# Al Depope

 ADepope | Al Depope | adepope.github.io | al.depope@ist.ac.at

## SUMMARY

I am a PhD student at IST Austria working in the intersection between mathematically grounded ML, numerical mathematics, software development and genetics applications.

## WORK EXPERIENCE

**PhD student @ IST Austria**                                           Sep 2020. – present

– working on devising and implementing Approximate message passing framework for inference in GWAS (genotype & methylation data). Check out the Github pages of softwares I developed together with colaborators: gVAMP and its modification adapted for methylation data called gVAM-Pomi. I am currently working on time-to-event VAMP-based models and meta analysis models supported by the VAMP framework. Supervisors: Matthew Robinson and Marco Mondelli.

**Backend&Frontend developer @ CERN**                                   Jul 2019 – Aug 2019

– during the two-month summer internship I had been working on upgrading the CMS (Compact Muon Solenoid) Online monitoring system. We added 11 resources which resulted in reducing the amount of time needed for fetching the data about environmental conditions of the subdetectors. (supervisors: Jory Sonneveld, Annapaola de Cosa and Benedikt Vormwald).

**Content contributor @ Slader (now Quizlet)**                          Aug 2018 - March 2019

– solving and documenting solutions to problems in Abstract Algebra in LaTeX

**Student mentor @ Department of Mathematics, University of Zagreb**    Sep 2016. - June 2020.

– providing assistance to students enrolled in a course through problem solving sessions, approximately 2 hours per week per course: Programming 1 & 2 (2016. - 2020.), Statistics (2018./2019.), Discrete mathematics (2017./2018.) & Euclidean spaces (2018./2019.)

## AWARDS

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|---|---|
| April 2024. | **Best student presentation award** at 52nd European Mathematical Genetics Meeting |
| February 2020. | **Best Master student final year award**, Department of Mathematics, University of Zagreb |
| May 2018. | **Best Bachelor student final year award**, Department of Mathematics, University of Zagreb |
| 2018./2019. | University of Zagreb scholarship for talented students |
| 2017./2018. | Scholarship for STEM field students |
| 2015. | The best in generation award, Gymnasium Andrija Mohorovičić, Rijeka |
| 2013. - 2017. | City scholarship for gifted students, City of Kastav |

# Education

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|---|---|
| 2020. - present | PhD student at **Institute of Science and Technology Austria (IST Austria)** Klosterneuburg, Austria (GPA so far: 1.0/1.0) |
| 2018. - 2020. | **Master's Degree in Mathematical Statistics** (GPA: 5.0/5.0), Department of Mathematics, University of Zagreb, Zagreb, Croatia Thesis: Geometric properties of unconditional martingale diference spaces (in Croatian) under supervision of prof. Zoran Vondraček [ knowledge of probability theory, stochastic processes, mathematical and applied statistics, functional analysis, optimization, numerical analysis ] |
| 2015. - 2018. | **Bachelor's Degree in Mathematics** (GPA: 5.0/5.0), Department of Mathematics, University of Zagreb, Zagreb, Croatia [ basic knowledge and understanding of results in algebra, analysis, geometry, probability, ordinary and partial differential equations, mathematical modelling, computing in C and C++, computer networks, database systems ] |
| 2011. - 2015. | **Mathematical gymnasium** (GPA: 5.0/5.0), Gimnazija Andrije Mohorovičića, Rijeka, Croatia |

# Skills

| | |
|---|---|
| C, C++ | proficient — I did several high-performance implementations in C++, using OpenMP and MPI code parallelization and linear algebra libraries such as Eigen |
| Matlab, R | proficient — mostly for model testing and data post processing |
| Python 🐍 | intermediate |
| JS, CSS, HTML, MySQL | familiar with concepts — have not been using it actively for a while |
| DNAnexus | proficient — data preparation and analysis on the WGS data |
| LaTeX | proficient |

# Publications

Depope, Al (Sept. 2020). *Geometric properties of unconditional martingale diference spaces (in Croatian)*. Master's thesis. URL: https://repozitorij.pmf.unizg.hr/islandora/object/pmf:9100.

Depope, Al, Jory Sonneveld, et al. (2020). *Adding resources to CMS Online monitoring system*. CERN. URL: https://cds.cern.ch/record/2705781/.

Depope, Al et al. (Apr. 2024a). "Inference of Genetic Effects via Approximate Message Passing". In: *ICASSP 2024 - 2024 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pp. 13151–13155. DOI: 10.1109/ICASSP48485.2024.10447198.

– (2024b). "Light-speed whole genome association testing and prediction via Approximate Message Passing". In: *bioRxiv*. DOI: 10.1101/2023.09.14.557703. URL: https://www.biorxiv.org/content/early/2024/03/07/2023.09.14.557703.

# Conferences & Summer Schools

2024.   IEEE International Conference on Acoustics, Speech and Signal Processing 2024.
— I presented our work on devising AMP framework for inferring genetic effects as part of Special Session on Variational Inference and Approximate Bayesian Techniques

2024.   9th Probabilistic Modeling in Genomics Conference (ProbGen24)

2024.   52nd European Mathematical Genetics Meeting

2023.   Introduction to GPU Programming using CUDA course at HLRS

2023.   C.I.M.E Summer school Machine Learning: From Data to Mathematical Understanding

2019.   ISem 23 - Evolutionary Equations
— together with two colleagues, I delivered a 90 minute talk on Da Prato and Grisvard's approach to defining sums of sectorial operators (supervisors: Ralph Chill and Sebastian Mildner)

2019.   BIOSTAT 2019. — 24th International Symposium on Biometrics

2018.   Scuola Matematica Interuniversitaria — Summer school addressed to young graduate or senior researcher interested in reasearch
— I participated in courses on Algebraic geometry and Numerical analysis of differential equations

2018.   ISem 22 - Ergodic Theorems
— together with two colleagues, I delivered a 90 minute talk on dilations of positive contractions on $L^p$ spaces and their applications (supervisors: Henrik Kreidler, Nikolai Edeko and Rainer Nagel)

# Languages

English   C1
German   A2

# Other

My hobbies include hiking and running, also when I have time I try to volunteer by preparing and giving lectures in competitive mathematics to gifted students from my old high-school and at MNM summer camps.