

Education

2017 – 2021 **Sardar Patel Institute of Technology**,
University of Mumbai,
Bachelor of Technology (B.Tech.) in Electronics Engineering GPA – 9.09/10.00.

Experience

- Sep 2021 - Present **Research Visitor, Mila - Quebec AI Institute**
Supervisors: Anirudh Goyal and Prof. Yoshua Bengio.
- Working on developing Modular mechanisms to induce Causal Structure in Deep Learning for improving generalization in sequential decision-making algorithms.
- Dec 2020 - Jun 2021 **Research Intern, Video Analytics Lab, Indian Institute of Science**
Supervisors: Jogendra Nath Kundu and Prof. R. Venkatesh Babu.
- Developed methods to incorporate edge detection and domain confusion in Deeplab-v2 architecture to induce domain invariant features for Domain Adaptation in Semantic Segmentation and explored Adversarial Domain Search methods for style transfer.
- May 2019 - Jul 2019 **Machine Learning Intern, Skinzy.**
- Implemented *Auto-Encoders* and data augmentation techniques using *Generative Adversarial Networks (GANs)* to obtain pretrained model for transferring useful features to the skin disease classifier for improved performance.
 - The overall accuracy *increased by 4%*, while also reducing overfitting significantly.
- Dec 2017 - Mar 2018 **Software Engineering Intern, VPS Techub.**
- Designed and implemented backend web services like *CRUD*, attendance and payment logger for a website using *laravel MVC framework*.
 - Implemented the UI and backend of a desktop application using *Java Swings*.

Projects

- Learning Multi-Level Hierarchies with Hindsight** [GitHub Link].
- Implemented a *Hierarchical goal-based Reinforcement Learning algorithm*, Hierarchical Actor Critic, as described in the paper, *Learning Multi-Level Hierarchies with Hindsight*, in *PyTorch*.
 - Reproduced results on the Mountain Car and Pendulum OpenAI gym environment.
 - Modified OpenAI gym environments to render states with sub-goals produced by the agent.*
- Proximal Policy Optimization** [GitHub Link].
- Implemented a minimal version of clipped objective *Proximal Policy Optimization* reinforcement learning algorithm for OpenAI gym environments in *PyTorch*.
 - Reproduced results on several standard reinforcement learning environments.
- Deterministic Generative Adversarial Imitation Learning** [GitHub Link].
- Formulated a training procedure based on *Generative Adversarial Networks (GANs)* for offline imitation learning to improve sample efficiency.
 - The algorithm worked for the Bipedal Walker environment with varying success.
- Twin Delayed DDPG** [GitHub Link].
- Implemented the deterministic *Value-Based Reinforcement Learning* algorithm described in the paper, *Addressing Function Approximation Error in Actor-Critic Methods*, to reproduce results on the *Roboschool (PyBullet)* and *Box2d* gym environment simulators.

Character level language modelling with RNNs

[GitHub Link].

- Implemented and trained a minimalist version of Char-RNN for character level language modelling using Multi-layer Recurrent Neural Networks (LSTM) in PyTorch.

Coursework Projects

- Jun 2020 - Dec 2020 **Offline Imitation Learning using Contrastive Methods,**
Supervisor: Prof. Rajendra G. Sutar.
- Developed an efficient offline imitation learning algorithm based on GANs.
 - Implemented the preliminary algorithm in *PyTorch* and trained it on *Google Colab*.
- Jan 2020 - Apr 2020 **Obtaining Point Cloud using Ultrasonic Sensor,**
Supervisor: Prof. Najib Ghatte.
- Designed and built a 3D point cloud constructing mechanism using ultrasonic sensor.
 - Implemented code to plot points obtained via serial communication from the micro-controller (*MSP430*) using pptk library.
- May 2019 - Jul 2019 **Regularization in Deep learning methods for Diabetic Retinopathy,**
Supervisor: Prof. Rajendra G. Sutar.
- Improved Generalization in Deep Learning based systems for diabetic retinopathy detection using transfer learning and autoencoder regularization.
 - Implemented the proposed algorithm in *PyTorch* and carried out tests on *Google Colab*.

Publications

- May 2021 **Offline Imitation Learning for Robotic Control using Contrastive Methods,**
Nikhil Barhate, Sahil Bhawe, Prathamesh Dalvi, Rajendra G. Sutar,
IEEE International Conference on Communication, Information and Computing Technology (ICCICT 2021).
- Oct 2020 **Reducing Overfitting in Diabetic Retinopathy Detection using Transfer Learning,**
Nikhil Barhate, Sahil Bhawe, Rugved Bhise, Rajendra G. Sutar, Deepak C. Karia,
IEEE International Conference on Computing, Communication and Automation (ICCCA 2020).

Skills

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| Languages | Python, C/C++, SQL |
| Frameworks | PyTorch, NumPy, Keras, OpenCV |
| Databases | MySQL, HBase |
| Utilities | Ubuntu Linux, Git, Docker, SSH, Jupyter Notebook |

Coursework

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| Database Management Systems | Data Structures and Algorithms | Operating Systems* |
| Computer Organization and Architecture | Micro-Architectures | Embedded Systems |
| Signals and Systems | Analog Electronics I & II | Computer and Communication Networks |
| Electromagnetic Engineering | VLSI Design | Power Electronics |
| Probability and Random Variables | Linear Algebra | Multivariable Calculus |
| Big Data Computing* | Machine Learning* | Deep Learning for Computer Vision* |
| Deep Reinforcement Learning* | Geometric Deep Learning* | Deep Unsupervised Learning* |

* ≡ Online