V Pramodh Gopalan

Fourth Year Undergraduate, IIT Kanpur, Department of Computer Science and Engineering
pramodh@cse.iitk.ac.in | +91-7400047180 | Pramodh-G | pramodh-gopalan-2617231ba

Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2019 - 2023	B.Tech in Computer Science and Engineering	Indian Institute of Technology, Kanpur	9.2/10
2019	Class XII (CBSE)	Ryan International School, Sanpada	96.2%
2017	Class X (CBSE)	Delhi Public School, Navi Mumbai	10/10

Scholastic Achievements

- **Academic Excellence Award** for being in top 10% students in dept. for **three consecutive years** *2019-21*
- **All India Rank 217** in **JEE Advanced** among 230k shortlisted candidates, conducted by IIT Roorkee *2019*
- **All India Rank 217** in **JEE Mains** among more than 1.2 million candidates, conducted by the CBSE *2019*
- **KVPY-SX Fellowship**, securing **All India Rank 624** among 50,000 candidates, conducted by IISc Bangalore *2018*
- Qualified the **Regional Math Olympiad** and attended **INMOTC** for being in the top 1% among 55,000 candidates *2017*
- **NTSE Scholarship**, awarded to top 1000 among 1 million candidates, Government of India *2017*

Experience

MITACS research intern, *Université de Montréal* *May 2022 - July 2022*
Mentor: *Prof. Fabian Bastin, Uncertain Lab* `Github`

- Examined usage of **retrospective approximation** in **stochastic optimization** to improve upon **SGD** and **L-BFGS**
- Constructed statistical stopping tests based on **common random numbers** for automated termination of the algorithm
- Tested the retrospective algorithm on **synthetic datasets** with **custom L-BFGS** solver written in **julia**
- Concluded that the algorithm **outperforms** L-BFGS with the number of gradient calls as a metric

Undergraduate research intern, *Northeastern University* *May 2021 - June 2022*
Mentor: *Prof. Alina Oprea, NDS2 Lab* `Report`

- Designed **defenses** against **poisoning attacks** in ML using **randomized feature selection** and **ensembling**
- Worked with existing code base to **extend attacks** to **Drebin** and **MNIST** datasets and tested **attack efficacy** on them
- Modeled a **theoretical framework** for the defense, derived **lower bound** on test time accuracy under attack settings
- Conducted **experiments** on above datasets, visualized results with **Pluto.jl** and **corroborated** it with theoretical results

Projects

Stochastic Gradient Barker Descent(SGBD) *Jan 2022 - April 2022*
Undergraduate Project, *Prof. Dootika Vats, Statistics Dept., IIT Kanpur* `Github`, `Report`

- Developed a novel, approximate MCMC technique robust to tuning parameters while being effective as **SOTA methods**
- Evaluated SGBD on the **arrhythmia dataset** and **constrained support systems**; Inferred it outperforms **SGLD** when used in **non-optimal** settings, with **kernel stein discrepancy** and **effective sample size** as metrics

Parallel Programming *Jan 2022 - April 2022*
Course Project, *Prof. Mainak Chaudhuri, CSE, IIT Kanpur* `Github`

- Implemented several software locks like **test** & **test** & **set**, **array locks** without **false sharing** using **cmpxchg** instruction
- Optimized **GPU Algorithms** for **Gauss-Seidel solver** and **matrix vector product** using **shared memory**
- Implemented **parallel algorithms** while accounting for **cache effects** in **lower triangle solvers** using **OpenMP APIs**

Building GemOS *Aug 2021 - Nov 2021*
Course Project, *Prof. Debadatta Mishra, CSE, IIT Kanpur*

- Designed **system calls** for **pipe** and **persistent pipe** structures for sharing data between multiple processes
- Devised thread **join**, **exit** and **create** system calls to develop a library of **threading APIs** with **private memory areas**

Technical Skills

Programming: C, C++, Python, Julia, R
Utilities: Git, LaTeX, Bash
Exposure: Verilog, Go, TensorFlow
Machine Learning: PyTorch, PyTorch Lightning, Scikit-learn, Flux.jl

Relevant Coursework

Operating Systems	Parallel Programming	Deep Learning for Computer Vision
Introduction to Machine Learning	Bayesian Analysis	Statistical Simulation and Data Analysis
Advanced Algorithms	Programming for	Computer Organization

Positions of Responsibility

Secretary, Programming Club IIT Kanpur *May 2020 - May 2021*

- Organized regular lectures, workshops and contests to inculcate the programming culture in campus
- Responsible for managing Competitive Programming Competition for students of the institute