Sumedh Pendurkar

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Research Interests / Research Experience

Reinforcement Learning, Reinforcement Learning from Human Feedback (RLHF), Large Language Models, Deep Learning, Combinatorial Optimization

Education

Texas A&M University *TX, USA*

Doctor of Philosophy in Computer Science, 4/4 GPA *August 2019 - May 2025*

- *Key courses*: Reinforcement Learning, Applied Bayes Methods, Optimization for Machine Learning, Machine Learning, AI, Analysis of Algorithms, Algorithms for Graph Mining
- *Advisor*: Dr. Guni Sharon

College of Engineering, Pune *Pune, India*

Bachelor of Technology in Computer Engineering, 9.12/10 CGPA *July 2015 - May 2019*

- *Key courses*: Data Science, Design and Analysis of Algorithms, AI, Theory of Computation, Introduction to Graph Theory

Work Experience

University of Alberta *Edmonton, AB, Canada*

Visiting Student *May 2023 - July 2023*

- Worked on developing curriculum generation methods for various guided state-space search algorithms.
- Proposed approach achieved 5-36 times better performance as compared to the baseline algorithms.
- *Supervisor:* Dr. Nathan Sturtevant and Dr. Levi Lelis

Niantic Inc. *Sunnyvale, CA, USA*

Machine Learning Scientist Intern *May 2022 - Aug 2022*

- Worked on game meta balancing methods for various peer vs peer games, such as Pokemon video games
- The work resulted in a publication at AAMAS

Goldman Sachs *Bangalore, India*

Summer Technology Analyst (Intern) *May 2018 - July 2018*

- Worked on UI part of a change management tool for business units using Angular 6
- Developed RESTful web services in Java for the change management tool, currently used in production

Indian Institute of Technology (IIT), Roorkee *Roorkee, India*

Visiting Student *May 2017 - July 2017*

- Designed deconv-net based model for single image super-resolution on optical satellite images, achieved 0.55 dB PSNR over SOTA. Resulted in a publication at ICIAP.
- Investigated zero-shot techniques for super-resolution of optical satellite images
- *Supervisor:* Dr. Biplab Banerjee

Selected Publications

Improving Large Language Model Inference for Reasoning Tasks with Tree Search Algorithms

S. Pendurkar, G. Sharon *2024*

Working.

Exploring the Benefits of Using Maximum-Entropy Objective for Overcoming Negative Transfer in Reinforcement Learning

V. Bajaj, S. Pendurkar, G. Sharon *2024*

Under Submission.

Goal Distribution in Conflict-Based Search for Multi-Agent Pathfinding and its Implications to Monte-Carlo Sampling
C. Simpson, S. Pendurkar, G. Sharon — *2024*
AAAI workshop on Multi-Agent Path Finding (MAPF)

Curriculum Generation for Learning Guiding Functions in State-Space Search Algorithms — *AB, Canada*
S. Pendurkar, L. Lelis, N. Sturtevant, G. Sharon — *2024*
Symposium on Combinatorial Search (SoCS)

The (Un)Scalability of Informed Heuristic Function Estimation in NP-Hard Search Problems
S. Pendurkar, T. Huang, B. Juba, J.Zhang, S. Koenig, G. Sharon — *2023*
Transactions of Machine Learning Research (TMLR)

Bilevel Entropy based Mechanism Design for Balancing Meta in Video Games — *London, UK*
S. Pendurkar, C. Chow, J. Luo, G. Sharon — *2023*
International Conference on Autonomous Agents and Multiagent Systems (AAMAS)

Comparison between popular Genetic Algorithm (GA)-based tool and Covariance Matrix Adaptation - Evolutionary Strategy (CMA-ES) for optimizing indoor daylight — *China*
M. Anis, S. Pendurkar, Y. Yi, G. Sharon — *2023*
IBPSA International Conference and Exhibition on Building Simulation

The (Un)Scalability of Heuristic Approximators for NP-Hard Search Problems — *New Orleans, USA*
S. Pendurkar, T. Huang, S. Koenig, G. Sharon — *2022*
Proceedings of NeurIPS workshop. ICBINB.

A Discussion on the Scalability of Heuristic Approximators — *Vienna, Austria*
S. Pendurkar, T. Huang, S. Koenig, G. Sharon — *2022*
Symposium on Combinatorial Search (SoCS) (Extended Abstract)

A Joint Imitation-Reinforcement Learning Framework for Reduced Baseline Regret — *Prague, Czech Republic*
S. Dey, S. Pendurkar, G. Sharon, JP. Hanna — *2021*
International Conference on Intelligent Robots and Systems (IROS)

Single Image Super-Resolution for Optical Satellite Scenes Using Deep Deconvolutional Network — *Trento, Italy*
S. Pendurkar, B. Banerjee, S. Saha, F. Bovolo — *2019*
International Conference on Image Analysis and Processing (ICIAP)

Semantic Guided Deep Unsupervised Image Segmentation — *Trento, Italy*
S. Saha, B. Banerjee, S. Sudhakaran, S. Pendurkar — *2019*
International Conference on Image Analysis and Processing (ICIAP)

Technical Skills

Proficient: Programming	Python, C, Javascript
Intermediate: Programming	Java, C++, SQL
Tools and Libraries	PyTorch, Keras, Git, Angular, GTK, Latex

Other Projects

Autograder for the Deep Reinforcement Learning Course — *August 2022 - December 2023*
- Developed and designed test cases for CSCE 642 Course at Texas A&M University.
- The autograder is being also used by other universities.

Sampling an action from a Q function in continuous action spaces *August 2021 - May 2022*

- Investigating various sampling techniques, to efficiently sample actions from the Q function which would resemble Boltzmann sampling in discrete space
- Proposed method would enable agents to have better exploration than SOTA algorithms like Deep Deterministic Policy Gradient, and would not have any assumptions on distribution like Soft-Actor Critic
- *Advisors:* Dr. Guni Sharon

Light-Regularized-GANs for low light images *September 2019 - Jan 2021*

- Added an intensity based regularisation to LightEnhancementGAN, to control the intensity of light added to the image without any external supervision

Open-Ended Visual Question Answering System *April 2018 - May 2019*

- Designed an attention based multi-modal fusion model which gives a free flowing answer to a question based on video

Word completion feature for GNU-Nano text editor *July 2016 - December 2016*

- Authored a word-completion feature which completes the current word based on the text present in the open file
- This feature was incorporated in GNU-Nano, an open source project

Communication/on-board controller system for pico satellite *April 2016 - July 2018*

- Developed shared memory protocols for two asynchronous controllers for on-board data sharing on a pico-satellite
- Worked on interfacing various peripherals with on-board controllers for data collection

Honors & Awards

2020	**First Place**, 2020 TAMIDS Data Science Competition	*TX, USA*
2018	**Deloitte Innovation Award**, Ministry of Road and Railways, Smart India Hackathon	*Nagpur, India*
2018	**Finalist (40/1980)**, Philips Hackathon on Data Science	*Bangalore, India*
2013	**Scholarship Holder**, National Talent Search Exam (NTSE), awarded to top 1000 students in India	*India*

Professional Activities

2020	**Reviewer**, ICRA 2021
2021	**Reviewer**, IROS 2021
2022	**Program Committee**, AAAI 2023, AAAI workshop on multi-agent path finding
2023	**Program Committee**, NeurIPS 2023, AAAI 2023, NeurIPS workshop 2023
2023	**Student Volunteer**, AAMAS 2023
2024	**Program Committee**, ICML 2024, TMLR 2024, AAAI 2024