Dimitar Chakarov

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Education

Toyota Technological Institute at Chicago
Ph.D. in Computer Science *2024 – current*
Advisor: Nati Srebro

Princeton University *2020 – 2024*
A.B. in Mathematics: 3.9/4.0, *magna cum laude*
Minor in Computer Science
Advisor: Matthew Weinberg

Experience

Institute for Computer Science, Artificial Intelligence and Technology, Student Researcher *Summer 2024*

- Investigated incentive design at the intersection of Federated Learning and Game Theory
- Developed a theoretical payment scheme that achieves approximate incentive compatibility, while maintaining convergence

Citadel Securities LLC, Quantitative Research Intern *Summer 2023*

- Analyzed intraday trading data using Python, engineered feature variables and compared regression models
- Developed a systematic strategy for pricing VIX options in C++ and simulated it on historical data

Pritykin Lab, Lewis-Sigler Institute for Integrative Genomics, Undergraduate Researcher *Jun 2022 – Mar 2023*

- Analyzed data from past publications in the field of computational genomics using Python and discovered confounding factors regarding the likelihood of mismatch among gRNA specificity in CRISPRa/i screens
- Debugged and tested an internal genomics enumeration tool, leading to improved accuracy in calculating specificity

Data-Driven Social Sciences at Princeton University, Research Assistant *Jan 2022 – Aug 2022*

- Assisted with implementing variants of Glmnet's algorithms
- Conducted tests and analyzed performance of the modified algorithms

Current Projects

Dimitar Chakarov, Eric Xie and S. Matthew Weinberg. *Approximation Schemes for Revenue Maximization with Multiple Subadditive Buyers.* In preparation.

Dimitar Chakarov, Nikita Tsoy, Kristian Minchev and Nikola Konstantinov. *Incentivizing Truthful Collaboration in Heterogeneous Federated Learning.* To appear in OPT 2024.

Publications

Henri Schmidt, Minsi Zhang, **Dimitar Chakarov**, Vineet Bansal, Haralambos Mourelatos, Francisco Sánchez-Rivera, Scott Lowe, Andrea Ventura, Christina Leslie and Yuri Pritykin. *Genome-wide CRISPR guide RNA design and specificity analysis with GuideScan2.* Under review. 2023.

Dimitar Chakarov and Yichi Zhang. *On a Generalization of Artin's Conjecture on Primitive Roots in Gaussian Integers.* Paper presented at the Research Science Institute Symposium, 2019.

Dimitar Chakarov and Yavor Papazov. *Evaluation of the Complexity of Fully Homomorphic Encryption Schemes in Implementations of Programs.* In Proceedings of the 20th International Conference on Computer Systems and Technologies (CompSysTech '19). Association for Computing Machinery, New York, NY, USA, 62–67, 2019.

Selected Awards

Sigma Xi Inductee, Department of Mathematics, Princeton University, 2024

Outstanding Teaching Award, Department of Computer Science, Princeton University, 2024

John Atanasov Presidential Award for Successful Research Debut in the Computational Sciences, Bulgaria, 2019

Research Science Institute, CEE, MIT, Top 5 Oral Presentation, 2019

Intel International Science and Engineering Fair, Special Award Winner, 2019

TEACHING

Course Assistant, Department of Computer Science, Princeton University

- COS 445 Economics and Computation *Spring 2023, Spring 2024*
- COS 217 Introduction to Programming Systems *Fall 2021, Spring 2023*

Course Designer, Office of the Dean of the College, Princeton University *Summer 2022*

Teaching Assistant, Research Science Institute, CEE, MIT *Summer 2021*

Mentor, Summer Reseach School, IMI-BAS *Summer 2020, Summer 2021*

RELEVANT COURSEWORK AND SKILLS

Graduate CS coursework at Princeton: Information Theory, Advanced Algorithm Design, Optimization for Machine Learning, Theoretical Machine Learning

CS coursework at Princeton: Introduction to Programming Systems, Algorithms and Data Structures, Operating Systems, Theory of Computation, Economics and Computation

Math coursework at Princeton: Honors Multivariable Calculus and Linear Algebra, Abstract Algebra, Advanced Graph Theory, Probability and Stochastic Systems, Probability Theory, Discrete Geometry, Regression and Time Series, Fourier Analysis, Complex Analysis, Numerical Analysis, Mathematical Modelling for Biology, Measure Theory and Integration, The Probabilistic Method

Languages: Bulgarian (native), English (fluent), German (conversational)

Programming: C, C++, Python, Java, Julia