Héctor Palacios

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- **Research Scientist** with 15+ years in AI, focusing on **ML**, **generative models**, and **symbolic planning**.
- Improved **generalization** in Large Language Models **(LLMs)** for **task-oriented dialogue** using **planning**.
- Proficient at evaluating the **generalization** and **robustness** of AI methods across domains and distributions.
- Utilize **NeuroSymbolic methods** to enhance **generalization**, **robustness**, and **interpretability**.
- Bridge **business** needs with **AI/ML** technology to develop feasible, **scalable**, high-value solutions.

ACADEMIC WORK

• **Collaborated** on over 30 research publications (see the next page).
• **Google Scholar:** H-index 11, 900+ citations.
• Delivered an **industrial invited talk** at the International Conference on Automated Planning and Scheduling (ICAPS) 2021 on **Planning for Controlling Business-to-business Applications**.
• Organized **workshops** at major AI conferences, including six editions of the Planning and Reinforcement Learning workshop (PRL).
• **Reviewed** for top AI conferences (AAAI, NeurIPS, ICLR, ICML, IJCAI, ICAPS, ECAI, AAMAS) and journals (AIJ, JAIR, KBS, ACM-TIST).
• **Influenced** the AI planning community by advocating for the **translation-based approach**.

TECHNICAL SKILLS

• **Coding:** Python, Java, C++, C, Functional languages.
• **ML/NLP tools:** Hugging Face, Pandas, Pytorch, Scikit-learn.
• **Symbolic AI tools:** Symbolic planners, SAT and constraint solvers, Combinatorial Optimization, Theorem provers, Parsers.
• **Dev operations:** Linux, Computer clusters, Docker, Git/GitHub.
• **Agile and Project Management** using Jira and similar tools: Ticketing, Sprints, Milestones, Minimum Viable Product (MVP).

EDUCATION

PHD, COMPUTER SCIENCE
Universitat Pompeu Fabra.
Dec 2009 | Barcelona/Spain
Advisor: Prof. Hector Geffner.

LANGUAGES

• **English:** professional.
• **Spanish:** native.
• **French:** elementary.

FUNDAMENTAL AND APPLIED RESEARCH

SERVICENOW RESEARCH | Staff Research Scientist
Mar 2021 – Aug 2023 | Montreal, Canada

- Led the conception and development of a project on **fine-tuned LLMs** for **task-oriented dialogue**, featuring slot filling and multiple actions per task; actively contributing to coding (arXiv 2023).
- Led and supervised work on **embodied taskable agent** in a simulated environment generalizing across skills, object types and relationships using **symbolic planning**, **winning** the ALFRED challenge 2022 (NeurIPS'23).
- Formulated and led work on **search** methods for **improving ML**-based planning by **approximated** symbolic model (PRL workshop @ IJCAI'22).
- Proposed, developed and advised on using **symbolic planning** for automatic generation of interactive **dialogue paths** (Proofs of Concept @ ServiceNow).

ELEMENT AI | Applied Research Scientist
Sep 2018 – Feb 2021 | Montreal, Canada

- Pioneered and transferred the only two technologies –for OCR and text2sql– from the **AI Core/R&D** team ever delivered to the **Products** team.
- Invented novel **constrained ML inference** for both, no retraining needed.
- For **OCR**, developed library that achieved **double-digit absolute improvement** in hard cases, while keeping the same performance in all the other samples.
- For **Question answering** (text2sql), formulated and supervised the use of constrained inference of **multi-classifiers** using **constraint optimization**, replacing ad-hoc heuristics.
- Designed **evaluation of text2sql** model using a LLM trained from scratch. Collected data and evaluated the performance.
- **Advised** internal customers and products about their **AI strategy**.

