Emile van Krieken

Research Associate – University of Edinburgh

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I am a Research Associate (Postdoc) at the University of Edinburgh, working on Artificial Intelligence. My main research interest is Neurosymbolic methods for machine learning. I obtained my PhD in 2024 at the Vrije Universiteit Amsterdam.

Education

PhD – Cum Laude (top 5%) Amsterdam, NL
Vrije Universiteit Amsterdam *Apr 2019 - Jan 2024*
Dissertation title: "Optimisation in Neurosymbolic Learning Systems"

Supervised by prof. Annette ten Teije and dr. Jakub Tomczak.
Doctorate committee: prof. Mark Hoogendoorn, prof. Luc de Raedt, prof. Cassio de Campos, dr. Sebastijan Dumancic, dr. Efi Tsamoura

Master in Artificial Intelligence – Cum Laude Amsterdam, NL
University of Amsterdam *Sep 2016–Feb 2019*

Average 9.0/10.0 (4.00 GPA)

- Thesis: "Differentiable Fuzzy Logics". Grade: 9.5/10.0.
  Supervisors: prof. Frank van Harmelen, dr. Erman Acar. Assessor: dr. Thomas Kipf.

Bachelor in Computer Science – Cum Laude Utrecht, NL
Universiteit Utrecht *Sep 2013–Jun 2016*

Average 8.7/10.0 (4.00 GPA)

Work Experience

Research Associate (Postdoc) Edinburgh, United Kingdom
University of Edinburgh *Since Sep 2023*
Working in the "Edinburgh Laboratory for Integrated Artificial Intelligence" (ELIAI) under the supervision of dr. Pasquale Minervini, dr. Antonio Vergari and dr. Edoardo Ponti. The project is on gradient-based learning of discrete structures.

Research Visit Trento, Italy
Fondazione Bruno Kessler *Sep 2021–Oct 2021*
Project together with dr. Alessandro Daniele and prof. Luciano Serafini on Neurosymbolic AI. Funded by the HumaneAI EU Horizon project.

Research Assistant Amsterdam, NL
Vrije Universiteit Amsterdam *Sep 2017–Feb 2018*

Supervised by dr. Jacqueline Heinerman, on social learning in robotics.

Treasurer Utrecht, NL
DWARS, GroenLinkse Jongeren *Oct 2016–Jul 2017*

Composer and Programmer Breda, NL
Gilded Games *Jun 2011–Nov 2015*

- Worked with an international team on large and successful modifications for Minecraft, such as 'The Aether'.

Publications

- T. Younesian, T. Thanapalasingam, **E. van Krieken**, D. Daza, P. Bloem. "GRAPES: Learning to Sample Graphs for Scalable Graph Neural Networks." Preprint 2023
- T. Thanapalasingam, **E. van Krieken**, P. Bloem, P. Groth. "Intelligraphs: Datasets for Benchmarking Knowledge Graph Generation." Preprint 2023
- **E. van Krieken**, T. Thanapalasingam, J. Tomczak, A. Ten Teije, F. van Harmelen. "A-NeSI: Scalable Approximate Inference for Probabilistic Neurosymbolic Learning." Advances in Neural Information Processing Systems 36 (NeurIPS 2023)
- Alessandro Daniele*, **E. van Krieken***, L. Serafini, F. van Harmelen. "Refining neural network predictions using background knowledge." Preprint, to appear in Machine Learning Journal, * equal contribution
- **E. van Krieken**, E. Acar, F. van Harmelen. "Analyzing differentiable fuzzy logic operators." Artificial Intelligence 302 2022
- K. van den Houten, **E. van Krieken**, B. Heidergott. "Analysis of Measure-Valued Derivatives in a Reinforcement Learning Actor-Critic Framework." Winter Simulation Conference 2022
- D. Alivanistos, S. B. Santamaria, M. Cochez, J.C. Kalo, **E. van Krieken**, T. Thanapalasingam. "Prompting as probing: Using language models for knowledge base construction." LM-KBC challenge at ISWC 2022, Track 2 winner
- **E. van Krieken**, J. Tomczak, A. Ten Teije. "Storchastic: A framework for general stochastic automatic differentiation." Advances in Neural Information Processing Systems 34 (NeurIPS 2021)
- K. Grouwstra, **E. van Krieken**. "Type-driven Neural Programming by Example." NeurIPS 2020 Workshop on Computer-Assisted Programming
- **E. van Krieken**, E. Acar, F. van Harmelen. "Analyzing differentiable fuzzy implications." Proceedings of the International Conference on Principles of Knowledge Representation and Reasoning. Vol. 17. No. 1. 2020
- **E. van Krieken**, E. Acar, F. van Harmelen. "Semi-Supervised Learning using Differentiable Reasoning." Journal of Applied Logic 6.4 2019
- J. Heinerman, B. Bussmann, R. Groenendijk, **E. Van Krieken**, J. Slik, A. Tezza, A. E. Eiben. "Benefits of social learning in physical robots". IEEE Symposium Series on Computational Intelligence (SSCI) 2018

