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. (preliminary) **Brilliantov, K.**; Alferov, V.; and Bliznets, I. 2023. Improved Algorithms for Maximum Satisfiability and Its Special Cases. *Proceedings of the AAAI Conference on Artificial Intelligence*
2. (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*

RESEARCH EXPERIENCE

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

- There is a method of adding extra information to Graph Neural Networks called Persistent Homology (PH)
- There are studies of Expressivity of these models, but there is a lack of studies about the Generalization Limits of these models

keywords: GNNs | PH | generalization & expressivity | theoretical ML

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 tryied 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 **Sep 2021 - Jan 2022**
coursework at HSE SPb under supervision of Ivan Bliznets *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 [1]

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

WORK EXPERIENCE

intern **Backend Engineer** **Jul 2021 - Oct 2021**
at Yandex.Direct, paid position *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 an **offer** but declined it.

keywords: Java | Spring | Kotlin

TEACHING EXPERIENCE

Mathematical Logic **Teacher's Assistant** **Apr 2022 - Jul 2022**
at HSE SPb, paid position *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** **Sep 2022 - Dec 2022**
at HSE SPb, volunteer *Remote*

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

C++ **Mentor** **Feb 2022 - Jun 2022**
at HSE SPb, volunteer *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