NUANCE COMMUNICATIONS | Senior Research Scientist
Nov 2016 – Sep 2018 | Montreal, Canada

- Developed a Siamese Network for **intent similarity** detection in natural language utterances using TensorFlow.
- Improved **Question answering** on domain-specific content and no labelled data, using word embeddings and information retrieval. Owned the project scope, clarified the evaluation and the scope of the existing solution.

REASONING / SYMBOLIC AI | PhD and Postdocs
until 2015, Barcelona and Madrid, Spain

- Solved rich **sequential decision making** problems featuring distribution/set of possible states and the effects of actions and observations.

AWARDS

- **Winner**, ALFRED challenge, Embodied AI workshop @CVPR 2022.
- **IJCAI-JAIR Best Paper Prize 2012** for an "outstanding paper @ JAIR".
- **Dissertation Awards** by the ECCAI (2009) and ICAPS (2010).
- **Winner**, Conformant track of the 5th International **Planning Competition** 2006.

PAST ACADEMIC POSITIONS

UNIVERSITAT POMPEU FABRA | Visiting Professor
Jan 2013 – Dec 2015 | Barcelona, Spain

UNIVERSIDAD CARLOS III DE MADRID | Postdoctoral Scholar
Dec 2010 – Dec 2012 | Madrid, Spain

PUBLICATIONS @ INDUSTRY

REFEREED CONFERENCE AND WORKSHOP PAPERS

- X. Liu, H. Palacios, C. Muise. Egocentric Planning for Scalable Embodied Task Achievement. NeurIPS 2023, main track, poster.
- R. Assouel, T. Marty, M. Caccia, I. Laradji, A. Drouin, S. Rajeswar, H. Palacios, Q. Cappart, D. Vazquez, N. Chapados, M. Gasse, A. Lacoste. The Unsolved Challenges of LLMs in Open-Ended Web Tasks: A Case Study. NeurIPS 2023 Foundation Models for Decision Making Workshop. 2023.
- M. Greco, A. Torralba, J. Baier, H. Palacios. Scaling up ML-based Black-box Planning with Partial STRIPS Models. IJCAI Planning and Reinforcement Learning (PRL) workshop. 2022. arXiv preprint arXiv:2207.04479.

PAPERS IN PROGRESS

- S. Raimondo, C. Pal, X. Liu, D. Vazquez, H. Palacios. Improving Generalization in Task-oriented Dialogues with Workflows and Action Plans. arXiv preprint arXiv:2306.01729. 2023.

JOURNAL PAPERS

- A. Niveau, H. Palacios, S. Scheck, B. Zanuttini. A Knowledge Compilation Perspective on Queries and Transformations for Belief Tracking. Annals of Mathematics and Artificial Intelligence. 2023. Accepted.

PATENTS

- H. Palacios, P. Noël. Systems and methods for enforcing constraints in character recognition. Patent US11615260B2. Issue date: 28 Mar 2023. https://patents.google.com/patent/US11615260B2.
- P. Noël, H. Palacios, T. Moisan. Systems and methods for using constraints to generate database queries. Patent US20230128290A1. Issue date: 27 Apr 2023. https://patents.google.com/patent/US20230128290A1.
- H. Palacios, P. Noël. Systems and methods for enforcing constraints to predictions. Patent US20220101162A1. Issue date: 31 Mar 2022. https://patents.google.com/patent/US20220101162A1.
- T. Scholak, L. Zamparo, H. Palacios, K. Legault, P. Noël, K. Majewski. Method and system for improving quality of a dataset. Patent US20210240680A1. Issue date: 5 Aug 2021. https://patents.google.com/patent/US20210240680A1.

EDITOR / ORGANIZER

- Co-organizer of Workshop series on Planning and Reinforcement Learning (PRL) series ICAPS 2020, 2021, 2022, IJCAI 2022, ICAPS 2023, IJCAI 2023.

