Srinath Mahankali

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Education

Massachusetts Institute Of Technology

Candidate for Bachelors in Artificial Intelligence and Decision Making; GPA 5.0/5.0 **Expected: May 2025**

- Selected Courses: Advanced Sensorimotor Learning (Graduate), Large Language Models (Graduate), Computer Vision (Graduate), Statistical Reinforcement Learning (Graduate), Machine Learning (Graduate), Robotics: Science and Systems, Robotic Manipulation, Design and Analysis of Algorithms

Research Experience

Improbable AI Lab, CSAIL, MIT **June 2022 - Present**

Undergraduate Researcher | Advisor: Prof. Pulkit Agrawal

- Developing a new algorithm for reinforcement learning agents to explore their environment efficiently and learn useful skills. Investigated the impact of various intrinsic rewards on exploration. Showed that randomly choosing intrinsic reward functions can lead to better exploration than novelty-based intrinsic rewards.
- Studying the use of a new algorithm, extrinsic-intrinsic policy optimization, for locomotion. Demonstrated that this algorithm improved performance while minimizing energy consumption on a real quadruped.

MIT Mathematics **January 2022 - August 2022**

Undergraduate Researcher | Advisor: Prof. Promit Ghosal

- Investigated randomly initialized neural networks (RINNs) experimentally and theoretically. Proved that one-layer RINNs are likely to make near-arbitrary datasets linearly separable. Showed that one-layer RINNs have a higher probability of doing this compared to deeper RINNs on real world, high dimensional datasets.

Simons Institute for the Theory of Computing, UC Berkeley **January 2020 - August 2022**

Undergraduate Researcher | Advisor: Prof. Yunan Yang

- Proved theorems on convergence and stability for the inverse scattering problem for the diffuse wave equation and the Helmholtz equation, depending on the chosen Sobolev norm.
- Conducted research on the convexity of optimal transport-based full-waveform inversion. Proved that choosing the Wasserstein metric rather than the L^2 norm leads to better convexity in structured settings.

Research Papers

- **Mahankali, Srinath**, Chi-Chang Lee, Gabriel B. Margolis, Zhang-Wei Hong, Pulkit Agrawal. Maximizing Quadruped Velocity by Minimizing Energy. Submitted to International Conference on Robotics and Automation 2024 (ICRA).
- **Mahankali, Srinath,** Zhang-Wei Hong, Pulkit Agrawal. Does Novelty-Based Exploration Maximize Novelty?
- Ghosal, Promit, **Srinath Mahankali,** and Yihang Sun. Randomly Initialized One-Layer Neural Networks Make Data Linearly Separable. arXiv preprint arXiv:2205.11716 (2022).
- **Mahankali, Srinath,** and Yunan Yang**.** Norm-dependent convergence and stability of the inverse scattering series for diffuse and scalar waves. Inverse Problems, 39(5), 054005. (2023)
- **Mahankali, Srinath**. The convexity of optimal transport-based waveform inversion for certain structured velocity models. SIAM Undergraduate Research Online, 14:109-129 (2021).

Course Projects

Problem Solving Through Critical Revision **March 2023 - May 2023**

Course: 6.S986 Large Language Models

- Studied the use of large language models for solving math word problems. Investigated different prompting strategies including few-shot and chain-of-thought prompting. Here is the final project document.

Reward Function-Conditioned Policies for Exploration **October 2022 - December 2022**

Course: 6.S897 Advanced Sensorimotor Learning

- Proposed a new method for exploration in reinforcement learning and showed improved performance in simple environments compared to state-of-the-art exploration methods. Here is the final project document.

Collision-Free Motion with Goal-Conditioned Reinforcement Learning **October 2022 - December 2022**

Course: 6.4210 Robotic Manipulation

- Studied the use of goal-conditioned reinforcement learning to train policies for robot arms to avoid collisions with obstacles in its environment. Here is the final project document.

Single Image Super-Resolution Using Neural Implicit Representations **March 2022 - May 2022**

Course: 6.869 Computer Vision

- Proposed a new method for single-image super resolution using neural fields. Compared its performance to methods such as bilinear interpolation and deep learning-based methods. Here is the final project document.

Comparing Machine Learning Models for Robust ASL Classification **October 2021 - December 2021**

Course: 6.867 Machine Learning

- Classify images in the ASL alphabet with machine learning methods such as: CNN, PCA/robust PCA with MLP, and PCA/robust PCA with Kernel SVM, comparing their accuracy and robustness to irregular data.
- Here is the final project document.

Leadership Experience

Curriculum Developer, **Momentum AI** **June 2023 - August 2023**

- Designed a comprehensive machine learning curriculum for high school students from disadvantaged backgrounds, encompassing topics from Python basics to gradient descent and deep learning.

Captain, **New York City Math Team** **September 2020 - June 2021**

- Recruited 130+ members, strategized for national competitions, and created curriculum for weekly practice
- Team Awards: 1st Place at Princeton University Mathematics Competition 2020 (held in 2021), 2nd Place at American Regions Mathematics League 2021, 3rd Place at Harvard-MIT Mathematics Tournament 2021

Teaching Assistant, **Stuyvesant Math Team** **September 2019 - June 2021**

- Organized virtual lessons for freshmen and senior math team members during the pandemic.

Awards & Honors

- MIT Goldwater Scholarship Nominee 2023
- Paul E. Gray 1954 UROP Endowment Fund Award
- Regeneron Science Talent Search 2021: Scholar (Top 300) Award
- Mathematical Association of America 2021: Qualified for USAMO

Skills

- Software: Python, PyTorch, Robot Operating System (ROS), LaTeX, MATLAB, Java, Typescript, HTML, CSS