KIRILL BRILLIANTOV

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EDUCATION

ETH Zurich (ETH)   **Sep 2023 - Jun 2025**
Master of Computer Science   *Zurich, Switzerland*

Constructor (Jacobs) University Bremen (JUB)   **Sep 2022 - Jun 2023**
Bachelor, Computer Science program, GPA **1.5 / 1.0**   *Bremen, Germany*

Relevant Courses: Distributed Systems, Natural Language Processing, Optimization Methods, Category Theory

(discontinued) **Higher School of Economics Saint-Petersburg (HSE SPb)**   **Sep 2019 - Aug 2022**
Bachelor, Applied Mathematics and Informatics program, GPA **9.08 / 10.0**   *Saint-Petersburg, Russia*

Relevant Courses: Calculus 1 & 2, Probability Theory, Statistics, Group & Number Theory, Linear Algebra & Advanced Algebra, Discrete Math, Graph Theory, Data Structures & Algorithms, Probability Algorithms, Approximate Algorithms, Exact Exponential Algorithms, Introduction to Machine Learning, Deep Learning, Numerical Methods 1 & 2, Software Engineering & Design, Java, C/C++, Haskell, High Performance Computations

PUBLICATIONS

1. (in review) **Brilliantov, K.**; Pavutnitskiy, F.; Pasechyuk, D.; Magai, G. (2023). Applying Language Models to Algebraic Topology: Generating simplicial cycles using multi-labeling in Wu's Formula. *arXiv preprint*

2. **Brilliantov, K.**, Alferov, V., & Bliznets, I. (2023). Improved Algorithms for Maximum Satisfiability and Its Special Cases. *Proceedings of the AAAI Conference on Artificial Intelligence*, 37(4), 3898-3905. https://doi.org/10.1609/aaai.v37i4.25503

RESEARCH EXPERIENCE

Studying Generalization Limits of Persistent Homology   **Jun 2023 - Aug 2023**
research internship at Aalto under supervision of Vikas Garg   *Helsinki, Finland*

- There are studies about the Expressivity of Persistent Homology (PH) for Graph Representations, but there is a lack of studies about the Generalization Limits of PH

keywords: | GNNs | | PH | | generalization & expressivity | | learning theory |

Applying Language Models to Algebraic Topology   **Feb 2022 - May 2023**
bachelor's thesis at JUB under supervision of Fedor Pavutnitksiy   *Remote*

- There is Wu formula for the homotopy groups of the two-dimensional sphere, we tried to sample elements from homotopy group using it.

- We proposed several approximate algorithms, using a wide variety of approaches from optimization theory and application of neural networks to NLP problems.

paid position at EIMI from Feb 2022 to Jul 2022
github, **keywords**: | free groups | | nlp | | pytorch | | huggingface |

$(n, 4)$-MaxSAT and General MaxSAT
coursework at HSE SPb under supervision of Ivan Bliznets

Sep 2021 - Jan 2022
Saint-Petersburg, Russia

- Studied the computational complexity of MaxSAT problem and its special cases
- Developed an algorithm with **9.95%** for $(n, 4)$-case and **8.38%** for $(n, 3)$-case faster running time
- Did this by analyzing bottleneck cases of the previous best algorithms
- AAAI2023 accepted [2]

keywords: | exact exponential algorithms | | branch & bound | | measure & conquer |

WORK EXPERIENCE

intern **Backend Engineer**
at Yandex.Direct, paid position

Jul 2021 - Oct 2021
Saint-Petersburg, Russia

- Was a part of a team developing API
- Rewrote $\approx$ **2000** lines of ancient Perl code to Java
- Learned Perl and had a great experience supporting legacy code and got a **return offer** but declined it.

keywords: | Java | | Spring | | Kotlin |

TEACHING EXPERIENCE

Mathematical Logic **Teacher's Assistant**
at HSE SPb, paid position

Apr 2022 - Jul 2022
Saint-Petersburg, Russia

- Helped lecturer teaching a group of **14** freshmen to solve mathematical logic problems.
- Checked their homework and did seminars.
- We covered: equinumerosity, boolean functions, boolean schemes, basics of proof theory.

C++ **Teacher's Assistant**
at HSE SPb, volunteer

Sep 2022 - Dec 2022
Remote

- Helped C/C++ lecturer reviewing home assignments of **20** freshmen
- Gave them feedback about readabilty, style, architecture, and correctness

C++ **Mentor**
at HSE SPb, volunteer

Feb 2022 - Jun 2022
Saint-Petersburg, Russia

- Was a mentor for group of **3** freshmen
- Helped solving technical and architectural problems
- Organized regular calls and did code review
- The commission **higly** rated their result

PROJECTS

MutationDetector

Jan 2018 - Jan 2019

- Developed a GUI for analyzing protein sequences
- It displays the given protein sequence and experiment parameters: difference of a mass between origin sequence and mutated
- It shows possbile mutations leading to given mass difference
- Presented this project at SISC-ISSF 2019 and got first prize in the computer science poster session

supervisor, **keywords**: | Java | | Swing |