability of relaxation-based heuristics for planning with object creation (ICAPS 2025).
- Designed zero-knowledge proof protocols for verifying AI-generated plans without revealing solutions (AAAI 2023).
- Ph.D. awarded *summa cum laude*; thesis received the **ICAPS Outstanding Dissertation Award** (2025).

Research Assistant 02/2018 – 12/2019
University of Basel, Switzerland

- Developed first lifted successor generation algorithm using query optimization (ICAPS 2020).
- Published on potential heuristics for classical planning (ICAPS 2019, IJCAI 2019).

Research Assistant 07/2014 – 01/2018
Federal University of Rio Grande do Sul, Brazil

- Studied tie-breaking in A* search, resolving a long-standing open question (IJCAI 2018).
- Bachelor's thesis won the **Brazilian Computer Society's Best Thesis Award** nationally.

Education

Ph.D. in Computer Science, University of Basel 2020–2024
Summa cum laude. ICAPS Outstanding Dissertation Award.

M.Sc. in Computer Science, University of Basel 2018–2019
Major in Machine Intelligence.

B.Sc. in Computer Science, Federal University of Rio Grande do Sul 2013–2018
Best Bachelor's Thesis Award (Brazilian Computer Society).

Software

- **Powerlifted** (creator): First competitive planner on lifted representations. C++/Python. Used by

researchers worldwide; applied in scheduling and computational security.
- **Fast Downward** (contributor): The most widely-used planning system. C++/Python. Contributed search algorithms and heuristic components.
- **Downward Lab** (contributor): Python framework for reproducible large-scale benchmarking.

Skills

Languages	Python, C++, Bash
AI/ML	Heuristic search, combinatorial optimization, constraint satisfaction, reinforcement learning, LLM fine-tuning (LoRA/SFT), prompt engineering
Systems	Designed, built, and maintained multi-year C++/Python codebases (Powerlifted); large-scale experimental benchmarking
Spoken Languages	Portuguese (native), English (fluent), German (advanced), Spanish (advanced)

Selected Publications

17 peer-reviewed papers at NeurIPS, AAAI, IJCAI, ICAPS. Full list: Google Scholar.

1. **Corrêa, A.B.**; Pereira, A.G.; and Seipp, J. Classical Planning with LLM-Generated Heuristics: Challenging the State of the Art with Python Code. **NeurIPS 2025**.
   LLMs generate Python heuristics that outperform state-of-the-art hand-crafted methods.
2. **Corrêa, A.B.**; Gelberg Y.; Melo, L.C.; Shumailov, I.; Pereira, A.G.; and Gal, Y. Iterative Deployment Improves Planning Skills in LLMs. arXiv:2512.24940.
   Iterative SFT on agent traces implements RL with implicit reward; 196–401% improvement in planning.
3. **Corrêa, A.B.** Delete-Free Planning with Object Creation is Undecidable. **ICAPS 2025**.
   Fundamental limits on what can be verified about AI systems that create new objects.
4. **Corrêa, A.B.**; Büchner, C. and Christen, R. Zero-Knowledge Proofs for Classical Planning Problems. **AAAI 2023**.
   Cryptographic verification of AI-generated plans without revealing the solution.
5. **Corrêa, A.B.**; Hecher, M.; Helmert, M.; Longo, D.M.; Pommerening, F. and Woltran, S. Grounding Planning Tasks Using Tree Decompositions and Iterated Solving. **ICAPS 2023**. Best Student Paper Runner-Up.
   Tree decompositions from parameterized complexity applied to large-scale planning.
6. **Corrêa, A.B.**; Pereira, A.G. and Ritt, M. Analyzing Tie-Breaking Strategies for the A* Algorithm. **IJCAI 2018**.
   Resolves a long-standing question on optimality of A* with zero-cost actions.

Selected Awards

- **ICAPS 2026 Best Paper Runner-Up** (2026): For "Potential Heuristics as Real-Valued Multilinear Polynomials".
- **Google's Gemini Academic Program Award** (2026): USD 10,000 for research on LLMs for planning.
- **ICAPS Outstanding Program Committee Member Award** (2026).
- **ICAPS Outstanding Dissertation Award** (2025).
- **International Planning Competition Winner** (2023): Two winning systems.
- **Heidelberg Laureate Forum** (2019, 2022): Selected twice as Young Researcher.
- **ACM ICPC Latin America Regional Finalist** (2017).
- **Erasmus Mundus Smart^2 Scholarship** (2016–2017): 10 months at TU Munich.

Service

- **Workshop organizer**: LM4Plan (ICAPS 2025, ICAPS 2026, ICML 2026).
- **Programme committee**: NeurIPS, AAAI, IJCAI, ICAPS, KR, ECAI, SoCS.
- **Journal reviewer**: Artificial Intelligence Journal, JAIR.
- **Supervision**: 8 completed student theses (2 M.Sc., 6 B.Sc.).