

# V Pramodh Gopalan

Fourth Year Undergraduate, IIT Kanpur, Department of Computer Science and Engineering

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## 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

**Exposure:** Verilog, Go, TensorFlow

**Utilities:** Git,  $\LaTeX$ , Bash

**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 Performance

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