Arnav Kumar Jain

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arnavkj1995

Research Interests

Reinforcement Learning (RL), Large Language Models (LLMs), Inverse Reinforcement Learning, Learning to Search, World Models, Robotics, Code Generation

Education

2022–present **Mila, Université de Montréal**.
PhD student supervised by *Prof. Irina Rish*

2013–2018 **Indian Institute of Technology Kharagpur**.
Integrated B.Sc. and M.Sc. in Mathematics and Computing

Research & Work Experience

Feb'25 – July'25 **Research Intern, Cohere**.
Working on multi-turn LLM agents for code generation

Aug'24– May'25 **Visiting Researcher, PoRTaL lab, Cornell University**.
Visited Sanjiban Choudhury's lab for collaboration on IRL via Successor Features Matching (SFM), model-based IRL with diffusion policies (`SAILOR`) and using RL to train LLM agents for Code Generation (μCode).

Aug'20 – Dec'20 **Data & Applied Scientist 2, Microsoft IDC**.
Collaborated with Dr. Manik Varma at MSR India to develop scalable and accurate eXtreme Classification algorithms for web-scale recommendation system (published at TheWebConf'21)

Jun'18 – Jul'20 **Data & Applied Scientist, Microsoft IDC**.
Algorithms to improve cross-lingual retrieval of relevant keywords for a query.

May'17 – Jul'17 **Research Intern, HyperVerge Inc.**.
Object detection algorithms for video surveillance systems.

May'16 – Jul'16 **Research Intern, ParallelDots**.
Lung nodule detection in 3D CT scans and mitosis detection in histology images.

Patents

2021 Extreme Classification Processing using Graphs and Neural Networks,
Kushal Dave, Deepak Saini, ***Arnav Kumar Jain****, Amit Singh, Jian Jiao, Ruofei Zhang and Manik Varma.*
Pending Approval

Publications

2025 A Smooth Sea Never Made a Skilled `SAILOR`: Robust Imitation via Learning to Search | Paper,
Arnav Kumar Jain*, Vibhakar Mohta*, Subin Kim, Atiksh Bhardwaj, Yunhai Feng, Sanjiban Choudhury, Gokul Swamy.*
Neural Information Processing Systems (**NeurIPS**), 2025 (Spotlight, 3.5%)
Embodied World Models Workshop, NeurIPS 2025.

2025 Multi-Turn Code Generation Through Single-Step Rewards | Paper,
Arnav Kumar Jain*, Gonzalo Gonzalez*, Wayne Chen, Alexander M Rush, Wenting Zhao, Sanjiban Choudhury.*
International Conference on Machine Learning (**ICML**), 2025 (Spotlight, 2.6%)
VerifAI, SSI-FM and RAP Workshops, ICLR 2025.

2025 Non-Adversarial Inverse Reinforcement Learning via Successor Feature Matching | Paper,
***Arnav Kumar Jain**, Jesse Farebrother, Harley Wiltzer, Irina Rish, Glen Berseth, Sanjiban Choudhury.*
International Conference on Learning Representations (**ICLR**) 2025
MHFAI Workshop, ICML 2024

2023 $\eta\psi$-Learning: Maximum State Entropy Exploration using Predecessor and Successor Representations | Paper,
***Arnav Kumar Jain**, Lucas Lehnert, Irina Rish, Glen Berseth.*
Neural Information Processing Systems (**NeurIPS**), 2023
Frontiers4LCD Workshop, International Conference on Machine Learning (ICML), 2023

2022 Learning Robust Dynamics through Variational Sparse Gating | Paper,
***Arnav Kumar Jain**, Shivakanth Sujit, Shruti Joshi, Vincent Michalski, Danijar Hafner, Samira Ebrahimi-Kahou.*
Neural Information Processing Systems (**NeurIPS**), 2022
Deep RL Workshop, Neural Information Processing Systems (NeurIPS), 2021

2021 GalaXC: Graph neurAL networks with Labelwise Attention for eXtreme Classification | Paper,
Deepak Saini, **Arnav Kumar Jain***, Kushal Dave*, Amit Singh, Jian Jiao, Ruofei Zhang, Manik Varma.*
The Web Conference (**TheWebConf**), 2021

2020 Graph Regularization for Multi-lingual Topic Models | Paper,
Arnav Kumar Jain, Gundeep Arora*, Rahul Agrawal.*
SIGIR Conference on Research and Development in Information Retrieval, 2020