Additional education

International Artificial Intelligence in Bergen Research School — Bergen, Norway
University of Bergen — *Jun 2022*

Topic: Knowledge Graphs and Machine Learning.

Explore Entrepreneurship — Amsterdam, NL
Vrije Universiteit Amsterdam — *May 2021*

Topic: An introduction to entrepreneurship and startups.

Research methods and methodology for IKS Vught, NL
School for Information and Knowledge Systems *Nov 2019*
Topic: Setting up large research projects.

Cambridge Professional English Breda, NL
Stedelijk Gymnasium Breda *Sep 2006–Jun 2012*

Teaching

- Deep Learning, 2020, 2021, 2022 (Master AI Vrije Universiteit Amsterdam).
  Teaching assistant, gave two lectures on Reinforcement Learning.
- Student supervision
  - Jochem Herrebrugh (2022, BSc VU)
  - Kim van den Houten (2021, MSc VU). Won 2021 Extrie Thesis Award.
  - Kiara Grouwstra (2020, MSc UvA)

Talks

- Machine Learning for Graphs course, Amsterdam (Jan 2024, invited)
- NeurIPS 2023 (Dec 2023, A-NeSI poster)
- New Frontiers in Graph Learning workshop at NeurIPS 2023 (Dec 2023, GRAPES poster)
- GFlowNet reading club at MILa - Quebec AI Institute (Nov 2023, invited)
- SMiLe workshop 2023 (June 2023, invited talk and poster)
- NeSy-GeMs workshop at ICLR 2023 (May 2023, poster)
- GFlowNet reading club at MILA - Quebec AI Institute (April 2023, invited)
- ILCC/CDT NLP Seminar series at University of Edinburgh (March 2023, invited)
- Algorithms group at TU Delft (Feb 2023, invited)
- AMLAB group at University of Amsterdam (Oct 2022, invited)
- DTAI group at KU Leuven (Sep 2022, invited)
- IJCLR (Sep 2022, oral)
- Logic and Learning Seminar, Bergen (Aug 2022, invited)
- RL Summer School 2022 in Amsterdam (Jul 2022, invited, lecture on policy gradients)
- HHAI 2022 KR4HI Workshop (Jun 2022, extended abstract)
- International Artificial Intelligence in Bergen Research School (Jun 2022, invited, **best presentation award**)
- BeNeRL 2022 (Jun 2022, Storchastic poster)
- NeurIPS 2021 (Dec 2021, Storchastic poster)
- DKM Unit seminar, Fondazione Bruno Kessler (Sep 2021, invited)
- Pyro Seminar, Broad Institute of MIT and Harvard (Jun 2021, invited, about Storchastic)
- DWS colloquium, Universität Mannheim (Nov 2020, invited)
- KR2020 (Oct 2020, oral)

Miscellaneous

- Co-lead of organising committee for Neurosymbolic Generative Models (NeSy-GeMs) workshop at ICLR 2023. Tasks: Proposal writing, website, social media and email maintenance, program chair, setting up the program committee, and moderation during the workshop day.
- Organised a symposium on Probabilistic Learning and Reasoning at the Vrije Universiteit Amsterdam in 2024 before my PhD defence.
- We won the LM-KBC challenge at ISWC 2022.
- National research evaluation informatics (2015-2020) of the department of computer science, VU Amsterdam (2022). Role: Represent PhD students.
- Acted as an evaluator of ELLIS PhD applications (2023).
- Reviewing:
  - Conferences: NeurIPS 2023, KR 2023, AISTATS 2022, 2023, 2024, CIKM 2020, AAAI 2020
  - Journals: Operations Research, JMLR, JBHI, JAIR
- Open Source Software
  - Storchastic: A PyTorch library for general gradient estimation.
  - Juggl: A plugin for the Obsidian note-taking app which adds an advanced and customizable graph view.
  - Made significant contributions to other popular Obsidian plugins: Supercharged Links, Breadcrumbs, Graph Analysis and Search on Internet.