Evan Dogariu

Undergraduate Student at Princeton University

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Education

Princeton University *Princeton, NJ*

Bachelor of Engineering and Science in Computer Science, GPA: 3.94/4.0 *Sep 2020 - May 2024*

Relevant Coursework (* denotes graduate coursework)

- Functional Analysis*
- Integration Theory & Hilbert Spaces
- Mathematical Physics*
- Geometric Measure Theory*
- Systems in Machine Learning*
- Neural Rendering*
- Advanced Algorithm Design*
- Theoretical Machine Learning*
- Deep Learning Theory*
- Probability and Stochastic Systems
- Differential Equations
- Computer Vision
- Natural Language Processing
- Machine Learning
- Distributed Systems
- Computational Geometry
- Theoretical Computer Science
- Real Analysis
- Linear Algebra
- Abstract Algebra
- Quantum Theory
- Biophysics

Nottingham High School *Trenton, NJ*

Valedictorian (1/400) *Sep 2016 - June 2020*

Publications and Pre-prints

[1] **E. Dogariu** and J. Yu. Robust Streaming, Sampling, and a Perspective on Online Learning. *arXiv preprint*, 2023. https://arxiv.org/abs/2312.01634

[2] **E. Dogariu**, H. Li, D. an, S. Wang, M. Luo and M. Chen, "Transfer Learning Methods for Magnetic Core Loss Modeling," 2021 IEEE 22nd Workshop on Control and Modeling of Power Electronics (COMPEL), 2021, pp. 1-6, doi: 10.1109/COMPEL52922.2021.9646065.

[3] H. Li, T. Guillod, **E. Dogariu**, A. Nadler, S. Wang, M. Luo, Y. Chen, C. Sullivan, M. Chen, "MagNet: An Open-Source Database for Data-Driven Magnetic Core Loss Modeling," 2022 IEEE Applied Power Electronics Conference and Exposition (APEC), Houston, TX, USA, 2022, pp. 588-595, doi: 10.1109/APEC43599.2022.9773372.

[4] H. Li, D. Serrano López, T. Guillod, S. Wang, **E. Dogariu**, A. Nadler, M. Luo, V. Bansal, N. Jha, Y. Chen, C. Sullivan, M. Che, "How MagNet: Machine Learning Framework for Modeling Power Magnetic Material Characteristics," in IEEE Transactions on Power Electronics, vol. 38, no. 12, pp. 15829-15853, Dec. 2023, doi: 10.1109/TPEL.2023.3309232.

Research & Projects

Meta-Optimization via Nonstochastic Control *May 2023 - Present*

Active research on applying a control-theoretic perspective to gradient-based optimization algorithms in order to derive meta-optimization algorithms with provable guarantees. Advised by Prof. Elad Hazan.

Boosting Approach to Deep Reinforcement Learning *February 2023 - May 2023*

Applied the theoretical framework of boosting to create efficient algorithms with provable guarantees in tough RL environments. Designed and implemented algorithms in both control frameworks like MuJoCo and Atari games. Studied analyses of such methods through lens of online learning and nonconvex Frank-Wolfe methods. Advised by Prof. Elad Hazan.

Random Infinite-Width-and-Depth Neural Networks *September 2023 - Present*

Ongoing research toward understanding the correlation structure of random neural networks with polynomial nonlinearities in the regime of joint limit of infinite width and depth at a fixed ratio. Applied a dynamical systems and ergodicity perspective to statistically-useful quantities.

Appearance Codes using Joint Embedding Learning of Multiple Modalities [paper][code] *February 2023 - May 2023*

Short research project on using learnable appearance codes without then need for inference-time optimization steps. Advised by Professor Felix Heide in his Neural Rendering course. Proposed a novel method for learning well-behaved latent spaces for appearance codes a priori using contrastive loss. The method works across multiple modalities (RGB, depth, etc.) and we empirically show this with a small VAE.

An End-to-End Network Pruning Pipeline with Sparsity Enforcement [paper] *February 2023 - May 2023*

Short research project on analyzing the combination of nonstandard model parameter initialization, pre-pruning training methodologies, and post-pruning training optimizations. Advised by Professor Kai Li in his Systems in Machine Learning graduate seminar. Researched surrounding literature on state of the art pruning methods (SNIP, GraSP, SynFlow) and sparsity-enforcing training methods and analyzed/ablated their performance when used together. The combination method beats each component individually and achieves better performance than more sophisticated SOTA techniques.

Speaker Change Detection [code] *October 2022 - November 2022*

Short research project on detecting a speaker changes in audio data. Used contrastive and energy-based deep learning methods on top of spectral filtering to learn unsupervised representations from VCTK and VoxCeleb datasets.

MagNet: Deep Learning-Based Core Loss Modeling [site] *June 2021 - October 2021*

Worked with the Andlinger Center for Energy & the Environment and Princeton's Power Electronics lab to acquire a large-scale power electronics core loss dataset and apply modern deep learning methods. Open-sourced the database and launched a public competition for prediction. First author research on the sample complexity of transfer learning methods. Advised by Prof. Minjie Chen.

Industry Experience

Symbotic *Wilmington, MA*

Machine Learning/Computer Vision Intern *May 2022 - August 2022*

Developed 3D-aware generalizations to standard single-shot detection algorithms like SSD and YOLO for 3D detection and segmentation. Developed a client-server pipeline via Docker, Kubernetes, and ZeroMQ in order to facilitate the deployment of the designed deep learning methods.

Teaching and Community

AI at Princeton [website] *Princeton, NJ*

Co-Founder and President *May. 2022 - Present*

- **Founded and run** the first AI undergraduate community at Princeton (300+ members).
- Helped **organize AI Tiger Trek**, a heavily-subsidized week-long trip to meet top professors, entrepreneurs, and individuals in AI in San Francisco during our spring break. We selected 8 talented students from a pool of 100+ applicants and received significant sponsorships from the Princeton COS department, the Princeton Entrepreneurship Club, and Radix Trading LLC.
- Also **created a week-long bootcamp** on the history and basics of deep learning, practical AI/ML, and novel research topics and companies in the AI space. [slides] [recording]
- **Lecture on a selection of topics** at our bi-weekly club meetings, including but not limited to large language models, diffusion models, theoretical machine learning, hardware acceleration for deep learning, and physics-inspired ML.
- Launched an initiative to provide opportunities for undergraduates to meet with research faculty and graduate students through lunches.

Princeton University COS Department

Preceptor/TA for COS217 and COS226 *Jan. 2022 - Jan. 2023*

- Hosted lab TA sessions for assistance on coding assignments for the introduction to systems (COS217) and algorithms and data structures (COS226) classes at Princeton University.
- Led a precept (20 students) and held weekly office hours for the algorithms and data structures (COS226) class at Princeton University.

Skills & Hobbies

Coding Languages	C/C++, Python, Java, Golang, MATLAB, Mathematica, LabVIEW, R, HTML/CSS
AI/ML Frameworks	PyTorch, Tensorflow, Keras, Pandas, NumPy, SciPy, Matplotlib/Seaborn, OpenAI Gym, MuJoCo
Software	Linux, Git, Anaconda, Docker, Kubernetes, Vim
Spoken Languages	English, Romanian, Spanish
Hobbies	Fixing/maintaining cars, building things out of wood and metal, soccer, chess