

Anton Sugolov

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Education

MSc. Mathematics (Thesis) 09.2024 – 08.2025 (exp.)
University of Toronto

- Probability I & II, PDE I, Optimization, Variational Methods in Generative Neural Networks

HBSc. Applied Mathematics and Statistics 09.2020 – 06.2024
University of Toronto 3.84

Research

LLMs: Dynamical Properties of Hidden Representations 11.2023 - Present
Research Group of Prof. Vardan Papyan *University of Toronto*

- Investigated embeddings in 38 base and finetuned LLMs through linearizations of transformer blocks.
- Discovered a correlation between Residual Jacobian Alignment and OpenLLM Leaderboard benchmark.
- *Submitted to NeurIPS 2024.*

Statistical Genetics 06.2020 - 06.2021
Prof. Lei Sun and Dr. Andrew Paterson *University of Toronto*

- Published open-source Genome Wide Association pipeline with 1KG genomes and LRAP gene expression

Projects

Implemented and currently training a **denoising diffusion** model ([repo](#)). Interested in the theory driving generative models from the viewpoint of stochastic analysis and optimal transport (notes).

Course project: small results and experiments based on ‘**The Emergence of Clusters in Self-Attention Dynamics**’. Presented at Applied² Graduate Seminar, University of Toronto. ([write-up](#), [slides](#))

Smaller statistical ML projects: **score-based generative modeling** (SSM, DSM), variational autoencoders, Bayesian regression, variational inference, Hamiltonian **Monte-Carlo**, probabilistic models

Publications

Sugolov, A., Emmenegger, E., Paterson, A.D., Sun L. Statistical Learning of Large-Scale Genetic Data: How to Run a Genome-Wide Association Study of Gene-Expression Data Using the 1000 Genomes Project Data. *Statistics in Biosciences* (2023).

Skills

Programming: Python, Java, R

Technical: PyTorch, HuggingFace, JAX (optax + eqx), Numpy, PennyLane, Git, Linux, Slurm, WandB

Languages: English, Ukrainian, French (basic)

Honours

Vector Scholarship in AI - Masters' 2024
Vector Institute *Unable to accept*

NSERC Undergraduate Summer Research Award 2023
University of Toronto

Regent's Scholarship I, II, III, and Dean's List 2021-2024
University of Toronto