

RISHABH PATRA

3RD YEAR UNDERGRADUATE

✉ rpatra.rp54@gmail.com | 🌐 hades-rp2010.github.io | 📄 hades-rp2010 | 🐦 rpatra_2010

RESEARCH INTERESTS

Reinforcement Learning, Graph Networks and Structured DL, Meta Learning, Machine Perception, Causality, Cognitive Sciences, Spiking Networks and reward Modulation

EDUCATION

Birla Institute of Technology and Sciences

Goa, India

B.E.(Hons) in Electronics and Communications engineering, CGPA - 7.96/10

Aug. 2018 – Present

EXPERIENCE

Research Fellow

Oct 2020 – Present

Maritime Research Centre, Pune | Advisor - Dr. (Cdr.) Arnab Das

- Validating and testing an ML based acoustic channel model for estimating the transmission loss between two communicating entities in the IOR
- Developing a Passive Sonar simulator, for real time ambient noise mapping of the IOR

Summer Intern

March 2018 – April 2020

Maritime Research Centre, Pune | Advisor - Dr. (Cdr.) Arnab Das

- Research on the existing underwater channel models and their feasibility of use in real time applications
- Provide Proof of concept of a ML based approach for the same, saving in computational time (faster than the current by 80x)

Prediction of ionospheric scintillation

March 2018 – April 2020

Digital Communications Lab, BITS Goa | Advisors - Abhijeet Dey and Dr. Nitin Sharma

- 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 in tensorflow for both prediction and classification of ionospheric time series data

PROJECTS

GenRL | Python Reinforcement Learning library | CODE

Aug 2020 – Present

- Collection of SOTA algorithms in Deep and Classical RL along with various utilities
- Currently contributing to various Model based RL algorithms

Low Frequency Ambient Noise mapping in the IOR

July 2020 – Sept 2020

- Performed Spectral analysis of RAW hydrophone data recorded in the IOR region
- Compared that with open sourced AIS data to compare the actual and the predicted shipping noise values

Structure and Inductive biases in Reinforcement Learning | CODE

July 2020 – Present

- Investigating how inductive biases are incorporated in various ML algorithms
- Implemented Self attention to learn relational interactions between different entities for an RL agent
- Implemented a GNN for message passing and coordination in a multi-agent setting

Simulating an LIF neuron | CODE

Jul 2020

- simulated a simple LIF neuron from scratch and plotted its responses to various inputs

Reinforcement Learning on Easy21 | CODE

Aug 2019

- Assignment of David Silver's RL course offered at UCL
- Developed an environment to simulate playing of Easy 21 (a less complicated version of black jack)
- Performed Monte Carlo control, TD Learning on this environment, plotting out the value functions

Deep Q learning on Atari Games | CODE

Aug 2019

- Experimented with DQN algorithms to play Pacman

Study of optimizers | CODE

Jan 2019

- Compared different optimizers and their rate of convergence on a simple dataset
- All optimizers coded from scratch using jax

One shot classification using Transfer learning | CODE

Jan 2019

- Used transfer learning techniques to improve performance of a Siamese network for one shot learning on the Omniglot dataset.

TECHNICAL SKILLS

Programming: Python, R, C/C++, MATLAB, Bash

Tools: Git, LATEX, Unix, VIM, AUTOCAD

Deep Learning: PyTorch, Tensorflow, Keras, NumPy, pandas, Matplotlib, jax, BINDSnet

Libraries: pandas, NumPy, Matplotlib

MENTORING AND LEADERSHIP ROLES

Core Member
Society for Artificial Intelligence and Deep Learning (SAiDL)

Oct 2020 – Present

RELEVANT COURSEWORK

Multivariate Calculus, Probability and Statistics, Linear Algebra and complex analysis, Non-linear Dynamics and Chaos, Statistical Mechanics, **Convolutional Neural Networks for Image Recognition@** (Stanford's CS231n), **Deep Reinforcement Learning@** (UC Berkeley's CS285), **Natural Language Processing@** (Stanford's CS224n), **Reinforcement Learning@** (UCL's COMPM050)
(@ = online)