

Pranav Agarwal

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Research Interests

Reinforcement Learning | Lifelong Learning | Generative World Models | Interpretability | Autonomous Driving

Education

Mila, Quebec AI Institute

Ph.D. in Computer Science

Thesis: Efficient Reinforcement Learning with Improved Prior Modeling

Montréal, Canada

Sept. 2022 – Present

GPA: 4.13/4.3

Mila, Quebec AI Institute

M.Sc. in Computer Science

Fast-tracked to Doctorate Programme.

Montréal, Canada

Jan. 2022 – Aug. 2022

GPA: 4.09/4.3

Indian Institute of Information Technology

Bachelors in Electronics and Communication Engineering

Graduated as Gold Medalist with Rank 1

Guwahati, India

Aug. 2015 – May 2019

GPA: 9.40/10.0

Experience

Research Scientist Intern

Wayve

May 2025 – Present

Vancouver, Canada

- Improving offline Reinforcement Learning (RL) policies for intervention scenarios using better exploration strategies.
- Leveraging a learned reward model to optimize policy training efficiency and robustness using the GAIA world model.
- Evaluating various exploration techniques to address sparse reward conditions and improve generalization across tasks.
- Contributing to the broader goal of scalable, safe decision-making in embodied AI systems through model-based RL.

Research Intern

CM Labs

Jan. 2022 – Aug. 2022

Montréal, Canada

- Designed and implemented a framework leveraging self-supervised learning to automate the evaluation of excavator operators, enabling objective performance assessment.
- Integrated the framework as a custom reward function in the Vortex simulation environment, achieving automated excavator control using state-of-the-art Reinforcement Learning (RL) techniques.
- Optimized model performance by applying hyperparameter tuning, ensuring scalable deployment in training simulators.
- Validated the framework's effectiveness, contributing to advancements in operator training and autonomous construction equipment.

Research Assistant

INRIA, RITS

Aug. 2019 – Mar. 2021

Paris, France

- Developed and evaluated state-of-the-art Reinforcement Learning (RL) algorithms, including DDPG, TD3, and PPO, for autonomous driving tasks in simulated environments.
- Engineered an OpenAI Gym-compatible wrapper for the Carla simulator, enabling seamless integration and benchmarking of RL algorithms.
- Proposed and validated a novel curriculum-driven, multi-policy RL agent, achieving efficient learning of autonomous driving with sparse reward signals.

Research Collaborator

INRIA, Flowers

May 2019 – April 2021

Paris, France

- Curated and annotated the Egoshots dataset, enabling its use for benchmarking image captioning models.
- Developed and fine-tuned state-of-the-art Image Captioning (IC) algorithms, including YOLO, NOC, and DNOC, to generate descriptive captions for egocentric image datasets.
- Introduced and validated a novel evaluation metric, *Semantic Fidelity*, to assess diversity and contextual relevance in image captioning outputs.
- Collaborated on improving model interpretability and scalability for practical applications in egocentric vision systems.

- Contributed to developing and analyzing the Eccentricity Convolutional Neural Network (ECNN), exploring its novel architecture for computer vision tasks.
- Conducted comprehensive performance evaluations of ECNN on large-scale datasets such as ImageNet and FaceScrub, benchmarking against established models like AlexNet.
- Identified strengths and limitations of ECNN in image classification tasks, providing insights for future architectural improvements.