SELECTED PUBLICATIONS @ ACADEMIA

PHD THESIS

- H Palacios. Translation-based approaches to Conformant Planning. Supervised by Prof. Hector Geffner. Dec 2009. Barcelona, Spain.
  - Honourable Mention at the 2009 Artificial Intelligence Dissertation Award by the European Coordinating Committee for AI (ECCAI).
  - 2010 Best Dissertation Award by the International Conference on Automated Planning and Scheduling (ICAPS).

JOURNAL PAPERS

- H. Palacios and H. Geffner. Compiling Uncertainty Away in Conformant Planning Problems with Bounded Width. Journal of Artificial Intelligence Research (JAIR). 35: 623-765. 2009. ISSN 1076-9757.
  - IJCAI-JAIR Best Paper Prize 2012 to an "outstanding paper published in JAIR in the preceding five calendar years".

REFEREED CONFERENCE PAPERS

- A. Albore, H. Palacios and H. Geffner. Compiling Uncertainty Away in Non-Deterministic Conformant Planning. European Conference on Artificial Intelligence (ECAI), p. 465-470. ISBN 978-1-60750-605-8. Lisbon, Portugal, August 16-20, 2010.
- B. Bonet, H. Palacios and H. Geffner. Automatic Derivation of Memoryless Policies and Finite-State Controllers Using Classical Planners. 19th International Conference on Automated Planning and Scheduling (ICAPS), p. 34-41. ISBN 978-1-57735-406-2. Thessaloniki, Greece, September 19-23, 2009.
- A. Albore, H. Palacios and H. Geffner. A Translation-based Approach to Contingent Planning. Int. Joint Conf. on Artificial Intelligence (IJCAI), p. 1623-1628. ISBN 978-1-57735-426-0. Pasadena, California, USA, July 11-17, 2009.
- H. Palacios and H. Geffner. From Conformant into Classical Planning: Efficient Translations That May be Complete Too. In Proceedings of the 17th International Conference on Automated Planning and Scheduling (ICAPS), p. 264-271. ISBN 978-1-57735-344-7. Providence, Rhode Island, USA, September 22-26, 2007.
  - Best Student Paper Award at ICAPS 2007.
- H. Palacios, B. Bonet, A. Darwiche, H. Geffner. Pruning Conformant Plans by Counting Models on Compiled d-DNNF Representations. In Proceedings of the 15th International Conference on Automated Planning and Scheduling (ICAPS), 2005. p 141-150. ISBN 978-1-57735-220-4. Monterey, California, USA. June 5-10 2005.

OTHER PUBLICATIONS @ ACADEMIA

JOURNAL PAPERS

- V. Agrawal, J. Baier, K. Bekris, Y. Chen, A.S. d'Avila Garcez, P. Hitzler, P. Haslum, D. Jannach, E. Law, F. Lecue, L.C. Lamb, C. Matuszek, H. Palacios, B. Srivastava, L. Shastri, N. Sturtevant, R. Stern, S. Tellex, S. Vassos. Reports of the AAAI 2012 Conference Workshops. AI Magazine. 33(4): 119-126 (2012). ISSN 0738-4602.

PATENTS

- M. B. Do, H. Palacios, R. Zhou, L. Kuhn, J. de Kleer. Methods and Systems for Active Diagnosis through Logic-based Planning. Patent US8145334. Issue date: 27 Mar 2012. (During internship at PARC, formerly Xerox PARC).

