Nikolaos Tsilivis

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Research Interests

Machine Learning, Science of Deep Learning, Robust Machine Learning, Applications of Machine Learning in Physical Sciences, Tropical Mathematics.

Academic Background

Ph.D. Data Science 2021-
Center for Data Science, New York University, NYC, USA
- Advisor: Julia Kempe.

Diploma Electrical and Computer Engineering (BSc & MSc equivalent) 2014-2021
National Technical University of Athens, Athens, Greece
- Major: Computer Science, Signal Processing, Control Theory.
- Minor: Mathematics.
- Thesis: Sparse Representations in Tropical Mathematics, advisor: Petros Maragos.

Exchange Studies 2018
KTH Royal Institute of Technology, Stockholm, Sweden

Experience

Visiting Researcher Fall 2023
Harvard University, Cambridge MA, USA
- Machine Learning Foundations group, host: Boaz Barak.

Visiting Researcher Spring 2021
New York University, New York City NY, USA
- Deep Learning theory, host: Julia Kempe.

Research Assistant 2019-2021
CVSP lab, National Technical University of Athens
- Research on sparse representations in non linear spaces.

Research Assistant / Junior Developer 2015-2016
Forecasting & Strategy Unit, National Technical University of Athens
- Web development - Twitter analytics for movie recommendations.

Publications

Peer Reviewed
- W. Merrill*, **N. Tsilivis***, and Aman Shukla. A Tale of Two Circuits: Grokking as Competition of Sparse and Dense Subnetworks. In *ICLR 2023 Workshop on Mathematical and Empirical Understanding of Foundation Models* , 2023
- J. Su, J. Kempe, D. Fielding, **N. Tsilivis**, M. Cranmer, and S. Ho. Adversarial Noise Injection for Learned Turbulence Simulations. In *NeurIPS 2022 Workshop on Machine Learning and the Physical Sciences*, 2022
- **N. Tsilivis** and J. Kempe. What Can the Neural Tangent Kernel Tell Us About Adversarial Robustness? In *Advances in Neural Information Processing Systems, NeurIPS 2022*, 2022

- **N. Tsilivis**, J. Su, and J. Kempe. Can we achieve robustness from data alone? In *ICML 2022 Workshop on New Frontiers in Adversarial Machine Learning*, 2022
- **N. Tsilivis**, A. Tsiamis, and P. Maragos. Toward a Sparsity Theory on Weighted Lattices. *Journal of Mathematical Imaging and Vision*, 2022
- **N. Tsilivis**, A. Tsiamis, and P. Maragos. Sparsity in Max-Plus Algebra and Applications in Multivariate Convex Regression. In *IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP 2021, Toronto, ON, Canada, June 6-11, 2021*, pages 2985–2989. IEEE, 2021
- **N. Tsilivis**, A. Tsiamis, and P. Maragos. Sparse Approximate Solutions to Max-Plus Equations. In J. Lindblad, F. Malmberg, and N. Sladoje, editors, *Discrete Geometry and Mathematical Morphology - First International Joint Conference, DGMM 2021, Uppsala, Sweden, May 24-27, 2021, Proceedings*, volume 12708 of *Lecture Notes in Computer Science*, pages 538–550. Springer, 2021 (**invited to the special issue**)

Submitted

- Y. Feng, T. Rudner, **N. Tsilivis**, and J. Kempe. Attacking Bayes
- W. Merrill* and **N. Tsilivis***. Extracting Finite Automata from RNNs Using State Merging
- J. Su, Ya Shi Zhang, **N. Tsilivis**, and J. Kempe. On the Robustness of Neural Collapse and the Neural Collapse of Robustness

Awards

- *Center for Data Science Fellowship (2021)*: Covers tuition and living expenses for 5 years.
- *Thomaideio Award (Publications) (2021)*: Awarded to undergraduate students of the National Technical University of Athens who published a research paper before their graduation.

Invited talks

- University of California, Irvine - GoalLab: *Lazy Optimization Regimes in Deep Learning*
- New York University, CDS PhD seminar: *What Can The Neural Tangent Kernel Tell Us About Adversarial Robustness?*

Programming Skills

- Languages: Python, C/C++, Java, SML, Prolog.
- Other: PyTorch, JAX, Matlab.

Languages

- Greek (native)
- English (proficient)