Franklin Wang

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EDUCATION

Massachusetts Institute of Technology | Cambridge, MA
Double Major in Computer Science and Mathematics, Bachelor of Science May 2025 (Intended)
GPA: 5.00/5.00
Coursework: Modern Mathematical Statistics, Machine Learning (Graduate Class), Natural Langauge Processing, Computational Sensorimotor Learning (RL), Multivariable Calc., Linear Alg., Computational Structures, Design & Analysis of Algorithms
Other Coursework: MIT AI Alignment ML Boot Camp: Worked 8 hrs/day for 2 weeks with PyTorch on topics like constructing GPT from scratch, implementing AutoGrad, Transformer circuits/interpretability, reinforcement learning

RESEARCH EXPERIENCE/PUBLICATIONS

Debiasing Word Order Sensitivity in Multimodal Text-Image Models | Stanford NLP Group & MIT CSAIL Oct 2023 – Present
- Achieved SOTA performance on Winoground dataset using a zero-shot approach leveraging masked language models as a prior to generate alternative captions to normalize BLIP's bias towards more "likely" images

Equivariant GNNs for Coarse-Grained Molecular Dynamics | MIT CSAIL Jaakkola Lab Sep 2023 – Present
- Apply equivariant tensor product-based GNNs to simulate polymer chains, improving upon non-equivariant models

LLMs for Interpreting Neural Networks | MIT CSAIL Torralba Lab Jun 2023 – Present
- Fine-tuned LLMs on large multi-GPU clusters to act as judges and scorers for benchmark evaluation
- Contributions to https://arxiv.org/pdf/2309.03886.pdf and future follow-up paper

Intuitive Physics with Graph Neural Nets and Transformers | MIT CSAIL Torralba Lab Feb – Apr 2023
- Designed transformer and GNN-based architectures to simulate the physics of solids and fluids using particle-based representations
- Ran experiments using data from physics engines to prepare for experiments on real-world data

Neural Ordinary Differential Equations for Nanofiltration Behavior Prediction | Lienhard Research Group Sep – Dec 2022
- Leveraged ODE-based neural networks to predict the behavior of ions through a nanofilter
- Developed custom physics-based layers in the neural network to constrain the model based on physical laws

Deep Learning for Faint, Fast-Moving Asteroid Streak Detection | Independent Research Aug 2019 – Aug 2022
Publication Links: Github Repo, arXiv PDF, doi:10.1093/mnras/stac2347
- Published first-author research paper in peer-reviewed journal & presented at the AAS 240 Conference
- Developed novel data simulation strategy to train a CNN to detect asteroids in telescope images
- Discovered 6 new asteroids missed by previous deep learning algorithms
- Created & optimized the entire pipeline: preprocessing data, training & deploying the CNN, processing detections for manual review

WORK EXPERIENCE

ML Research Intern at Genesis Therapeutics Jun – Aug 2023
- Researched graph neural net approaches to modeling the dynamics of small molecule drugs with quantum mechanical data, leading to >300 times speedup compared to quantum methods and improving accuracy over traditional molecular dynamics approximations
- Created large-scale dataset of compute-intensive QM simulations of ligand-protein residue systems
- Created custom data loading caching system to significantly reduce redundant graph neural net calculations

NLP Research Intern at Uniphore Jul – Aug 2022
- Contrastively trained Bi-LSTM model in TensorFlow, improving sentence embeddings for empathy detection in call center transcripts
- Experimented with multimodal (audio + text) models for emotion prediction

Software Intern at Noah Medical Jun – Aug 2020
- Utilized C++ and C# for mesh decimation, sensor registration & accuracy evaluation, navigation visualization
- Worked frequently with quaternions, rotation matrices, and vectors

OTHER PROJECTS

Firststep.ID
Links: Github Repo, Website, Writeup by #cut50
- Collaborated with the #cut50 nonprofit to create FirstStep.id, which helps previously incarcerated individuals find the ID they need
- Created the backend using Flask & Python; won 1st place at the 2nd Chances Empathy Hackathon at SCU

AWARDS

International Science & Engineering Fair: 1st in Physics & Astro, Peggy Scripps Award for Science Communication
Davidson Fellow Laureate: $50K scholarship for ML asteroid detection research project, awarded to top 4 projects
USA Computing Olympiad Platinum Division: Ranked in the top 100 for the 2020 US Open contest

SKILLS

Programming Languages: Python, C++, Java, C#
Machine Learning/Data Science Libraries: PyTorch, TensorFlow, NumPy, SciPy, Pandas, Scikit-learn
Topics: NLP, Computer Vision, Graph Neural Nets, Multimodal Models, Synthetic Data, Contrastive Learning, Reinforcement Learning