

Piotr Piękos

PhD Candidate

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👤 [Google Scholar](#)

Education

KAUST, Saudi Arabia.

- **GPA 4.0/4.0** Computer Science, Ph.D. (08.2022-Now)
Working on sparse models (Mixture-of-Experts), neural network architectures and reinforcement learning algorithms.
Supervised by Prof. Jürgen Schmidhuber

University of Warsaw, Poland.

- Mathematics, M.Sc. (grad. 2021)
Thesis about improving mathematical reasoning in BERT
- Mathematics, B.Sc. (grad. 2018)
Thesis: a survey of machine learning methods in Natural Language Processing
- Computer Science, B.Sc. (grad. 2017)
Thesis: an implementation of the face recognition algorithm as an application on an android phone.

Experience

- 05.2024- **Amazon, Amsterdam, Netherlands, Applied Scientist Internship.**
- 10.2024 Creating hierarchical discrete representations from dense vector representations used for representations of product in the Amazon catalog. Lead to a publication about [Hyperbolic Residual Quantization](#) apart from being implemented in the internal Amazon systems.
- 06.2023- **IDSIA, Lugano, Switzerland, Research Internship.**
- 08.2023 Continued previous remote collaboration that resulted in 2 papers: [SwitchHead](#)(NeurIPS 2024) and [Compositional Optimality Equation](#)(GCRL NeurIPS 2023 Workshop).
- 01.2022- **Polish Academy of Sciences, AWARElab group, Researcher.**
- 06.2022 I was a collaborator in the Fast and Precise paper, a Notable Top 5% paper at ICLR 2023.
 - Implemented experiments on the Sokoban environment.
 - Investigated extendability of the algorithm to new environments, e.g. First Order Logic solvers.
- 10.2021- **Allegro.pl, Research Engineer.**
- 01.2022 Improving the quality of the neural search used in the Allegro.pl portal. Improved the speed of the data processing for the training, which allowed to increase the size of the data used for the training and, hence, improved the performance of the model.
- 07.2017- **ITmagination, Machine Learning Engineer / ML Team Leader.**
- 06.2020 Designed machine learning systems for external companies. Responsibilities:
 - Analysis of systems and suggesting new methods for utilizing the companies' data.
 - Implementing and experimenting with machine learning models.
 - Creating a serving infrastructure that allows to utilize the models in production.Example projects:
 - Automatic patent assistant that suggests mentors and next steps based on the description of the project.
The implementation was based on the BERT language model.
 - System for predicting necessary staff to operate a shop on a given day.
 - Evaluating online influencers for marketing companies with Object detection methods such as Faster-RCNN.
- 07.2016- **Hcore, Python Developer Internship.**
- 09.2016 Backend Software Engineering in Python for a network monitoring product.

Publications

Mixture of Sparse Attention: Content-Based Learnable Sparse Attention via Expert-Choice Routing [PDF](#) [↗](#) .

Piotr Piękos, Róbert Csordás, Jürgen Schmidhuber

NeurIPS 2024 **SwitchHead: Accelerating Transformers with Mixture-of-Experts Attention** [PDF](#) [↗](#) .

Róbert Csordás, Piotr Piękos, Kazuki Irie, Jürgen Schmidhuber

Hyperbolic Residual Quantization: Discrete Representations for Data with Latent Hierarchies [PDF](#) [↗](#) .

Piotr Piękos, Subhradeep Kayal, Alexandros Karatzoglou

ICRA 2024 **Utilizing a Malfunctioning 3D Printer by Modeling Its Dynamics with Artificial Intelligence.**

Renzo Cabalero*, Piotr Piękos*, Eric Feron, Jürgen Schmidhuber

GCLR **Efficient Value Propagation with the Compositional Optimality Equation** [PDF](#) [↗](#) .

NeurIPS 2023 workshop Piotr Piękos, Aditya Ramesh, Francesco Faccio, Jürgen Schmidhuber

ICLR 2023, **Fast and Precise: Adjusting Planning Horizon with Adaptive Subgoal Search** [PDF](#) [↗](#)
Notable Top [Project website](#) [↗](#) .
5%

Michał Zawalski, Michał Tyrolski, Konrad Czechowski, Tomasz Odrzygóźdź, Damian Stachura, Piotr Piękos, Yuhuai Wu, Łukasz Kuciński, Piotr Miłoś

ACL-IJCNLP **Measuring and Improving BERT's Mathematical Abilities by Predicting the Order of Reasoning** [PDF](#) [↗](#) [Project website](#) [↗](#) .
2021, Oral

Piotr Piękos, Henryk Michalewski, Mateusz Malinowski

CVMJ 2025 **Mindstorms in Natural Language-Based Societies of Mind** [PDF](#) [↗](#) .

Mingchen Zhuge, Haozhe Liu, Francesco Faccio, Dylan R Ashley, Róbert Csordás, Anand Gopalakrishnan, Abdullah Hamdi, Hasan Abed Al Kader Hammoud, Vincent Herrmann, Kazuki Irie, Louis Kirsch, Bing Li, Guohao Li, Shuming Liu, Jinjie Mai, Piotr Piękos, Aditya Ramesh, Imanol Schlag, Weimin Shi, Aleksandar Stanić, Wenyi Wang, Yuhui Wang, Mengmeng Xu, Deng-Ping Fan, Bernard Ghanem, Jürgen Schmidhuber

Awards

EEML 2021 - **Best Poster Award**, for Measuring and Improving BERT's Mathematical Abilities by Predicting the Order of Reasoning

R0-FoMo NeurIPS 2023 Workshop - **Best Paper Award**, for Mindstorms in Natural Language-Based Societies of Mind

Open-source

BERT for trax: Added BERT model and masked language modelling pipeline preparation to trax. [Github](#) [↗](#)

EGS: Triton kernel for fused operation of gather/scatter with a linear layer. [Github](#) [↗](#)

Technical skills

Python, PyTorch, [Triton](#), LLMs,
Huggingface, LLMs, NLP, Transformers,
Reinforcement Learning, Deep Learning,
C++, Haskell, SQL, Algorithms
Linux, Bash, GIT, Unit tests

Languages

English Fluent (111/120 TOEFL score)
Polish Native

Interests

Chess, Music, Psychology