Sean Farhat

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https://sfarhat.github.io

Education

University of Illinois, Urbana-Champaign Aug 2021 - Aug 2023
M.S., Computer Science (GPA 4.0) [Advisor: Deming Chen]

University of California, Berkeley Aug 2016 - Aug 2020
B.S. (w/ Honors), Electrical Engineering and Computer Science (GPA 3.8)

Selected Coursework: Optimization, Machine Learning, Deep Generative Models, Parallel Programming, Probability, Algorithms, Linear Algebra, Signal Processing, Embedded Systems, Computational Photography, Data Structures

Technical Skills

Languages: Python, C, Java, Bash, Git, LaTeX
Tools: PyTorch, HuggingFace Transformers/Diffusers, CUDA, Weights & Biases, NumPy, Scikit-Learn, Docker, Slurm

Research Experience

A Good Teacher Is All You Need Aug 2022 - July 2023
Sean Farhat, Deming Chen *(to be submitted)*

- Devised an alternative to pre-training/finetuning for maximizing performance in small machine learning models
- Leveraged concepts from knowledge distillation, foundation models, self-supervised constrastive learning, and text-guided generative diffusion models to design new training paradigm, **'Don't Pre-train, Teach' (DPT)**
- Achieved up to **28% better** performance than best knowledge transfer algorithms across 5 vision datasets
- Able to surpass finetuned model performance with **94% less** training time, reducing from **17 days to 1**

Work Experience

Apple May - Aug 2022
Platform Architecture Intern

- Tasked with improving power consumption of algorithms for 5G networking, framework now used by multiple teams
- Broke down protocol algorithms into max-throughput/min-power optimization parameterized by signal processing software processes and respective hardware components
- Wrote Python, Bash, and C scripts to interface with proprietary software and run telemetry on live device situations

Accenture Labs May - Aug 2019
Systems and Platforms Research Intern

- Designed pipeline to generate synthetic training data for robotic machine learning algorithms via a digital twin
- Created simulation of UR5 robot arm in programmable environments with Python, ROS, and Gazebo

UIUC, UC Berkeley 2018-2022
Lecturer, Teaching Assistant

- Wrote homeworks, exams, and notes, created programming projects with automated grading, delivered lectures
- TA for Artificial Intelligence, Optimization Models (**4.85/5**), Numerical Methods, and Computer Systems and Architecture (**4.8/5**), course enrollment 300-1000+ students
- Lecturer for Computer Systems and Architecture (**6.4/7, 3rd highest in department history**)

Projects (more on website)

Improving Deep Operator Nets via Sensor Point Optimization PyTorch, Firedrake

- Improved Deep O-Net training by hyper-optimizing function evaluation points via meta-learning
- Solved nested gradient problem via Neumann approximation of inverse Hessian
- Led to **20% decrease** in test error for Diffusion PDEs and **72.42% decrease** for Wave PDEs

Roomba Mario Kart C, Python

- Overrode Bluetooth (BLE) connection to control roombas with Nintendo Switch controllers
- Re-derived wheel physics for smooth driving and turning via analog stick pressure
- Managed various I/O embedded devices (on-roomba lights, on-ground sensors) via SPI and GPIO connections
- Scheduled and monitored state of game for 4 players concurrently via multiprocessing

Awards & Recognition

Tau Beta Pi, Eta Kappa Nu, Outstanding GSI Award, Regents' and Chancellor's Scholarship