REFEREED CONFERENCE PAPERS

- K. Fernandes, J.S. Cardoso, H. Palacios. Learning and Ensembling Lexicographic Preference Trees with Multiple Kernels. 2016 International Joint Conference on Neural Networks (IJCNN 2016).
- S. Jimenez, A. Jonsson, H. Palacios. Temporal Planning With Required Concurrency Using Classical Planning. 25Th International Conference on Automated Planning and Scheduling (ICAPS). Jerusalem, Israel. June 7-11, 2015.
- C. Boutilier, J. Lang, J. Oren, H. Palacios. Robust Winners and Winner Determination Policies under Candidate Uncertainty. Twenty-Eighth AAAI Conference on Artificial Intelligence (AAAI). July 27-31, 2014. Québec, Canada.
- J. Hoffmann, N. Fates, H. Palacios. Brothers in Arms? On AI Planning and Cellular Automata. European Conference on Artificial Intelligence (ECAI). p. 223-228. ISBN 978-1-60750-605-8. Lisbon, Portugal. August 16-20, 2010.
- B. Bonet, H. Palacios and H. Geffner. Automatic Derivation of Finite-State Machines for Behavior Control (Nectar Track). 24th AAAI conference on Artificial Intelligence (AAAI), p. 1656-1659. ISBN 978-1-57735-463-5. Atlanta, Georgia, USA, July 11-15, 2010
- A. Albore, H. Palacios and H. Geffner. Fast and Informed Action Selection for Planning with Sensing. In Current Topics in Artificial Intelligence, vol 4788/2007. Selected papers of the 12th Conference of the Spanish Association for Artificial Intelligence (CAEPIA), p. 1-10. ISBN: 978-3-540-75270-7. Salamanca, España. November 12-13, 2007.
- H. Palacios and H. Geffner. Compiling Uncertainty Away: Solving Conformant Planning Problems Using a Classical Planner (Sometimes). In Proceedings of the 21st National Conference on Artificial Intelligence (AAAI), p. 900-905. ISBN 978-1-57735-281-5. , Boston, Massachusetts, USA, July 16-20, 2006.
- H. Palacios and H. Geffner. Mapping Conformant Planning into SAT through Compilation and Projection. In Lecture Notes in Computer Sciences, vol 4177/2006. Selected papers of the 11th Conference of the Spanish Association for Artificial Intelligence (CAEPIA), 2005. p. 311-320. ISBN 3-540-45914-6. Santiago de Compostela, España, November 16-18, 2005.
  - Best Paper Finalist at CAEPIA 2005.
- H. Palacios and H. Geffner. Planning as Branch and Bound: A Constraint Programming Implementation. In Proceedings of the 28th Latin-American Conference on Informatics (infoUYclei), 2002. p. 239-251. ISBN 9974-7704-1-6. Montevideo, Uruguay, November 25-29 2002.

REFEREED WORKSHOPS PAPERS

- D. Furelos-Blanco,A. Jonsson, H. Palacios, S. Jimenez. Forward-Search Temporal Planning with Simultaneous Events. ICAPS Workshop on Constraint Satisfaction Techniques for Planning and Scheduling, 2018.
- H. Palacios, A. Albore, H. Geffner. Compiling Contingent Planning into Classical Planning: New Translations and Results. In Proceedings of the Workshop "Models and Paradigms for Planning under Uncertainty: a Broad Perspective", ICAPS 2014.
- C. Boutilier, J. Lang, J. Oren, H. Palacios. Robust Winners and Winner Determination Policies under Candidate Uncertainty. Fourth International Workshop on Computational Social Choice, 2012.
- H. Palacios and H. Geffner. Compiling Uncertainty Away: Solving Conformant Planning Problems Using a Classical Planner (Sometimes). In Proceedings of the Workshop on Planning Under Uncertainty and Execution Control for Autonomous Systems, ICAPS 2006.
- H. Palacios and H. Geffner. Mapping Conformant Planning into SAT through Compilation and Projection. In Proceedings of the 1st International Workshop on Quantification in Constraint Programming held during the International Conference on Principles and Practice of Constraint Programming (CP), 2005.

EDITOR / ORGANIZER

- Papers from the 2012 AAAI Workshop "Problem Solving Using Classical Planners". H. Palacios, P. Haslum, J. Baier. 98 pp. 2012. ISBN 978-1-57735-577-9.
- Proceedings of the ICAPS'10 workshop on Planning and Scheduling Under Uncertainty (13 May 2010), Bidot J., Bryce D., Buffet O., Palacios H., Sanner S. (Editors). 2010.