VIRAJ MEHTA

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EDUCATION

PhD in Robotics, Carnegie Mellon University — 2019 – now

Advised by Jeff Schneider. Currently conducting research on reinforcement learning and bandits for control of plasma in nuclear fusion reactors with several areas of core ML research upstream of this application. These include sample-efficient reinforcement learning (especially through exploration), offline reinforcement learning, the use of prior physics knowledge in dynamical system modeling, generative models. Explicit applications include the design of feedforward controls for plasma current rampdown and for reduced use of inductive current drive in tokamaks.

MS in Computer Science, Artificial Intelligence Track, Stanford University — 2017 – 2018

Advised by Silvio Savarese, Animesh Garg, and Fei-Fei Li. Conducted research on robot learning for tool use (achieved 70-80% task success rate, doubling baseline performance) and 3D shape reconstruction via neural deformation. Published two papers on these topics.

BS in Mathematics, Stanford University — 2014 – 2018

INDUSTRY EXPERIENCE

Machine Learning Fellow — 2019
Capital Technologies — *New York, NY*

Designed the overall architecture of a system for ingesting data from private companies and automatically generating appropriate analysis for credit underwriting. Developed a modular architecture for simulating companies' financial performance. Also developed a graphical model for ingesting financial statements in a semistructured format.

Machine Learning Fellow — 2018 – 2019
KKR — *New York, NY*

Helped start the Alternative Data and Analytics team. Managed a machine learning project in the capital markets (early warnings with 65% precision for $x00M term loan deals), performed ML analyses for private equity due diligences and portfolio companies (incl $1B investment in Epic Games), and interfaced with vendors in the space to build partnerships for KKR. Also contributed to the strategic planning of the firm around emerging technologies.

Software Engineering Intern — 2016
Google — *Mountain View, CA*

Built scalable feature processing code for prediction of clickthrough rate for billions of Google search ads. System currently used across Google for feature transformations, greatly reducing developer time needed to write transforms and improving performance by $\sim 20\%$ in complex cases. To my knowledge the system is still in use at Google today.

TEACHING

- **Spring 2021** TA for CMU 16-726: Learning-Based Image Synthesis with Jun-Yan Zhu.
- **Fall 2020** TA for CMU 16-811: Math Fundamentals of Robotics with Michael Erdmann.
- **2015 – 2016** TA for Stanford GSB course on negotiation.

EXTRACURRICULAR ACTIVITIES

- Licensed Private Pilot
- Represented Stanford in 2017 Jeopardy! College Championship against students from 15 universities; placed third in the nation and won $25,000.

Publications and Conference Presentations

[1] Ian Char, Joseph Abbate, **Viraj Mehta**, Youngseog Chung, and William Conlin. "Differential Rotation Control for the DIII-D Tokamak via Model-Based Reinforcement Learning". In: *American Physical Society Division of Plasma Physics Annual Meeting*. Spokane, Washington, Oct. 2022.

[2] Frederic Koehler, **Viraj Mehta**, Andrej Risteski, and Chenghui Zhou. "Variational autoencoders in the presence of low-dimensional data: landscape and implicit bias". In: *International Conference on Learning Representations*. 2022.

[3] **Viraj Mehta**, Ian Char, Joseph Abbate, Rory Conlin, Mark D Boyer, Stefan Ermon, Jeff Schneider, and Willie Neiswanger. "Exploration via Planning for Information about the Optimal Trajectory". In: *Advances in Neural Information Processing Systems*. Vol. 35. 2022.

[4] **Viraj Mehta**, Ian Char, Joseph Abbate, Rory Conlin, Mark D Boyer, Stefano Ermon, Jeff Schneider, and Willie Neiswanger. "Sample-efficient Plasma Control by Planning for Optimal Trajectory Information". In: *ICML Workshop on Adaptive Experimental Design and Active Learning in the Real World*. 2022.

[5] **Viraj Mehta**, Biswajit Paria, Jeff Schneider, Stefano Ermon, and Willie Neiswanger. "An Experimental Design Perspective on Model-Based Reinforcement Learning". In: *International Conference on Learning Representations*. 2022.

[6] Frederic Koehler, **Viraj Mehta**, and Andrej Risteski. "Representational aspects of depth and conditioning in normalizing flows". In: *International Conference on Machine Learning*. 2021.

[7] **Viraj Mehta**, Joseph Abbate, William Conlin, Egemen Kolemen, and Jeff Schneider. "Controlling Plasma Profiles in a Learned Model via Reinforcement Learning". In: *American Physical Society Division of Plasma Physics Annual Meeting*. Pittsburgh, Pennsylvania, Nov. 2021.

[8] **Viraj Mehta**, Ian Char, Willie Neiswanger, Youngseog Chung, Andrew Oakleigh Nelson, Mark D. Boyer, Egemen Kolemen, and Jeff Schneider. "Neural Dynamical Systems: Balancing Structure and Flexibility in Physical Prediction". In: *IEEE Conference on Decision and Control*. 2021.

[9] **Viraj Mehta**, Ian Char, Adam Villaflor, and Jeff Schneider. "BATS: Best Action Trajectory Stitching". In: *NeurIPS Offline Reinforcement Learning Workshop*. 2021.

[10] Kuan Fang, Yuke Zhu, Animesh Garg, Andrey Kurenkov, **Viraj Mehta**, Li Fei-Fei, and Silvio Savarese. "Learning Task-Oriented Grasping for Tool Manipulation from Simulated Self-Supervision". In: *Proceedings of Robotics: Science and Systems*. Pittsburgh, Pennsylvania, June 2018.

[11] Andrey Kurenkov, Jingwei Ji, Animesh Garg, **Mehta, Viraj**, JunYoung Gwak, Christopher Choy, and Silvio Savarese. "DeformNet: Free-Form Deformation Network for 3D Shape Reconstruction from a Single Image". In: *2018 IEEE Winter Conference on Applications of Computer Vision (WACV)*. 2018, pp. 858–866. DOI: 10.1109/WACV.2018.00099.

[12] Andrey Kurenkov*, **Viraj Mehta***, Jingwei Ji, Animesh Garg, and Silvio Savarese. "Towards Grasp Transfer using Grasp Deformation". In: *1st Conference on Robot Learning (short talk)* (2017).

[13] Greg Clark*, **Viraj Mehta***, Cameron Darwin*, Faith Jackobs, Tyler Perry, Katia Hougaard, and Stanley Roux. "Effects of chemical inhibitors and apyrase enzyme further document a role for apyrases and extracellular ATP in the opening and closing of stomates in Arabidopsis". In: *Plant Signaling and Behavior* (2013).