

Pranav Agarwal

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[🌐 https://pranaval.github.io/](https://pranaval.github.io/)

Interests

Deep Learning, Reinforcement Learning, Generative Networks, Autonomous Driving, TinyML

Education

École de Technologie Supérieure Montréal **G.P.A: 4.09/4.3**
Masters in Information Technology Engineering (with thesis) 2022–ongoing

Indian Institute of Information Technology Guwahati **G.P.A: 9.40/10**
Bachelors in Electronics and Communication Engineering 2015–2019

Experience

CM Labs **Montréal**
Supervised by: Dr. Samira Ebrahimi Kahou, Dr. Sheldon Andrews Jan 2022–ongoing

- Implemented a generative model for automatic evaluation of crane operators.
- Crane Automation on Vortex Simulator using PPO based on the proposed reward.

INRIA RITS **Paris**
Supervised by: Dr. Raoul de Charette Aug 2019–Mar 2021

- Worked on Reinforcement Learning (RL) Algorithms (DDPG, TD3 and PPO) for Autonomous Driving.
- Implemented an OpenAI Gym like wrapper for CARLA Simulator to train and test different RL algorithms.
- Proposed a novel curriculum driven multi policy RL agent to learn to drive using only sparse rewards.

INRIA Flowers **Paris**
Supervised by: Dr. Natalia Díaz-Rodríguez May 2019–Apr 2020

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

Singapore University of Technology and Design **Singapore**
Supervised by: Dr. Gemma Roig May 2018–July 2018

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

Publication

Sparse Curriculum Reinforcement Learning for End-to-End Driving

- Proposed a sparse reward dependent end to end driving on navigation maps using curriculum learning.
- Our method discovers driving behaviour using simple binary rewards, generalizing to unseen tracks.
- arXiv preprint [arXiv:2103.09189](https://arxiv.org/abs/2103.09189), 2021

An ego-vision dataset and semantic fidelity metric to evaluate image captioning models

- Proposed a semantic fidelity metric to evaluate the diversity in image captioning models without labels.
- Relative to other metrics, our proposed evaluate the predicted captions without human annotated labels.
- Presented at **Machine Learning in Real Life Workshop ICLR**, 2020

Learning to Synthesize Faces using Audio clips for Cross Modal Bio-Metric matching

- Using generative networks, proposed cross-modal biometric matching, synthesizing faces using voice.
- Similar to neurological experiments, our work demonstrates dependence of voice and face attributes.
- Presented at **TENSYP**, 2019

Fall Detection and Posture Recognition

- Proposed an end to end framework for Posture recognition and fall detection using machine learning.
- Deployed and tested the complete framework in real life using Arduino and IMU sensors.
- Presented at **ICSTEM**, 2019. Awarded the **Best Technology Award** by Govt. of India.

Research Projects

Learning to play Connect 4 using Monte Carlo Tree Search

- Using different search based algorithms to play connect 4 on kaggle environment.
- Final approach proposed using Monte Carlo Tree Search achieved score in the top 30%.

Video Based Automatic Commentary System in Cricket and Soccer

- Real-time automatic commentary system (3 classes) using deep learning architectures.
- Scraped and annotated data from Youtube videos.
- Compared the performance of 3D CNN and CNN+LSTM models for action recognition on videos.

Combinatorial Optimization Using Conditional GANs

- Bin Packing and Knap Sack Problems has a wide range of applications.
- Proposed a novel approach using conditional GANs for solving 2D rectangular bin packing.

Awards

- Awarded the **President's Gold Medal** for graduating with highest GPA.
- Received the best **Technology award** by Government of India at Vibrant Gujrat-2019 (ICSTEM-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 top 0.1 % (securing full marks) across India in standard XII exams.

Technical Skills

- **Programming Languages:-** Python, C, C++, Matlab, ROS
- **Software and tools:-** OpenCV in Python, Numpy, Scipy, Matplotlib, Carla, Git, Linux
- **Machine Learning Packages:-** Pytorch, Tensorflow, Keras.

Relevant Courses

Mathematics : Linear Algebra, Multivariate Calculus, Probability and Statistics

Computer Science : C Programming, Data Structures, Operating System, Computer Architecture

Robotics and AI : Learning & Optimization, Advance Control System, Reinforcement Learning

Online Courses : Python Programming, Deep Learning, AI for Medical Diagnosis, Algorithms

References

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