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EDUCATION

JOHNS HOPKINS UNIVERSITY
M.S.E. Computer Science 2020
B.S. Physics & Computer Science 2020
 GPA 3.97/4.0

RESEARCH

COMPUTATIONAL COGNITION, VISION, LEARNING LAB (2017 - 2020)

- Developed novel **adversarial attacks** for deep neural networks.
- Adversarial examples for edge detection: They exist, and they transfer (WACV 2020). Cosgrove & Yuille
- Robustness Out of the Box: Compositional Representations Naturally Defend Against Black-Box Patch Attacks (arXiv 2020). Cosgrove et al.
- Compositional generative networks and robustness to perceptible image changes (CISS 2021). Kortylewski et al.

BANDITS FOR COORDINATE DESCENT (2019)

- Explored accelerating the convergence of primal-dual coordinate descent algorithms using multi-arm bandits.
- Advisors: Raman Arora and Teodor Marinov

EXPERIENCE

MICROSOFT | APPLIED SCIENTIST II
 August 2021 - Present | Mountain View, CA

- Developing **Responsible AI & safety** mitigations for a **large language model** (LLM) search product. Shipped model improvements that **reduced harmful generations** while preserving product quality.
- Created LLM operating system assistant demoed to Satya Nadella.
- Filed 2 **first-author patents** (LLM assistants).
- Represented Microsoft in a Stanford collaboration ([Holistic Evaluation of Language Models](#)). Implemented features for **Megatron-Turing-530B** API to reach parity with OpenAI API.
- Other projects: multimodal models, code gen modeling for **GitHub Copilot**.

TESLA | MACHINE LEARNING SCIENTIST
 Jan 2021 - July 2021 | Palo Alto, CA

- Improved **pedestrian detection** and kinematics for **Autopilot**, Full Self-Driving, and AEB. Presented findings to Elon Musk. Helped to **improve IIHS AEB safety** ratings to Advanced and towards [Superior](#).
- Implemented core infra for **feature caching** and dataset manipulation (AI Day [54:25](#)).
- First to apply **simulated data** to improve Vision-Only Autopilot lane changes on the highway.
- Collaborated closely with senior engineers and mentored intern.

MICROSOFT | SOFTWARE ENGINEER INTERN
 May 2020 - August 2020 | New York (remote)

- Applied **large language models** to several product scenarios.
- Researched ways to augment language models with **information retrieval**.

MICROSOFT | SOFTWARE ENGINEER INTERN
 May 2019 - August 2019 | Bellevue

- Worked on **ML & NLP** applications for Microsoft Advertising.
- Deployed model into production and piloted with users.
- Implemented **locality sensitive hashing** to accelerate query times.
- Designed and deployed distributed cloud service with failover mechanisms.

SLALOM CONSULTING | SOFTWARE ENGINEERING INTERN
 June 2018 - August 2018 | New York

- Researched, designed, and developed a proof-of-concept distributed ledger application for the reinsurance industry using the Corda framework.

SELECTED PROJECTS

- PyTorch spectral normalization GAN** • [source](#) • [blog](#)
- Graph neural networks** for learning a **TSP heuristic** • [source](#)
- AlphaZero** implementation for Connect Four • [source](#)
- GPU**-accelerated **reaction-diffusion** simulation • [source](#)
- Navier-Stokes** solver (vorticity streamfunction) • [video](#)
- MCMC** simulations of quantum-mechanical systems ([PIMC](#), [DMC](#))
- Infinite-detail** planet renderer [source](#) • [video](#) • [paper](#)
- Traffic simulation using **Nagel-Schreckenberg** model • [source](#)
- Realtime GLSL shaders for black hole **non-Euclidean raytracing** • [video](#)