

# Aleksandra Bakalova

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## EDUCATION

<b>Saarland University</b> Master's degree in Natural Language Processing / Computational Linguistics. <i>Relevant coursework:</i> Analyzing LMs (grade: 1.0/1.0), Efficient and Robust NLP (grade: 1.0/1.0).	Oct 2023 – July 2025 GPA: 1.0/1.0 Saarbrücken, Germany
<b>HSE University</b> Bachelor's degree in Applied Mathematics and Computer Science. Curriculum focus on Machine Learning and Applications. Merit-based scholarship. <i>Thesis:</i> Methods for Ranking Hypotheses in Text Generation. Grade: 9/10. <i>Relevant coursework:</i> Optimization in Machine Learning (grade: 8/10), Deep Learning (grade: 9/10), Reinforcement Learning (grade: 9/10), Algorithms and Data Structures (10/10).	Sep 2019 – June 2023 GPA: 8.18/10 Moscow, Russia
<b>Yandex School of Data Analysis</b> Two-year Post Undergrad Deep Learning Courses. Merit-based scholarship (competition of 25 candidates per place). <i>Relevant coursework:</i> Natural Language Processing (grade: 5/5), Effective Deep Learning Systems (grade: 5/5), Python Language (grade: 5/5)	Sep 2022 – June 2024 GPA: 4.6/5 Moscow, Russia

## EXPERIENCE

<b>Research Assistant, Saarland University</b> Chair of Dr. Michael Hahn Understanding large language models. Working on mechanistic interpretability of in-context-learning. <i>Preprint:</i> <a href="#">arxiv</a>	November 2023 - now Saarbrücken, Germany
<b>Software Engineering intern, Google</b> Cloud, Sole Tenancy Autoscaling team <ul style="list-style-type: none"><li>Designed and implemented in C++20 an algorithm for a modification of a classical bin-packing problem where items are virtual machines and bins are sole tenant nodes.</li><li>Embedded the solution into the existent microservices architecture and covered it with tests.</li></ul>	July 2021 - Sep 2021 Warsaw, Poland, remotely

## PROJECTS

<b>KNN-LM for Llama-2-7b</b> <ul style="list-style-type: none"><li>Implemented a retrieval augmentation method, which was tested before only on small models, on quantized Llama-2-7b.</li><li>Achieved 22% improvement in perplexity on wikitext-2 over vanilla model.</li></ul> <i>Code:</i> <a href="#">github</a>	2024
<b>Interpretability of Soft Prompts</b> Explored geometry of soft prompts trained for different tasks with different initializations using prompt-tuning technique. <i>Code:</i> <a href="#">github</a>	2024
<b>Dynamics of Human-LLM Alignment</b> Explored emergence of alignment between word representations taken from the language model and the human brain. Analyzed the alignment dynamics with removal of certain linguistic properties from the model's representations. <i>Code:</i> <a href="#">github</a>	2024
<b>LUNA: A Framework for Language Understanding and Naturalness Assessment</b> <ul style="list-style-type: none"><li>Implemented 20 automatic text generation metrics using PyTorch and HuggingFace and integrated them into a single intuitive interface to simplify metrics usage.</li><li>Optimized for batch processing, which is crucial for the performance of model-based metrics.</li></ul> Group project, 2 members. <i>Code:</i> <a href="#">github</a> <i>Paper:</i> <a href="#">arxiv</a>	2023
<b>Robust Deep Networks With Randomized Tensor Regression Layers</b> Proposed a method to generalize a randomization technique from one tensor decomposition to another and implemented it in PyTorch using TensorLy library. Increased robustness of ResNet-20 to adversarial attacks. <i>Code:</i> <a href="#">github</a>	2022

## SKILLS

C++, Python | PyTorch, hf transformers, accelerate, peft | NLP, LLMs, RAG | Git, Bash, Docker | English: IELTS C1

## TEACHING & SUMMER SCHOOLS & VOLUNTEERING

- Teacher Assistant**, NLP course, Yandex School of Data Analysis (Sep 2023 - now)
- TaCoS: Student Conference in Computational Linguistics**, participant & volunteer (May 2024, Saarbrücken, Germany)
- Advanced Language Processing Winter School**, participant (April 2024, Grenoble, France)
- Teacher Assistant**, Probability Theory and Statistics course, HSE University (Sep 2021 - June 2022)
- Summer school "Letnyaya Shkola"**, lecturer on the topic of text classification (July 2023, Dubna, Russia)