Avik Pal | Sophomore Undergraduate

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avik-pal

Summary

- Undergraduate Student at the **Department of Computer Science and Engineering**.
- 1+ year experience working with **Machine Learning** models.
- 1+ year experience working with **Deep Learning** models focused on **Computer Vision**.
- Strong coding skills using **Python(1+ year), Julia(1+ year) and C(6+ months)**.

Education

Indian Institute of Technology Kanpur **2017 - Present**
Bachelor of Technology *in* ***Computer Science and Engineering*** *CPI - 9.93/10.0*

National Gems Higher Secondary School **2015 - 2017**
High School. Studied Mathematics and Computer Science *Percentage Score – 97.0%*

National Gems Higher Secondary School **2006 - 2015**
Studied Mathematics and Science *Percentage Score – 97.8%*

Publications

Fashionable Modelling with Flux
Published at 32nd Conference on Neural Information Processing Systems (NeurIPS 2018), Montréal, Canada *Link:* ***paper***
Michael Innes, Elliot Saba, Keno Fischer, Dhairya Gandhi, Marco Concetto Rudilosso, Neethu Mariya Joy, Tejan Karmali, **Avik Pal**, Viral Shah

Work Experience

JuliaLang (under NumFOCUS)
Google Summer of Code Participant *April - August, 2018*
- Worked on the development of a Deep Learning Framework **Flux.jl** in Julia.
- Main work was focused on putting together Computer Vision Models together in the **model-zoo** and **Metalhead.jl**.
- Developed working examples like **Fast Neural Style Transfer**.
- Integrated the backend with CuDNN and added more modern Convolutional Layers for faster and more efficient Neural Network Design. Achieved around **10x speed up** in performance.

New York Office, IIT Kanpur
Summer Intern *May - July, 2018*
- Part of a Machine Learning Team involved in the development of an **Online Recommendation System** which needed to be deployed on a large scale.
- Developed a **Deep Learning Model** for **automatic flagging of vulgar content**.

Skill-sets

Programming Languages: Python, Julia, C, CUDA, Java, Matlab, C++
Data Science and Numerical Computation Libraries: Numpy, Scikit-Learn, XGBoost, Pandas, matplotlib, scipy, ArrayFire
Deep Learning Frameworks: Pytorch, Tensorflow, Keras, Flux, CUDNN
Version Control: Git
Operating Systems: Linux (ArchLinux, Ubuntu), Windows
Typesetting Tools: LaTeX, Markdown

Projects – Computer Vision / Deep Learning

Deep Generative Models for Generating Visually Sparse Images
Undergraduate Research Project under Prof. Vinay Namboodiri *October, 2018 -Present*

Implementation: Python
- Working on deep generative models for **generating samples from distributions of visually sparse images** i.e. images with sparse visual detail such as architectural plans or black and white drawings of primary shapes.
- Project currently in initial stage. Presently benchmarking the Inception Score, sample quality and gradient flow in GANs trained on a synthetic dataset of randomly generated rectangles.
- Investigating techniques and architectural modifications such as **residual connections** and **attention mechanisms** for improving gradient flow.

TorchGAN
Research Framework for modelling Generative Adversarial Networks in Pytorch *September, 2018 -Present*
Implementation: Python
Source Code: torchgan
- Studied and wrote efcient implementations of several popular GAN losses such as **Minimax**, **Wasserstein GAN**, **Mutual Information Penalty**, **LSGAN**, **EBGAN**, **BEGAN**, **DRAGAN**.
- Studied and implemented GAN evaluation metrics such as **Inception Score** and **Frechet Inception Distance**.
- Created a highly customisable training loop that allows users to easily extend the framework to support their own custom architectures and losses with very little code.
- Project current has **700+ stars** on github.

Flux.jl and Supporting Frameworks
Open Source Contributions *August, 2018 - Present*
Implementation: Julia
- Added popular computer vision models to **Metalhead.jl**. Developed a clean API for transfer learning.
- Integrated **NNPACK** with **Flux** which allows using multi-core CPU to train Flux models. This has led to a **10x improvement** in training time.
- Added wrappers for some new features added in CUDNN for **CuArrays.jl**. Also implemented **CUDA kernels** for Flux Layers.

Projects – Natural Language Processing

Microsoft Code Fun Do
Machine Learning Powered Legal Assistant *March - April, 2018*
Implementation: Python & Javascript **Source Code:** *https://github.com/avik-pal/Code.Fun.Do.2018*
- Developed a machine learning powered agent to help study legal documents.
- The agent was able to effectively **summarize the entire document** and **highlight the important words** in it.
- Also a **QnA bot** was integrated with the platform which allowed easier interaction with the app. The bot used the Google Search API to recommend lawyers with prior experience to similar cases.
- The project was awarded **3rd position** in the On Campus round of Code Fun Do in IIT Kanpur.

Projects – Mathematical Optimization

InterIIT Techmeet 2018
Optimal Bidding Algorithm for Day Ahead Demand Size Management *December - January, 2018*
Implementation: Python
- Worked on developing an algorithm for efficient **day ahead Demand Side Management**.
- Used **variety of statistical models like generalized linear models for prediction of costs**.
- Used **Mixed Integer Linear Programming** & **Mixed Integer Quadratic Programming** to predict the optimal bid that was to be made.
- Was awarded the **6th position among 23 teams** at InterIIT Techmeet 2018, Madras.

Relevant Coursework

Real Analysis and Multivariate Calculus
Linear Algebra and ODE
Introduction to Computing **A***
Discrete Mathematics
Probability for Computer Science
Logic for Computer Science
Numerical Methods in Engineering **A***
Data Structures and Algorithms **
Computer Organization **
Bayesian Analysis **

** Ongoing Courses A* Exceptional Performance in Course

Awards and Achivements

- Received **Academic Excellence** from IIT Kanpur for the **Academic Year 2017**
- Ranked within **top 2%** among **0.15 million students** in **JEE Advanced, 2017**
- Ranked within **top 0.15%** among **1.5 million students** in **JEE Mains, 2017**
- Secured an **All India Rank 71** in **WBJEE (West Bengal Joint Entrance Exam) 2017**

Fields of Interest

- Artificial Intelligence
- Machine Learning & Deep Learning
- Computer Vision - Object Detection and Generative Adversarial Networks