Publications

- **Interpreting Large Language Models' Personality through Critical Event Analysis**
Pranav Agarwal, Ioana Ciucă
ICML Workshop (Actionable Interpretability), 2025
Keywords: Interpretability, LLMs, Evaluation
- **Continual Reinforcement Learning**
Under Review, 2025
Keywords: Reinforcement Learning, Continual Learning, Robotics
- **Learning to Play Atari in a World of Tokens**
Pranav Agarwal, Sheldon Andrews, Samira Ebrahimi Kahou
International Conference on Machine Learning (ICML), 2024
Keywords: Reinforcement Learning, Transformers, Deep Learning, World Models
- **TPTO: A Transformer-PPO based Task Offloading Solution for Edge Computing**
Niloofer Gholipour, Marcos Dias de Assuncao, **Pranav Agarwal**, Rajkumar Buyya
IEEE ICPADS (29th International Conference on Parallel and Distributed Systems), 2023
Keywords: Edge Computing, Transformers, Reinforcement Learning
- **Empowering Clinicians with MeDT: A Framework for Sepsis Treatment**
Aamer Abdul Rahman, **Pranav Agarwal**, Vincent Michalski, Rita Numeir, Samira Ebrahimi Kahou
NeurIPS Workshop (Goal-Conditioned Reinforcement Learning), 2023 — **Spotlight Presentation**
Keywords: Healthcare AI, Transformers, Deep Reinforcement Learning
- **Transformers in Reinforcement Learning: A Survey**
Pranav Agarwal, Aamer Abdul Rahman, Pierre-Luc St-Charles, Simon JD Prince, Samira Ebrahimi Kahou
ACM Computing Surveys (Under Review), 2024
Keywords: Transformer Architectures, RL Applications
- **Automatic Evaluation of Excavator Operators Using Learned Reward Functions**
Pranav Agarwal, Marek Teichmann, Sheldon Andrews, Samira Ebrahimi Kahou
NeurIPS Workshop (Reinforcement Learning for Real Life), 2022
Keywords: Robotics, Reinforcement Learning, Reward Learning
- **Sparse Curriculum Reinforcement Learning for Autonomous Driving**
Pranav Agarwal, Pierre De Beaucorps, Raoul De Charette
arXiv preprint, 2021
Keywords: Self-Driving Vehicles, Curriculum Learning, Reinforcement Learning
- **Egoshots: Ego-Vision Dataset and Semantic Fidelity Metric for Image Captioning**
Pranav Agarwal, Alejandro Betancourt, Vana Panagiotou, Natalia Díaz-Rodríguez
ICLR Workshop (Machine Learning in Real Life), 2020
Keywords: Computer Vision, Dataset Creation, Captioning Models
- **Learning to Synthesize Faces Using Voice Clips for Cross-Modal Biometric Matching**
Pranav Agarwal, Soumyajit Poddar, Anakhi Hazarika, Hafizur Rahaman
IEEE TENSYP (Region 10 Symposium), 2019
Keywords: Multimodal Learning, Voice-Face Correlation, Generative Models

Academic Activities

- **Conference Reviewer:**

- Machine Learning: ICLR, ICCV
- Graphics: SIGGRAPH
- Robotics: ICRA, IROS, IEEE Robotics and Automation Letters (RA-L)
- Intelligent Systems: IEEE SII

Technical Skills

- Python (Expert: NumPy, SciPy, Pandas), C++ (STL, Boost), MATLAB
- Embedded: ROS/ROS2, Arduino, Raspberry Pi
- Frameworks: PyTorch (Lightning, TorchScript), TensorFlow (Extended, Serving)
- Tools: Keras, OpenCV, scikit-learn, MLflow, Weights & Biases
- Autonomous Vehicles: CARLA, Vortex Studio
- Robot Learning: NVIDIA Isaac Gym, MuJoCo, Gazebo
- Visualization: Matplotlib, Seaborn, Plotly
- DevOps: Git, Docker, Jenkins, Linux (Ubuntu, CentOS)
- Cloud: AWS EC2/S3, Google Colab, Jupyter Notebooks

Relevant Courses

- **Mathematics:** Linear Algebra, Multivariate Calculus, Probability, Statistics, Numerical Methods
- **Computer Science:** Algorithms, Data Structures, OS, Computer Architecture, C/C++ Systems Programming
- **Robotics & AI:** Reinforcement Learning, Optimal Control, Robot Learning, Autonomous Systems
- **Machine Learning:** Deep Learning (Transformers, CNNs, RNNs), Medical AI, Computer Vision, MLE
- **Certifications:** Deep Learning (Coursera), AWS ML, NVIDIA DLI Robotics, ROS Professional

Awards

- **Academic Excellence:**

- President's Gold Medal for highest GPA in graduating class
- Merit Certificate: Top 0.1% nationwide in Standard XII exams (full marks)
- Quebec Exemption from International Master's Fees

- **Research & Innovation:**

- ETS Substance Research Dissemination Scholarship (\$1000)
- Mitacs Accelerate Fellowship for Graduate Studies
- Best Technology Award, Vibrant Gujarat 2019 (Government of India)

- **Leadership & Extracurricular:**

- Winner, ElectroWarFare (Intra-College Techno Fest, IIIT Guwahati)
- Silver Medalist, YUVAAN Cricket (Intra-College Sports Fest, IIIT Guwahati)