Sumedh Pendurkar

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Research Interests

Reinforcement Learning, Heuristic Search, Combinatorial Optimization, AI

Education

Texas A&M University — *TX, USA*

Doctor of Philosophy in Computer Science, 4/4 GPA — *August 2020 - Present*

- *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

Selected Publications

Bilevel Entropy based Mechanism Design for Balancing Meta in Video Games

S. Pendurkar, C. Chow, J. Luo, G. Sharon — *2022*

Under Review.

The (Un)Scalability of Heuristic Approximators for NP-Hard Search Problems

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 (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)

Experience

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
- Proposed method involves gradient-free optimization techniques like CMA-ES for balancing the game parameters while Monte Carlo based Nash RL methods are used for learning the best AI agent
- Resulted in a manuscript currently under review

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*

Research Intern *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
- Investigated zero-shot techniques for super-resolution of optical satellite images
- *Advisor:* Dr. Biplab Banerjee

Technical Skills

Programming Python, C, Javascript

Tools and Libraries PyTorch, Keras, Git, Angular, GTK, Latex

Projects

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 DDPG, and would not have any assumptions on distribution like SAC
- *Advisors:* Dr. Guni Sharon

Learning heuristic function for large search problems *September 2020 - Present*

- Investigating reinforcement learning based approaches for lifelong heuristic search algorithms
- Studying the scalability of such approximators for NP-hard problems
- Currently, extending our approach to multi-agent path finding (MAPF)
- *Advisors:* Dr. Guni Sharon, Dr. Sven Koenig

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 as it attends to both, question words and video while outputting every single word of answer

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 **Reviewer**, AAAI 2023, AAAI Workshop on Multi-Agent Path Finding