

Sayantana Choudhury

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[Website](#) | [LinkedIn](#) | [Google Scholar](#) | [GitHub](#)

PROFESSIONAL SUMMARY

- *PhD candidate* with a strong passion for developing optimization algorithms to solve large-scale *Machine Learning* and *Deep Learning* problems, under the supervision of Nicolas Loizou.
- Currently focused on designing algorithms for min-max optimization problems in areas such as *Generative Adversarial Network (GAN) training*, *Robust Learning* and *Federated Learning*.
- Moreover, interested in developing adaptive optimization algorithms for modern deep learning tasks.
- Highly collaborative researcher and first author of three research papers, *accepted at NeurIPS 2023, 2024 and ICLR 2024*.

EDUCATION

Johns Hopkins University, Baltimore

- **PhD** in Applied Mathematics and Statistics Present
- **MSE** in Applied Mathematics and Statistics 2023

Indian Statistical Institute, Kolkata

- **Masters in Statistics** with Distinction 2020
- **Bachelors in Statistics** 2018

RESEARCH INTERESTS Large-Scale Optimization, Machine Learning, Adaptive Methods, Min-Max Optimization, Variational Inequality Problems, Distributed and Decentralized Algorithms, Federated Learning.

RELEVANT SKILLS Programming: Python, R, MATLAB
Framework/ Libraries: PyTorch, NumPy, Matplotlib, Pandas, Scikit-learn, Seaborn

PUBLICATIONS

Sayantana Choudhury, Nazarii Tupitsa, Nicolas Loizou, Samuel Horvath, Martin Takac, Eduard Gorbunov | *Remove that Square Root: A New Efficient Scale-Invariant Version of AdaGrad* | [Link](#) | Accepted at **NeurIPS 2024**.

Siqi Zhang*, **Sayantana Choudhury***, Sebastian Stich, Nicolas Loizou | *Communication-Efficient Gradient Descent-Accent Methods for Distributed Variational Inequalities: Unified Analysis and Local Updates* | [Link](#) | Accepted at **ICLR 2024**.

Sayantana Choudhury, Eduard Gorbunov, Nicolas Loizou | *Single-Call Stochastic Extragradient Methods for Structured Non-monotone Variational Inequalities: Improved Analysis under Weaker Conditions* | [Link](#) | Accepted at **NeurIPS 2023**.

Eduard Gorbunov, Nazarii Tupitsa, **Sayantana Choudhury**, Alen Aliev, Peter Richtarik, Samuel Horvath, Martin Takac | *Methods for Convex (L_0, L_1) -Smooth Optimization: Clipping, Acceleration, and Adaptivity* | [Link](#) | Under review.

EXPERIENCE

MBZUAI, Abu Dhabi*Research Intern*

- Developed a novel scale-invariant adaptive algorithm called KATE, addressing the expensive hyper-parameter tuning required for modern deep learning applications (like LLM training and computer vision tasks), achieving optimal convergence rates for non-convex minimization problems.
- Showcased KATE's superior performance in training *ResNet on the CIFAR10* dataset and *BERT fine-tuning on the emotions dataset from Hugging Face Hub*.

CSSL, Delhi*Summer Intern*

- Analyzed skill mapping for NITI AAYOG and CSSL data using confirmatory factor analysis, addressed poor TLI values, and designed new models with Explanatory Factor Analysis.
- Developed an R package for CSSL to statistically detect copy pairs using Multi-dimensional Item Response Theory and Hypothesis Testing.
- Identified key factors affecting student performance using *Grouped LASSO* regression on high-dimensional, low-sample data.

HONORS AND AWARDS

- *Acheson J. Duncan Fund* for the Advancement of Research in Statistics Travel Award 2024
- *NeurIPS 2023* Scholar Award 2023
- *Acheson J. Duncan Fund* for the Advancement of Research in Statistics Travel Award 2023
- *MINDS (Mathematical Institute of Data Science)* Fellowship 2022
- Award for Excellent Academic Performance in Masters First Year Indian Statistical Institute, Kolkata. 2019
- *KVPY* Fellowship 2015
- Selected for *INSPIRE Fellowship* 2015

INVITED TALKS & POSTER

- Conference on *Neural Information Processing Systems (NeurIPS)* 2024
- Google Research, Bengaluru, India (Talk) 2024
- Conference on *Neural Information Processing Systems (NeurIPS)* 2023
- *SIAM Conference on Optimization (OP23)* 2023
- *Annual Conference on Information Sciences and Systems (CISS 2023)* 2023

TEACHING ASSISTANT

- Iterative Algorithms in Machine Learning: Theory and Applications 2023
- Optimization in Data Science 2023
- Large Scale Optimization for Data Science 2022
- Machine Learning II 2022
- Introduction to Convexity 2021
- Network Analysis and Operations Research 2021

PROFESSIONAL SERVICES

- Reviewer for *Journal of Machine Learning Research (JMLR)* 2024.
- Reviewer for *International Conference on Machine Learning (ICML)* 2024.
- Reviewer for *Neural Information Processing Systems (NeurIPS)* 2024.
- Reviewer for *Scientific Reports*.
- Mini-symposium Organizer: Recent Advancements in Optimization Methods for Machine Learning at *SIAM Conference on Optimization* 2023.