Jonas **Belouadi**

Ph.D. Candidate in Computer Science · University of Mannheim

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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. 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*

- Focus: Natural Language Processing & Machine Learning
- Topic: 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 topic: 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 topic: Text Generation from Knowledge Bases

Experience

Adobe Research — *Lyon, France*

Research Internship — *Apr. 2025 - Sep. 2025*

- Explored procedural material generation with large vision-language models.

National Institute of Information and Communications Technology (NICT) — *Kyoto, Japan*

Research Internship — *Aug. 2024 - Mar. 2025*

- Conducted research on zero-shot text-guided graphics program synthesis.

Natural Language Learning Group (NLLG) — *Darmstadt, Germany*

Research & Teaching Assistant — *Nov. 2021 - Feb. 2022*

- Conducated 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 commited students from all over the world.	*Monthly grant*

Skills

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

DeTi*k*Zify	Automated synthesis of graphics programs for scientific figures and sketches.
AutomaTi*k*Z	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

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

ScImage: 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

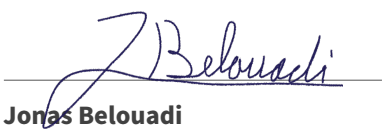
Reproducibility Issues for BERT-based Evaluation Metrics
Yanran Chen, **Jonas Belouadi**, Steffen Eger
Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing, 2022, Abu Dhabi, United Arab Emirates

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

Preprints

MultiMat: Multimodal Program Synthesis for Procedural Materials using Large Multimodal Models
Jonas Belouadi, Tamy Boubekeur, Adrien Kaiser
arXiv:2509.22151 [cs.CV], 2025



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