Pranav Agarwal

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Research Interests

Large Language Models (LLMs), Robotics, Reinforcement Learning, Neuroscience

Education

École de Technologie Supérieure & Mila **Sep 2022 – present**
Ph.D. in Information Technology Engineering *Montréal, Canada*
Advisors: Prof. Samira Ebrahimi Kahou, Prof. Sheldon Andrews *GPA: 4.13/4.33*

École de Technologie Supérieure & Mila **Jan 2022 – Aug 2022**
M.Sc in Information Technology Engineering *Montréal, Canada*
Advisors: Prof. Samira Ebrahimi Kahou, Prof. Sheldon Andrews *GPA: 4.09/4.33*
Fast-tracked to Doctorate Programme.

Indian Institute of Information Technology **Aug 2015 – May 2019**
Bachelors in Electronics and Communication Engineering *Guwahati, India*
Advisor: Prof. Soumyajit Poddar *GPA: 9.40/10.0*

Research Experience

CM Labs **Jan 2022 – August 2022**
Research Intern *Montréal, Canada*
Advisor: Dr. Marek Teichmann

- Developed a framework to automate the evaluation of excavator operators using self-supervised learning.
- Applied the developed framework as a reward function to automate excavators in simulation (Vortex) using Reinforcement Learning (RL).

INRIA, RITS **Aug 2019 – Mar 2021**
Research Assistant *Paris, France*
Advisor: Dr. Raoul de Charette

- Modeled RL algorithms (DDPG, TD3, and PPO) for autonomous driving.
- Implemented an OpenAI-gym-like wrapper for Carla simulator.
- Proposed a novel curriculum-driven multi-policy RL agent to learn to drive using only sparse rewards.

INRIA, Flowers **May 2019 – Apr 2020**
Research Collaborator *Paris, France*
Advisor: Prof. Natalia Díaz-Rodríguez

- Annotation of Egoshots dataset.
- Modeled Image Captioning (IC) Algorithms (YOLO, NOC, and DNOC) to caption the Egoshots dataset.
- Proposed a new IC metric, Semantic Fidelity to evaluate diversity in image captioning models.

Singapore University of Technology and Design **May 2018 – July 2018**
Research Intern *Singapore*
Advisor: Prof. Gemma Roig

- Worked on Eccentricity Convolution Neural Network (ECNN).
- Compared the performance of ECNN on ImageNet and FaceScrub to the existing models like AlexNet.

Academic Activities

- Served as a reviewer for ICCV.
- Served as an ICRA, SII, IROS, Robotics and Automation Letters reviewer.

Publications

1. **Learning to Play Atari in a World of Tokens**
   Under Review
   Pranav Agarwal, Sheldon Andrews, Samira Ebrahimi Kahou

2. **TPTO: A Transformer-PPO based Task Offloading Solution for Edge Computing Environments**
   IEEE, 29th International Conference on Parallel and Distributed Systems, ICPADS 2023
   Niloofar Gholipour, Marcos Dias de Assuncao, **Pranav Agarwal**, Rajkumar Buyya

3. **Empowering Clinicians with MeDT: A Framework for Sepsis Treatment**
   Goal-Conditioned Reinforcement Learning, Neurips Workshop, 2023, ***Spotlight***
   Aamer Abdul Rahman, **Pranav Agarwal**, Vincent Michalski, Rita Noumeir, Samira Ebrahimi Kahou

4. **Transformers in Reinforcement Learning: A Survey**
   Under Review
   Pranav Agarwal, Aamer Abdul Rahman, Pierre-Luc St-Charles, Simon JD Prince, Samira Ebrahimi Kahou

5. **Automatic Evaluation of Excavator Operators using Learned Reward Functions**
   Reinforcement Learning for Real Life, NeurIPS Workshop, 2022
   Pranav Agarwal, Marek Teichmann, Sheldon Andrews, Samira Ebrahimi Kahou

6. **Sparse Curriculum Reinforcement Learning for End-to-End Driving**
   arXiv preprint, 2021
   Pranav Agarwal, Pierre De Beaucorps, Raoul De Charette

7. **Egoshots, an ego-vision life-logging dataset and semantic fidelity metric to evaluate diversity in image captioning models**
   Machine Learning in Real Life, ICLR Workshop, 2020
   Pranav Agarwal, Alejandro Betancourt, Vana Panagiotou, Natalia Díaz-Rodríguez

8. **Learning to Synthesize Faces Using Voice Clips for Cross-Modal Biometric Matching**
   IEEE Region 10 Symposium, TENSYMP 2019
   Pranav Agarwal, Soumyajit Poddar, Anakhi Hazarika, Hafizur Rahaman

Technical Skills

- **Programming**: Python, C, C++, Matlab, ROS
- **Simulators**: Carla, Vortex, IssacGym, MuJoCo
- **Software**: OpenCV in Python, Numpy, Scipy, Matplotlib, Git, Linux
- **Frameworks**: Pytorch, Tensorflow, Keras

Relevant Courses

- **Mathematics**: Linear Algebra, Multivariate Calculus, Probability and Statistics
- **Programming**: C, Data Structure, Operating System, Computer Architecture
- **Robotics**: Learning & Optimization, Advance Control System, Reinforcement Learning
- **Online**: Python, Deep Learning, AI for Medical Diagnosis, Algorithms

Awards

- Mitacs Accelerate Fellowship for Graduate Studies.
- Quebec Exemption from International Master's Fees.
- Awarded the President's Gold Medal for graduating with the highest GPA.
- Received the best Technology award by the Government of India at Vibrant Gujarat 2019.
- Silver Medalist at YUVAAN cricket - An Intra Collge sport's fest of IIIT Guwahati.
- Winner of ElectroWarFare - An Intra College Techno Fest event of IIIT Guwahati.
- Merit certificate for being in the top 0.1% (securing full marks) across India in standard XII exams.