Evan Dogariu

DOCTORAL STUDENT AT NEW YORK UNIVERSITY

Theoretical Machine Learning*

Natural Language Processing

Probability and Stochastic Systems

Deep Learning Theory*

Differential Equations

Computer Vision

Machine Learning

Distributed Systems

Compiling Techniques

Education

New York University

DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE, COURANT INSTITUTE OF MATHEMATICAL SCIENCES

Princeton University

BACHELOR OF ENGINEERING AND SCIENCE IN COMPUTER SCIENCE, GPA: 3.94/4.0

Relevant Coursework (* denotes graduate coursework)

Functional Analysis* Integration Theory & Hilbert Spaces Mathematical Physics* Condensed Matter Theory*, Geometric Measure Theory 1* Geometric Measure Theory 2*, Systems in Machine Learning* Neural Rendering* Advanced Algorithm Design*

Nottingham High School

VALEDICTORIAN (1/400)

Publications and Pre-prints

[1] X. Chen, E. Dogariu, Z. Lu, E. Hazan. Nonconvex Meta-optimization for Deep Learning. HiLD 2024: 2nd Workshop on High-dimensional Learning. Dynamics, 2024. https://openreview.net/pdf?id=AJwlILrBOr

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

[3] 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.

[4] 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.

[5] 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 [paper][code]

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

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

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.

May 2023 - Present

New York City, NY Sep 2024 - May 2028

Computational Geometry Theoretical Computer Science Real Analysis Linear Algebra Abstract Algebra Quantum Theory **Biophysics**

Princeton, NJ

Sep 2020 - May 2024

Sep 2016 - June 2020

February 2023 - May 2023

Appearance Codes using Joint Embedding Learning of Multiple Modalities [paper][code]

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]

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]

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]

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 _____

Google DeepMind

STUDENT RESEARCHER

Researched spectral state space models and their applications under Dr. Naman Agarwal in collaboration with Prof. Elad Hazan.

Symbotic

MACHINE LEARNING/COMPUTER VISION INTERN

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]

CO-FOUNDER AND PRESIDENT

- 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

- 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

October 2022 - November 2022

Wilmington, MA May 2022 - August 2022

May 2024 - August 2024

May. 2022 - Present

February 2023 - May 2023

February 2023 - May 2023

Jan. 2022 - Jan. 2023