

Paolo Morettin

Curriculum Vitae

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Expertise: Machine learning, probabilistic models, automated reasoning.

My research lies at the intersection of machine learning and automated reasoning, with a focus on **probabilistic inference** with **algebraic** and **logical constraints**. I am currently fully supported by a Marie Skłodowska-Curie Action project aimed at advancing the **trustworthiness of AI** systems by developing verification tools that provide **formal guarantees** on their correctness.

Current position

2022–
current **Assistant professor (RTDa) / MSCA fellow**, *University of Trento, IT*

Education

- 2016–2020 **PhD**, *Structured Machine Learning group, University of Trento, IT, PhD cum laude*
Thesis: *Learning and reasoning in hybrid structured spaces.*
Advisor: Prof. Andrea Passerini, co-advisor: Prof. Roberto Sebastiani
- 2013–2016 **MSc in Computer Science**, *University of Trento, IT, 110/110 cum laude*
Thesis: *Learning Modulo Theories with latent variables.*
Advisor: Prof. Andrea Passerini, co-advisor: Prof. Stefano Teso
- 2009–2013 **BSc in Computer Science**, *University of Udine, IT, 110/110 cum laude*
Thesis: *A comparative study on constraint solvers.*
Advisor: Prof. Agostino Dovier

Work Experience

- 2020–2022 **Postdoctoral researcher**, *Declarative Languages and AI group, KU Leuven, BE*
Advisor: Prof. Luc De Raedt
- 2019 **Visiting scholar**, *Statistical Relational AI lab, University of California, Los Angeles, CA, USA*
Jul–Oct Tractable WMI models, advisor: Prof. Guy Van den Broeck
- 2018 **Visiting scholar**, *Declarative Languages and AI group, KU Leuven, Leuven, BE*
Apr–Jun Learning hybrid and structured distributions, advisor: Prof. Luc De Raedt
- 2016 **Engineer**, *Advanced Laboratory on Embedded Systems, (UTRC), Trento, IT*
Jun–Nov Formal methods group
- 2016 **Substitute teacher**, *ITIS J.F. Kennedy, Pordenone, IT*
Apr–Jun Substitute teacher in a technical high school (computer science program)
- 2015 **Data science intern**, *Insight Centre for Data Analytics, University College Dublin, Ireland*
Mar–May Dynamic tracking of communities in social networks, advisor: Prof. Pdraig Cunningham
- 2008–2009 **Software developer**, *Compix, Pordenone, IT*
Consulting, Visual Basic and .NET development

Selected peer-reviewed Publications

- 2024 *Enhancing SMT-based Weighted Model Integration by structure awareness*
Gabriele Masina, Giuseppe Spallitta, Paolo Morettin, Andrea Passerini, Roberto Sebastiani

AIJ

2022	<i>SMT-based weighted model integration with structure awareness</i> Gabriele Masina, Giuseppe Spallitta, Paolo Morettin, Andrea Passerini, Roberto Sebastiani	UAI
2021	<i>Hybrid Probabilistic Inference with Logical and Algebraic Constraints: a Survey</i> Paolo Morettin, Pedro Zuidberg Dos Martires, Samuel Kolb, Andrea Passerini	IJCAI
2020	<i>Probabilistic Inference with Algebraic Constraints: Theoretical Limits and Practical Approximations</i> Zhe Zeng*, Paolo Morettin*, Fanqi Yan*, Antonio Vergari, Guy Van den Broeck	NeurIPS
2020	<i>Efficient Generation of Structured Objects with Constrained Adversarial Networks</i> Luca Di Liello, Pierfrancesco Ardino, Jacopo Gobbi, Paolo Morettin, Stefano Teso, Andrea Passerini	NeurIPS
2020	<i>Scaling up Hybrid Probabilistic Inference with Logical and Arithmetic Constraints via Message Passing</i> Zhe Zeng*, Paolo Morettin*, Fanqi Yan*, Antonio Vergari, Guy Van den Broeck	ICML
2020	<i>Learning Weighted Model Integration distributions</i> Paolo Morettin, Samuel Kolb, Stefano Teso, Andrea Passerini	AAAI
2019	<i>The pywmi Framework and Toolbox for Probabilistic Inference using WMI</i> Samuel Kolb, Paolo Morettin, Pedro Zuidberg Dos Martires, Francesco Sommariva, Andrea Passerini, Roberto Sebastiani, Luc De Raedt	IJCAI
2019	<i>Advanced SMT techniques for Weighted Model Integration</i> Paolo Morettin, Andrea Passerini, Roberto Sebastiani	AIJ
2017	<i>Efficient Weighted Model Integration via SMT-Based Predicate Abstraction</i> Paolo Morettin, Andrea Passerini, Roberto Sebastiani	IJCAI

Books / Chapters

2023 Chapter	<i>Semantic Loss Functions for Neuro-Symbolic Structured Prediction (in Compendium of Neurosymbolic Artificial Intelligence)</i> Kareem Ahmed, Stefano Teso, Paolo Morettin, Luca Di Liello, Pierfrancesco Ardino, Jacopo Gobbi, Yitao Liang, Eric Wang, Kai-Wei Chang, Andrea Passerini, Guy Van den Broeck	IOS Press
2022 Book	<i>Learning and Reasoning in Hybrid Structured Spaces (Book Series: Frontiers of Artificial Intelligence and Applications)</i> Paolo Morettin	IOS Press

Service

Program committee / reviewer AAAI (2021-2024), AISTATS (2022-2024), ECAI (2020), FMCAD (2023), ICLR (2022-2024), ICML (2021-2024), IJCAI (2020-2023), KR (2024), NeurIPS (2020-2022, 2024).

Editorial board member Journal of Machine Learning Research (since 2023).

Reviewer for journals Machine Learning Journal, Frontiers in AI, Data Mining and Knowledge Discovery, Künstliche Intelligenz.

Other activities

Volunteer	AI*IA 2018
Organizer	GNI 2016 finals (the Italian Computer Science competition for high-school students)

Languages

English	Professional proficiency
Italian	Native