# 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.

## Awards

### HONORS & RECOGNITIONS

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

### GRANTS & SCHOLARSHIPS

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|---|---|---|
| 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

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| **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

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|---:|---|
| **DeT*ik*Zify** | Automated synthesis of graphics programs for scientific figures and sketches. |
| **AutomaT*ik*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

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| **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

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
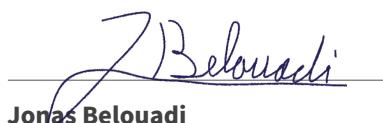
Cross-genre argument mining: Can language models automatically fill in missing discourse markers?
Gil Rocha,  Henrique Lopes Cardoso,  **Jonas Belouadi**,  Steffen Eger
*Argument & Computation* (Mar. 2024) pp. 3–35. Sage Publishing, 2024

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