2020 Prior guided GAN based Semantic Inpainting| Paper,
Avisek Lahiri, **Arnav Kumar Jain***, Sanskar Agrawal, Prabir Kumar Biswas, Pabitra Mitra.*
Computer Vision and Pattern Recognition (**CVPR**), 2020

2019 Faster unsupervised semantic inpainting: A GAN based approach | Paper,
Avisek Lahiri, **Arnav Kumar Jain***, Divyashree Nadendla, Prabir Kumar Biswas.*
International Conference on Image Processing (**ICIP**), 2019

2018 Optimal Spline Trajectories by Modelling Kinematic Constraints in Robot Soccer | Paper,
Abhinav Agarwalla, **Arnav Kumar Jain***, KV Manohar, Arpit Saxena, Jayanta Mukhopadhyay.*
Conference on Data Science and Management of Data (**CoDS-COMAD**), 2018

2016 KgpKubs Team Description Paper,
*Abhinav Agarwalla, Kumar Abhinav, **Arnav Jain**, Kaustubh Mundhadha, Dhananjay Yadav, ...*
RoboCup, 2016

Workshop Papers

2020 Predicting Regional Locust Swarm Distribution with Recurrent Neural Networks | Paper,
Hadia MO Samil, Annabelle Martin*, **Arnav Kumar Jain***, Susan Amin, and Samira Ebrahimi-Kahou.*
AI+HADR Workshop, Neural Information Processing Systems (**NeurIPS**), 2020

2017 Recurrent Memory Addressing for describing videos | Paper,
Arnav Kumar Jain, Abhinav Agarwalla*, Kumar Krishna Agrawal* and Pabitra Mitra.*
DeepVision Workshop, Computer Vision and Pattern Recognition (CVPRW), 2017

Reviewing

ICLR'25, ICML'25, NeurIPS'25, ICML'24, RLC'24, NeurIPS'24, ICML'23, NeurIPS'23 (Top Reviewer), ICML'22, NeurIPS'22.

Mentoring

2025- **Atiksh Bhardwaj**, *(BTech student at Cornell University).*
Scaling up Model-based Inverse Reinforcement Learning (`SAILOR`).

2025 **Gonzalo Gonzalez-Pumariega**, *(PhD student at Cornell University)*.
Multi-turn Code Generation (μCode)

2024-2025 **Vibhakar Mohta**, *(MS CMU, Now Nuro)*.
Scaling up Model-based Inverse Reinforcement Learning (`SAILOR`).

2024-2025 **Subin Kim**, *(MS student at KAIST, Now PhD @ UPenn)*.
Scaling up Model-based Inverse Reinforcement Learning (`SAILOR`).

2024 **Mahdi Kleit**, *(MS student at Mila)*.
Finetuning Diffusion Models.

Talks

2025 **RoboPapers Podcast**, `SAILOR`

2025 **RL-Sofa, Mila**, Robust Imitation via Learning to Search

2024 **PoRTaL group, Cornell University**, Switching RL WorkFlow to Jax

2023 **ServiceNow Research**, Efficient Exploration with Successor and Predecessor Representations

2023 **Mila RL Workshop**, Efficient Exploration with Successor and Predecessor Representations

Awards & Achievements

2025 **ICLR Travel Assistance**.
Received the financial assiatance from ICLR to present SFM.

2024 **FRQNT Fellowship**.
Received the Fonds de recherche du Québec PhD fellowship.

2023 **Top Reviewer, NeurIPS 2023**.

2019 **Excellence in Innovation, Microsoft**.
Awarded for creating models resulting in business impact and reducing defect rate on Bing Ads platform

2018 **ACM India Student Travel Grant**.
Received travel grant to present accepted paper in ACM IKDD CoDS COMAD 2018

2017 **Data Science Bowl 2017**.
Received 5000$ for the 3^{rd} highest voted kernel on *Candidate generation and LUNA16 preprocessing*

2015 **FIRA RobotSoccer WorldCup, South Korea**.
Participated in FIRA, 2015 in SIMUROSOT league and won Bronze in MIROSOT league, and were the first Indian team to have a podium finish

2015 **SudoCode, Kshitij, IIT Kharagpur**.
Secured 1^{st} Position (2015) and Best Freshers' (2014) in a national event to develop AI algorithms.

2013 **Innovation in Science Pursuit for Inspired Research (INSPIRE) Scholarship**.
Scholarship awarded by the Department of Science and Technology, Government of India

Other Activities

2014 **Texas Instruments certified Winter Workshop**.
Mentored 60 freshmen to develop a bot that can follow lanes and detect shapes.

2013 – 2015 **National Service Scheme**.
Organized two medical camps with free checkups and medicines, and volunteered to teach school children.