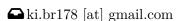
# KIRILL BRILLIANTOV

Zurich, Switzerland











#### EDUCATION

ETH Zurich (ETH)

Master of Computer Science

Total Bachelor's GPA: 8.996/10.0

Constructor (Jacobs) University Bremen (C(J)UB) completed Bachelor of Computer Science, GPA 1.5 / 1.0

Higher School of Economics Saint-Petersburg (HSE SPb)

<u>discontinued</u> Bachelor of Computer Science, GPA 9.08 / 10.0

Sep 2023 - Jun 2025 Zurich, Switzerland

Sep 2022 - Jun 2023

Bremen, Germany

Sep 2019 - Aug 2022 Saint-Petersburg, Russia

# **PUBLICATIONS**

1. Brilliantov, K.; Souza, A.; Garg, V. (2023). How well does Persistent Homology generalize on graphs? Under review, ICML 2024

2. Alferov, V.; Bliznets, I.; Brilliantov, K. (2023). Parameterization of (Partial) Maximum Satisfiability Above Matching in the Variable-Clause Graph. Accepted at AAAI-24

3. 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; Under review, ICML 2024

4. 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

Uncertainty Quantification in Diffusion and Optimal Transport research project at ETH under supervision of Charlotte Bunne, LAS Group

Nov 2023 - Feb 2024 Zurich, Switzerland

Studying Generalization Limits of Persistent Homology

Jun 2023 - Aug 2023

research internship at Aalto University under supervision of Vikas Garq, Amauri Souza Helsinki, Finland

We studied the generalization ability of Persistent Homology, particularly PersLay-based model, for graph classification tasks [1].

We used PAC-Bayesian framework and did several experiments to evaluate our empirically bound.

keywords:

**GNNs** 

ΡН

generalization & expressivity

learning theory

**PAC-Bayes** 

Applying Language Models to Algebraic Topology bachelor's thesis at JUB under supervision of Fedor Pavutnitksiy

Feb 2022 - May 2023

Remote

The Wu's formula provides combinatorial description of  $S^2$  homotopy groups using Free

Groups. We tried to find certain elements satisfying this formula.

We proposed several approximate algorithms, using a wide variety of approaches from optimization theory to neural NLP methods.

paid position at EIMI from Feb 2022 to Jul 2022

github, keywords: free groups pytorch nlp huggingface

#### (n,4)-MaxSAT and General MaxSAT

coursework at HSE SPb under supervision of Ivan Bliznets

Sep 2021 - Jan 2022 Saint-Petersburg, Russia

We studied the computational complexity of MaxSAT problem and its special cases. We developed an algorithm with 9.95% for (n,4)-case and 8.38% for (n,3)-case faster running time

By the end of 2023 this algorithm is the theoretical **SOTA** for (n, s)-MaxSAT (s = 3, 4). We published the paper at AAAI2023 and I gave an **online presentation** of the work.

**keywords**: exact exponential algorithms

branch & bound

measure & conquer

## WORK EXPERIENCE

## **Backend Engineer**

internship at Yandex. Direct

Jul 2021 - Oct 2021

Saint-Petersburg, Russia

I 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

#### Bachelor's Thesis co-Supervisor

volunteer at CUB with Fedor Pavutnitskiy

Dec 2023 - May 2024

Remote

The student is: Pavel Almazov. We further studying ideas concerning applying ML to algebraic topology. We would like to perform several quantitative assessments of the developed model [3] and adopt **Reinforcement Learning** methods.

### Teaching Assistant. C++

Sep 2022 - Dec 2022

volunteer at HSE SPb

Remote

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

# Teaching Assistant. Mathematical Logic

Apr 2022 - Jul 2022

paid position at HSE SPb

Saint-Petersburg, Russia

Helped lecturer teaching a group of 14 freshmen. Checked their homeworks and did tutorials. We covered: equinumerosity, boolean functions, boolean schemes, basics of proof theory.

#### Coursework Supervisor. C++

Feb 2022 - Jun 2022

volunteer at HSE SPb

Saint-Petersburg, Russia

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

## **PROJECTS**

### MutationDetector

Jan 2018 - Jan 2019

coursework at high school under supervision of Kira Vyatkina

Saint-Petersburg, Russia

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 possible mutations leading to given mass difference. Presented this project at SISC-ISSF 2019 and got first prize in the CS poster session.

keywords:

Java

Swing