Nikita Tsoy

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Doctoral researcher in trustworthy ML, with publications on incentives in ML systems, shortcut learning, federated learning under privacy concerns, and performative prediction. Background combines machine learning, economics, and mathematical modeling.

Skills

Machine Learning: deep learning, learning theory, shortcut learning, OOD generalization, differential privacy, federated learning, trustworthy ML

Statistics: econometrics, causal inference, quasi-experimental methods, time series

Mathematical Modeling: game theory, optimization, numerical methods

Programming: Python, PyTorch, NumPy, pandas, scikit-learn, Stata, R, C++

Languages: Russian (native), English

Research Experience

INSAIT, Sofia University — **Sofia, Bulgaria**
Doctoral Researcher in Machine Learning — *2023–present*
Advisor: Nikola Konstantinov

- Developed game-theoretic models of data-sharing incentives in ML systems, combining ML scaling laws with industrial organization models
- Analyzed participation incentives in federated learning under privacy concerns
- Studied shortcut learning in deep networks through theoretical analysis and controlled experiments on shortcut localization using a novel methodology
- Theoretically analyzed how model deployment changes the data distribution under performativity
- Contributed to empirical research on robustness of published econometric findings by implementing robustness checks and proposing weak-instrument diagnostics

ETH Zurich — **Zurich, Switzerland**
Research Assistant in Machine Learning — *2022–2023*

- Investigated data sharing between competing firms, leading to a NeurIPS publication

Education

INSAIT, Sofia University — **Sofia, Bulgaria**
PhD in Machine Learning — *2023–present*

New Economic School — **Moscow, Russia**
MA in Economics, cum laude, GPA: 4.97/5 (top-1) — *2020–2022*
Thesis: Radio Impact on the US Banking Crisis of the 1930s. Advisors: R. Enikolopov and M. Valsecchi

Moscow Institute of Physics and Technology — **Moscow, Russia**
BS in Applied Mathematics and Physics, cum laude, GPA: 4.91/5 — *2016–2020*

Publications

1: **Tsoy, N.** "Market Incentives for AI Safety Investment." *NeurIPS*. 2026.

2: **Tsoy, N.**, & Konstantinov, N. "On Measuring Localization of Shortcuts in Deep Networks." *TMLR*. 2026.

3: **Tsoy, N.**, Kirev, I., Rahimiyazdi, N., & Konstantinov, N. "On the Impact of Performative Risk Minimization for Binary Random Variables." *ICML*. 2025.

4: **Tsoy, N.**, & Konstantinov, N. "Simplicity Bias of Two-Layer Networks beyond Linearly Separable Data." *ICML*. 2024.

5: **Tsoy, N.**, Mihalkova, A., Todorova, T. N., & Konstantinov, N. "Provable Mutual Benefits from Federated Learning in Privacy-Sensitive Domains." *AISTATS*. 2024.

6: **Tsoy, N.**, & Konstantinov, N. "Strategic Data Sharing between Competitors." *NeurIPS*. 2023.

Working papers

1: Chakarov, D., **Tsoy, N.**, Minchev, K., & Konstantinov, N. "Incentivizing Truthful Collaboration in Heterogeneous Federated Learning." *OPT Workshop*. 2024.

2: Campbell, D., Brodeur, A., Dreber, A., Johannesson, M., Kopecky, J., Lusher, L., & **Tsoy, N.** "The Robustness Reproducibility of the American Economic Review." *I4R Discussion Paper Series*. 2024.

Awards

- Gold Reviewer, ICML 2026
- Top Reviewer, ICML 2025
- Petr Aven scholarship (top-3 students, 2021–2022)
- Abramov-Frolov Foundation Scholarship (top-10% students, 2016–2019)
- Bronze, "I am a Professional" Olympiad in Mathematics (2019)
- Awardee, Russian Olympiad in Mathematics (2015, 2016)
- 1st place, Belarusian Olympiad in Mathematics (2015)