

Jonas Belouadi

PH.D. CANDIDATE IN COMPUTER SCIENCE · UNIVERSITY OF MANNHEIM

Mannheim, Baden-Württemberg, Germany

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Summary

As a fourth-year doctoral researcher at the University of Mannheim, I study the limitations of large language models in resource-constrained multimodal and multilingual settings. My specific focus is the intersection of multimodal learning and neural program synthesis, particularly in *graphics program synthesis* with vision-language models (VLMs). This field explores how multimodal AI systems can generate programs that compile to visual media. I also have experience with pre-training token-free language models for style-conditioned poetry generation without the need for manually imposed stylistic constraints, as well as developing unsupervised evaluation metrics for machine translation of low-resource languages.

Higher Education

University of Mannheim & Bielefeld University

Mannheim & Bielefeld, Germany

PH.D. IN COMPUTER SCIENCE

May 2022 - Present

- Topic: Graphics Program Synthesis & Multilingual Natural Language Processing
- Thesis title: Multimodal and Multilingual Language Modeling under Resource Constraints

Darmstadt University of Technology

Darmstadt, Germany

M.SC. IN COMPUTER SCIENCE WITH MINOR IN ELECTRICAL ENGINEERING

Apr. 2019 - Oct. 2021

- Graduated with honors
- Final grade: 1.29 (German 5-point scale)
- Thesis title: Self-Learning for Unsupervised Evaluation Metrics
 - Third place in university-wide thesis competition

Darmstadt University of Technology

Darmstadt, Germany

B.SC. IN COMPUTER SCIENCE

Oct. 2016 - Mar. 2019

- Final grade: 1.48 (German 5-point scale)
- Thesis title: Text Generation from Knowledge Bases

Experience

Adobe Research

Lyon, France

RESEARCH SCIENTIST INTERN

Apr. 2025 - Sep. 2025

- Synthesized photo-realistic appearances of 3D objects using VLMs and procedural generation.

National Institute of Information and Communications Technology (NICT)

Kyoto, Japan

RESEARCH SCIENTIST INTERN

Aug. 2024 - Mar. 2025

- Developed a novel VLM architecture enabling zero-shot synthesis of scientific vector graphics from text descriptions.

Natural Language Learning Group (NLLG)

Darmstadt, Germany

RESEARCH & TEACHING ASSISTANT

Nov. 2021 - Feb. 2022

- Conducted research on new evaluation metrics for machine translation.
- Assisted in organizing lectures and seminars on natural language processing.

Achievements

AWARDS

2023	ACL Honorable Mention , Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics	Toronto, Canada
2023	EACL Outstanding Paper , Proceedings of the 17th Conference of the European Chapter of the Association for Computational Linguistics	Dubrovnik, Croatia

FELLOWSHIPS

2024	NICT Research Fellowship , Financial support to facilitate international research collaborations.	Project funding
2024	Google Cloud Platform Credit Award , Financial aid for selected academic research projects.	Project funding
2020	PROMOS , Scholarship for students completing academic stays abroad.	Monthly grant
2019	Deutschlandstipendium , Scholarship for high-achieving and committed students from all over the world.	Monthly grant

TECHNOLOGIES

Programming	Python, C, C++, Bash, Java, Lua
Frameworks & Libraries	PyTorch, HuggingFace Transformers, Sentence Transformers, NumPy, Pandas
Development & Deployment	Git, Linux, \LaTeX , Docker, Neovim, Gradio, HuggingFace Spaces, Google Colab, Slurm

OPEN-SOURCE PROJECTS

DeTikZify	Automated synthesis of graphics programs for scientific figures and sketches.
AutomaTikZ	Automated synthesis of scientific vector graphics using text captions.
pantran.nvim	Plugin that provides machine translation functionality within the Neovim text editor.
uniformers	Library for token-free, character-level language modeling.
umetrics	Library for experimenting with reference-free evaluation metrics for machine translation.

LANGUAGES

German	Native proficiency
English	Full professional proficiency
Japanese	Limited working proficiency
Italian	Limited working proficiency

Selected Publications

CONFERENCE PROCEEDINGS

MultiMat: Multimodal Program Synthesis for Procedural Materials using Large Multimodal Models

Jonas Belouadi, Tamy Boubekeur, Adrien Kaiser

The Fourteenth International Conference on Learning Representations, 2026, Rio de Janeiro, Brazil

TikZero: Zero-Shot Text-Guided Graphics Program Synthesis

Jonas Belouadi, Eddy Ilg, Margret Keuper, Hideki Tanaka, Masao Utiyama, Raj Dabre, Steffen Eger, Simone Paolo Ponzetto

Proceedings of the IEEE/CVF International Conference on Computer Vision, 2025, Honolulu, Hawaii

DeTikZify: Synthesizing Graphics Programs for Scientific Figures and Sketches with TikZ

Jonas Belouadi, Simone Paolo Ponzetto, Steffen Eger

The Thirty-eighth Annual Conference on Neural Information Processing Systems, 2024, Vancouver, Canada

AutomaTikZ: Text-Guided Synthesis of Scientific Vector Graphics with TikZ

Jonas Belouadi, Anne Lauscher, Steffen Eger

The Twelfth International Conference on Learning Representations, 2024, Vienna, Austria

ByGPT5: End-to-End Style-conditioned Poetry Generation with Token-free Language Models

Jonas Belouadi, Steffen Eger

Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics, 2023, Toronto, Canada

UScore: An Effective Approach to Fully Unsupervised Evaluation Metrics for Machine Translation

Jonas Belouadi, Steffen Eger

Proceedings of the 17th Conference of the European Chapter of the Association for Computational Linguistics, 2023, Dubrovnik, Croatia

SciImage: How Good are Multimodal Large Language Models at Scientific Text-to-Image Generation?

Leixin Zhang, Steffen Eger, Yinjie Cheng, Weihe Zhai, **Jonas Belouadi**, Fahimeh Moafian, Zhixue Zhao

The Thirteenth International Conference on Learning Representations, 2025

Reproducibility Issues for BERT-based Evaluation Metrics

Yanran Chen, **Jonas Belouadi**, Steffen Eger

Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing, 2022, Abu Dhabi, United Arab Emirates

JOURNAL ARTICLES

ChatGPT: A Meta-Analysis after 2.5 Months


Christoph Leiter, Ran Zhang, Yanran Chen, **Jonas Belouadi**, Daniil Larionov, Vivian Fresen, Steffen Eger

Machine Learning with Applications (June 2024) p. 100541. Elsevier, 2024

Cross-genre argument mining: Can language models automatically fill in missing discourse markers?

Gil Rocha, Henrique Lopes Cardoso, **Jonas Belouadi**, Steffen Eger

Argument & Computation (Mar. 2024) pp. 3–35. Sage Publishing, 2024


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