ATHARV SONWANE

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ABOUT ME

I am interested in Artificial Intelligence, specifically in the areas of deep learning, reinforcement learning and their applications in robotics. I am exploring how human like generalization and reasoning can be incorporated into reinforcement through various human learning priors.

EDUCATION

Birla Institute of Technology and Science Pilani, Goa, India *Aug 2018 - Present*
Bachelor in Engineering (Hons.), Computer Science
CGPA = 8.7 / 10

EXPERIENCE

Reinforcement Learning for Robotic Grasping *Summer 2020*
Prof G. C. Nandi, Centre of Robotics and Machine Intelligence, IIIT Allahbad

- Exploring how Deep Reinforcement Learning algorithms can be used for grasping using robotic arms
- Benchmarking performance of various algorithms.

Reinforcement Learning for Drone Automation *Summer 2020*
Research Internship at CSIR - CEERI

- Applied Deep Q learning to navigation of autonomous quadcopters. A live depth-map feed was taken as input to generate movement commands for the drone.
- Built a controller on top of the MAVROS framework and simulated the learning process using PX4 and PX4 SITL.

Prediction of Ionospheric Scintillation *Jan – May 2020*
Digital Communications Lab, BITS Pilani, Goa

- Analysis and forecasting of GNSS (Global Navigation Satellite System) signals to learn more about disturbances due to ionospheric activity using Deep Learning
- Implemented LSTM based models for both prediction and classification of signals.

Software for Robotics, Reading Course *Aug – Dec 2019*
Advisor – Prof. Neena Goveas, Dept. CS and IS, BITS Pilani, Goa

- Prepared lectures and lab exercise for an introductory robotics course.
- Designed final project around the various aspects that make up an embedded system.

PROJECTS

- **Causality in Reinforcement Learning** *July 2020 - Present*
  - Experimentation with integrating causal factors in RL algorithms.

- **Relational Inductive Biases in Reinforcement Learning** *July 2020 - Present*
  - Exploring how relational inductive biases and graph networks can be used to improve reinforcement learning algorithms.

- **Onseshot Classification using Transfer Learning** *Aug 2019*
  - Used transfer learning techniques to improve performance of a Siamese network for one shot learning on the Omniglot dataset

- **Q – Learning for some Atari Environments** *Aug 2019*
  - Experimented with using Double DQN algorithm to play Pong and Pacman gym environments.

- **Spoken Digit Classification** *Dec 2019*
  - Trained a CNN to classify audio clips of spoken digits encoded with a Short Time Fourier transform.

- **Gennav:** Autonomous delivery robot *May 2018 - Present*
  - Building a python library for robotics navigation algorithms and utilities that are commonly required in navigation stacks.
  - The library aims to be completely modular and have a unified API so that it is useable in a broad range of applications and easily extensible to new robotics domains

- **Trotbot:** Autonomous delivery robot *Sep 2018 - Present*
  - Built obstacle detection and path planning stack using Robot Operating System (ROS) in Python
  - Implemented Rapidly Exploring Random Trees (RRT) for path planning in complex indoor environments

- **Robotic Sketcher** *Jan 2020*
  - Created an automated sketching machine to produce visually appealing sketches from images.

TEACHING

- **QSTP: Robotics and Automation** *June 2020 – July 2020*
  - Created reference material and assignments for the course as well as mentoring over 100 students in introductory ROS, Control Theory, Motion Planning

- **CTE: Intermediate Robotics** *Jan 2020 – April 2020*
  - Mentor for the Intermediate Robotics Course where I guided students in motion planning and automation of robots

RELEVANT COURSEWORK

Online Machine Learning (Stanford), Convolutional Neural Networks for Visual Recognition (Stanford CS231n), Deep Reinforcement Learning (UC Berkley CS285)

Offline Graphs and Networks, Quantum Informatics and Computing, Linear Algebra, Data Structures and Algorithms, Object Oriented Programming, Probability and Statistics, Digital Design, Calculus

SKILLS

Programming: Python, C, Java, C++, Bash, Assembly, MATLAB, Rust

Frameworks and Tools: Pytorch, Keras, NumPy, Pandas, Qiskit, Git

Robotics and Embedded Systems: Robotics Operating System (ROS), rViz, Gazebo, MAVROS, PX4, Raspberry Pi, Arduino.

RESEARCH INTERESTS

Deep learning, Reinforcement Learning, Causality, Machine Perception and Robotics, Cognitive Neuroscience, Meta Learning.

EXTRA-CIRCULAR ACTIVITIES

Chief Coordinator

- *Electronics and Robotics Club (ERC)*

Core Member

- *Society for Artificial Intelligence and Deep Learning (SAiDL)*

Member

IEEE Student Chapter