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

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

S. Pendurkar, T. Huang, S. Koenig, G. Sharon — *2022*

arxiv. Under Review

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 statistics while Monte Carlo based RL methods are used for learning the best AI agent
- *Advisor:* Dr. Roger Luo, Dr. Guni Sharon

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 - Present*

- 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