Piyush **Raikwar**

Pursuing Integrated Master's

Room No. 301, BH-1, ABV-IIITM, Gwalior, India

(+91) 7507909929 | piyushraikwar555@gmail.com | piyush-555.github.io/ | Piyush-555 | piyush555

Introduction

Hi! Currently I'm in my 5th year of Integrated Master's. I like to experiment with and understand the behavior of **Neural Networks**. That includes research areas related to Generative Networks, Sparsity, Knowledge Transfer, etc. I have some research experience in **Continual/Lifelong Learning** and **Knowledge Distillation**. Some other topics that interests me are Meta-learning, Reinforcement Learning, and Evolutionary Algorithms.

As of now, I'm looking for a career in AI research, either Empirical or Applied and opportunities to help in making AI work in real world.

Education

Indian Institute of Information Technology and Management Gwalior (ABV-IIITM) *Gwalior, India*

Integrated Master's in Information Technology *2017 - 2022*

- Cumulative GPA - 7.79 / 10
- **Bachelor's Thesis: Uncertainty-guided Variational Continual Learning (U-VCL)**
  A Continual Learning method to mitigate catastrophic forgetting, based on the foundations of Bayesian approximation and Variational Inference which combines VCL with an uncertainty based parameter importance as in UCB.

Experience

Conduent Labs India (Erstwhile Xerox Research Centre India) *Remote*

Intern *August 2021 - Present*

- Working on enabling AI on edge devices, specifically compression and fast inference of Deep Neural Networks.

Indian Institute of Technology Jodhpur *Remote*

Research Intern *APRIL 2021 - July 2021*

- Worked on **Data-free Knowledge Distillation** in Deep Neural Networks under the mentorship of Prof. Deepak Mishra.
- To be specific, the goal was to transfer knowledge from a larger neural network to a smaller one without using any information about the original data distribution, thus preserving the privacy of the original samples.
- Explored topics related to Generative Networks, Mode Collapse, Mutual Information in Neural Networks, etc.

NeuralSpace *Remote*

Research Assistant *FEBRUARY 2020 - JULY 2020*

- Implemented and Experimented with several things including Bayesian Neural Networks, Uncertainty Estimation, and Gaussian Mixture Models for **Continual Learning** under the mentorship of Kumar Shridhar. The code can be found here.

Google Summer of Code'19 w/ CuPy *Remote*

Student Developer *MAY 2019 - AUGUST 2019*

- The project was done during Google Summer of Code'19 with CuPy, a NumPy-compatible array library accelerated by CUDA.
- Implemented a **'fallback mode'** for CuPy, under the mentorship of Akifumi Imanishi. The final report can be found here.
- This will automatically call the respective NumPy method if that method is not available in CuPy, while simultaneously performing data transfer between Host and Device under the hood. Even takes care of in-place operations!
- Implemented tests using **pytest & unittest**, all the while considering different versions of Python as well as dependencies of CuPy.

Projects

Wind Farm Layout Optimization

Shell.ai Hackathon

- The goal was to maximize Annual Energy Production (AEP) by placing wind turbines at ideal positions in a given area, subject to some specified constraints. [Link]
- Applied Evolutionary Strategies to tune the coordinates of the windmills.
- Reimplemented given AEP simulation model to make it differentiable, and tried gradient descent with Lagrangian to solve for coordinates.

Browse Node Prediction

- This was a 72 hr challenge. The goal was to predict the browse nodes, which are used to help customer navigate through Amazon's website and classify products to product type groups.
- The dataset specifications were: Text descriptions, 9000+ target classes, highly unbalanced, 2.9 million+ samples.
- Applied Count Vectorizer followed by Multinomial Naive Bayes. Learned to handle **Sparse NumPy/SciPy arrays** and to process data in chunks.
- Used Sentence Embeddings followed by Logistic Regression.

Avoiding Rejects

A Challenge from a delivery company

- This was a hiring challenge from a delivery company and lasted about a week. The goal was to predict whether the Delivery Executive (DE) will reject the order or not. Therefore, sending orders to the DE who is most likely to perform the delivery. Thus, reducing the time to reach the customer.
- The dataset was imbalanced and contained various timestamps, data related to order, different location coordinates, etc.
- Besides the given data, features that I created were: Time left for DE's shift to end, distance between DE's current location & customer's/DE's home location, neighbourhood, past trends, current number of orders DE has, etc.
- Modelled these features using different machine learning models, out of which tree-based models, specifically Random Forest and Gradient Boosted trees performed the best.

OpenAI Gym CarRacing

Self-motivated

- Applied **Imitation Learning** on CarRacing-v0 environment by using a neural network to map key presses to frames and other features such as speedometer, extracted from recorded gameplay. [Link]
- Also reimplemented 'World Models'by David Ha, Jürgen Schmidhuber to solve this game. [Link]
- Implemented a Lite version of original World Models by replacing VAE with PCA, and RNN with temporal feedback. [Link]

Honors & Awards

2020	**Winner**, Smart India Hackathon	*India*
2017	**Recipient** , Budding Programmer Award	*IIIT Gwalior*

Skills

ML/DL	**PyTorch** TensorFlow TensorFlow Lite Keras **NumPy pandas matplotlib scikit-learn** SciPy JAX OpenCV
Programmming	**Python pytest Flask** C/C++
Miscellaneous	**Git Docker** Linux LaTeX

Courses

Coursera	Machine Learning, **Neural Networks and Deep Learning**, Convolutional Neural Networks - Andrew Ng
Online	Information Theory, Pattern Recognition and Neural Networks - David MacKay
Coursera	Reinforcement Learning - UAlberta
Institute	**Machine Learning**, **Nature Inspired Computing, Information Theory**

College ID