Arnav Kumar Jain

Research Interests

Deep Reinforcement Learning, Model-Based Reinforcement Learning, Unsupervised World Models, Lifelong learning

Education

- 2021-present **Mila, Université de Montréal**. PhD student supervised by *Prof. Irina Rish* (*Transferred to UdeM in 2022*)
- 2013–2018 Indian Institute of Technology Kharagpur. Integrated B.Sc. and M.Sc. in Mathematics and Computing

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

- 2021 Learning Robust Dynamics through Variational Sparse Gating,
 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

Work Experience

Jun'18 - Data & Applied Scientist, Microsoft IDC.

- Dec'20 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)
 - Worked on algorithms to improve cross-lingual retrieval of relevant keywords for a query.
 - $\circ~$ Implemented sparse matrix multiplication layers in Tensorflow to speed up training by 10 $\times.$

May'17 - Research Intern, HyperVerge Inc..

Jul'17 Worked on object detection algorithms for video surveillance systems.

May'16 – Research Intern, ParallelDots.

Jul'16 Worked on lung nodule detection in 3D CT scans and mitosis detection in histology images.

Research Experience

Jul'17 - Improved Techniques for Image and Video Inpainting, Masters' Thesis Project,

May'18 Advisors: Prof. Pabitra Mitra and Prof. Prabir Kumar Biswas, IIT Kharagpur. Implemented a noise prior prediction network and incorporated structural priors like facial keypoints for better image reconstructions. Implemented an RNN-based grouped prior model to inpaint a sequence of frames (published in ICIP'19 and CVPR'20)

Jul'16 – Video Description Generation,

Apr'17 Advisor: Prof. Pabitra Mitra, IIT Kharagpur. Introduced Key-Value Memory Networks to a multimodal setting. Implemented key-addressing mechanism in an LSTM decoder with attention to further exploit temporal dependencies.

Mar'14 - Kharagpur Robosoccer Students' Group (KRSSG),

Apr'18 Advisor: Prof. Jayanta Mukhopadhyay, IIT Kharagpur.

Designed strategies for autonomous differential drive and omni-directional robots playing soccer using a multithreaded 3-tier software architecture to take decisions during the game. Developed a new path plannner using Spline trajectories and Bayesian Optimization. The team has represented India in FIRA 2013(Malaysia), 2014(Beijing), 2015(South Korea) and RoboCup 2016 (Germany), 2017 (Japan) and won **Bronze** in MIROSOT League in FIRA, 2015.

Awards & Achievements

- 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

 2016 LSMDC Movie Multiple-Choice Challenge, ECCV 2016. Secured 3rd position in the challenge to select the best description of small video clips
 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 medical camps with free checkups and medicines, and volunteered to teach school children.