Arnav Kumar Jain

✉ arnav-kumar.jain@mila.quebec
🏠 arnavkj1995.github.io
⌂ arnavkj1995

Research Interests

Reinforcement Learning (RL), Large Language Models (LLMs), Reasoning, Code Generation, Reinforcement Learning from Human Feedback (RLHF), Inverse Reinforcement Learning

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-	**Research Intern, Cohere Inc**. Working on multi-turn LLM agents for code generation
Aug'24-	**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 for real world tasks and using RL to train LLM agents for Code Generation (μCode).
Aug'20 – Dec'20	**Data & Applied Scientist 2, Microsoft IDC**. Worked 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**. Worked on algorithms to improve cross-lingual retrieval of relevant keywords for a query.
May'17 – Jul'17	**Research Intern, HyperVerge Inc.**. Worked on object detection algorithms for video surveillance systems.
May'16 – Jul'16	**Research Intern, ParallelDots**. Worked on 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	Multi-Turn Code Generation Through Single-Step Rewards	link, **Arnav Kumar Jain***, *Gonzalo Gonzalez*, Wayne Chen, Alexander M Rush, Wenting Zhao, Sanjiban Choudhury*. VerifAI, SSI-FM and RAP Workshops, ICLR 2025.
2025	Non-Adversarial Inverse Reinforcement Learning via Successor Feature Matching	link, **Arnav Kumar Jain**, *Jesse Farebrother, Harley Wiltzer, Irina Rish, Glen Berseth, Sanjiban Choudhury*. International Conference on Learning Representations (**ICLR**) 2025 MHFAI Workshop, International Conference on Machine Learning (ICML) 2024
2023	$\eta\psi$-Learning: Maximum State Entropy Exploration using Predecessor and Successor Representations	link, **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 | link,
Arnav Kumar Jain, Shivakanth Sujit, Shruti Joshi, Vincent Michalski, Danijar Hafner, and 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 | link,
Deepak Saini*, **Arnav Kumar Jain***, Kushal Dave*, Amit Singh, Jian Jiao, Ruofei Zhang, and Manik Varma.
The Web Conference (**TheWebConf**), 2021

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

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

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

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

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

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

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

Reviewing

ICLR'25, ICML'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.

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.

2024- **Subin Kim**, (MS student at KAIST).
Scaling up Model-based Inverse Reinforcement Learning.

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

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 3rd 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 1st 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.