V Pramodh Gopalan

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Academic Details

Examination	Institute	Year	CPI/%
Graduation	IIT Kanpur	2023	9.1/10.0
High School, CBSE	Ryan International School, Mumbai	2019	96.2
Secondary School, CBSE	Delhi Public School, Mumbai	2017	10/10

Scholastic Achievements

- **Academic Excellence Award** for exceptional performance in Academics at IIT Kanpur *(2020)*
- Secured **All India Rank 217** in **JEE Advanced 2019** among 230K eligible aspirants *(2019)*
- Secured **All India Rank 217** in **JEE Mains 2019** among 1.1 Million candidates *(2019)*
- Awarded the prestigious **KVPY fellowship** by Dept. of Science and Technology, Govt. of India *(2019)*
- Amongst the top students across the country to appear for the nation-level olympiads in Physics and Astronomy, **INPhO** and **INAO** respectively *(2019)*
- Participated in a training camp for appearing in **INMO**(Indian National Math Olympiad) *(2018)*
- Recipient of the **National Talent Search (NTSE) scholarship** awarded by the NCERT *(2017)*

Internships and Research Projects

Defending against Poisoning Attacks in Machine Learning
[May 2021-Ongoing]

Research Intern | Prof. Alina Oprea — *NDS2 Lab, Northeastern University*

- Working on Creating **Defenses** against **Poisoning** Attacks in **ML**, using **Ensembling**.
- **Extended** existing **implementations** of attacks to accomdate **Malware** and **Vision** Datasets, and tested the attack efficacy on them.
- Formulated a **theoretical framework**, and derived a **lower bound** on the **effectiveness** of the defense.
- Carried out **experiments** to validate the **theoretical** claims, and **visualized** the results **interactively** using libraries like **Pluto.jl** and **Makie.jl**

Image Preprocessing as an Adversarial Defense *Code Here*
[Aug 2021- Jan 2021]

Research Project | Prof. Vireshwar Kumar — *IIT Delhi*

- Briefly examined CV based navigation models for Unmanned Aerial Vehicles to determine adversarial weaknesses.
- Conducted a literature review on Defenses to Adversarial Examples from the Reading List of Nicholas Carlini.
- Implemented various **Adversarial Defenses** based on **Image Preprocessing**, such as **Blurring**, **Pixel Shuffling**, **Secret Key based Block Shuffling**

Decentralised Mechanism Design using Blockchains ***Code Here***
[Oct 2020 - Nov 2020]

Course Project CS711 | Guide: Prof Swaprava Nath — *IIT Kanpur*

- Implemented various **Sealed-Bid Auction Mechanisms** using Blockchains.
- Learned about various problems in Blockchains related to **privacy** and tackling them using modern Cryptographic Primitives like **Secure MPC**.
- Modelled a game theoretic version of privacy problem in Blockchain as **Normal Form Game** and inferred various **equilibriums** that may be present according to different applications.
- Presented an analysis of how effective the current Enigma Protocol is, and proposed an **alternative better approach** for a particular step by using **VCG Mechanisms.**

Key Projects

Model Zoo: A study in GANs ***Code Here***
[Summer 2020]

Summer Project | Programming Club — *IIT Kanpur*

- Learned about Convolutional Neural Networks in depth and implemented architectures like **ResNET** and **VGG** using **Pytorch**.
- Carried out a literature review on GANs and implemented basic **GAN** and **DCGAN** on **MNIST** and **CIFAR-10** Datasets.
- Read papers on **Context Encoders** and implemented it using Pytorch.
- Studied **Audio Generation** using **WaveGAN**.
- Created **Blogs** mentioning related Literature, along with **Results** and **Architectures**.

Cross Validated
[Summer 2021]

Summer Project | Stamatics Club — *IIT Kanpur*

- Explored various sampling methods like **Inverse Transform**,**Accept-Reject**, **Bernoulli Factories**, **Importance Sampling**, **Box-Muller** and **Ratio of Uniforms** used in Monte Carlo Algorithms.
- Studied optimization methods like **SGD**, **Newton-Raphson**, **MM** and **EM** algorithms used in estimation of parameters in MLE.
- Implemented **Probit Regression** model in **Julia** on the titanic dataset to estimate chances of survival.
- Introduced to **MCMC and MH** algorithms and topics in Bayesian Modelling such as **Bayesian Linear and Logistic Regression**

InfoSec IITK
[Feb'20 - Apr'20]
Semester Project | Association of Computing Activites — *IIT Kanpur*

- Studied various exploits such as **Binary Exploitation**, **SQL injection**, **Steganography**, and tools to use them like **gdb**, **SQL map**, **Steghide**, and **StegSolve**.
- Participated in numerous **CTF**s as a part of the project evaluation.

Technical Skills

- **Programming & Scripting Languages:** C++, C, Python, Julia, Bash, R
- **Libraries and Frameworks:** Pandas, NumPy, seaborn, scikit-learn, PyTorch, PyTorch-Lightning, Flux.jl, Tensorflow/Keras(familiar).
- **Utilities:** Git, LaTeX gcov, gtest, Markdown, Docker

Relevant Coursework

- **Computer Science:** Fundamentals of Programming, Data Structures and Algorithms, Game Theory and Mechanism Design, Computer Organisation, Software Development, Operating Systems†, Theory of Computations†, Advanced Algorithms†, Introduction to Machine Learning†
- **Mathematics/Others:** Real Analysis, Linear Algebra, Probability Theory, Logic for CS, Bayesian Analysis, Statistical Simulation and Data Analysis in R †, Introduction to Electronics.
- **Online Courses:** Reliable and Interpretable AI (ETH Zürich), Introduction to Deep Learning using Tensorflow (Coursera)

† - *Ongoing Courses*

Positions

Secretary, Programming Club
[May 2020 - Apr 2021]
Programming Club, IITK — *IIT Kanpur*

- Part of a team of 20 students responsible for holding various events to the campus community of more than over 8000 students
- Responsible for managing a Competitive Programming Competition for students of the institute for a month.
- Hold

Mentor - Julia for Machine Learning
[Apr 2021 - Jul 2021]
Association for Computing Activities, IITK — *IIT Kanpur*

- Introduced Julia, A High Performance Language to about a group of 30 students.
- Delivered Lectures on various aspects of Julia, Such as Multiple Dispatch, Type Inference, MetaProgramming and Loop Fusion.
- Introduced them to fundamental concepts in Machine Learning such as Probability and Statistics, Different modes in Automatic Differentiation, Gradient Descent.

Student Guide
[Nov 2021-May 2021]
Counseling Service — *IIT Kanpur*

- Mentored six freshmen throughout their first year and exposing them to academic and extracurricular opportunities available in the Institute.