Pranav Jangir

+1-201-887-9128 | pj2251@nyu.edu | linkedin.com/in/pranavjangir

Education

NYU Courant Institute of Mathematical Sciences

*Masters in Computer Science with GPA - **4.0/4*** *August 2022 – Present*

- Key Courses: Deep Learning, Honors Analysis of Algorithms, Programming Languages, Operating Systems, Algorithmic Game Theory

Indian Institute of Technology, Guwahati

*Bachelor of Technology in Mathematics and Computing with GPA - **9.12/10*** *July 2016 – July 2020*

- Key Courses: Discrete Mathematics, Modern Algebra, Data Structures and Algorithms, Game Theory, Optimization, Theory of Computation, Matrix Computations, Advanced Probability & Random Processes, OS, Networks, Databases, Computer Architecture

Industry Experience

Google - Ads Quality **August 2020 – March 2022**

Software Engineer *Bangalore, India*

- Worked on improving ads quality and coverage for low resource languages like Hindi and Polish that had significantly high query traffic but low ads coverage. Project Impact: +$300 Million per year in revenue
- Incorporated translated signals in the ads serving flow as additional signals and modified ads retrieval and scoring models to score and filter irrelevant ads in the translated space. Wrote efficient C++ in a multi-threaded environment to minimize CPU cost and keep latency increase less than 0.3 ms
- Joint work with Google research team to build translation quality scorer using decision trees
- Trained and validated new translate models designed specifically to increase Ad revenue by A/B testing against production models

Tower Research Capital - Post Trade Division **May 2019 – July 2019**

Software Engineer Intern *Gurugram, India*

- Developed a semi-automated Machine Learning pipeline for extracting tabular data out of PDF/text files
- Utilized Self-organizing maps to cluster similar looking pdf lines. The clusters help in visualizing and quickly soft labelling the data for training model. Used XGBoost to attain precision and recall of 88% and 96% respectively

Research Experience and Publications

Fast Filter Subset Scan for Anomalous Pattern Detection **March 2023 – Present**

Prof. Daniel Neill, Associate Professor, Computer Science, Machine Learning for good lab *NYU Courant*

- Designing new methods for fast and scalable detection of anomalous patterns in massive, multivariate datasets
- Focusing on real-world application domains where one must detect complex, subtle, and probabilistic patterns that are difficult to spot with existing techniques, such as an emerging disease outbreak or a pattern of smuggling activity [GitHub (Work in progress)]

Algorithmic Game Theory **Jan 2023 – Present**

Prof. Richard Cole, Professor, Computer Science *NYU Courant*

- Studying auction mechanisms where algorithmic game theory can be used to design efficient and fair mechanisms for allocating goods or services among self-interested agents.
- Studying matching algorithms for healthcare, where algorithmic game theory can help design efficient and fair mechanisms for matching patients with doctors, hospitals, or organ donors.

Secure Machine Learning and Data Analysis **December 2021 – August 2022**

Dr. Arpita Patra, Associate Professor, Department of CSA *Indian Institute of Science*

- Designed an algorithm that solves Private Heavy Hitters problem and beats the current state of the art Poplar in running time by 10x. Poster Titled "Vogue: Faster Computation of Private Heavy Hitters" accepted at ACM CCS'22 [Paper] [GitHub]
- Implemented State of the art multiplication triples verification using Distributed Zero Knowledge proofs and other primitives like SecureML Truncation and MPC friendly activation functions [GitHub]
- Implemented "SWIFT", a maliciously secure 3 party MPC in the pre-processing paradigm and used it to implement various Deep Neural Networks like LeNet and VGGNet for benchmarking [GitHub]

Space Efficient Graph Algorithms **January 2019 – April 2019**

Dr. H. Ramesh, Assistant Professor, Department of Mathematics *IIT Guwahati*

- Designed In-place algorithms for maximal matching in bipartite graphs and Single Source Shortest Path problem with time complexity $\mathcal{O}(nm)$ and $\mathcal{O}(m + n \log n)$ respectively, using just $\mathcal{O}(\log n)$ extra space

Selected Projects

Future video frames prediction | *Deep Learning* **Spring 2023**

- Given first 11 frames of a video, predict the next 11 frames. The videos contain 48 kinds of 3D shapes that move and collide.
- Trained a video predictor model on large amount of unlabelled data using semi-supervised learning techniques and finetuned on smaller set of labelled data.
- Applied decision trees based heuristics on top of the video predictor model to reduce noise in the predictions. Achieved a jaccard score of 44%.
- Won first place in Deep Learning course final competition [GitHub]

Verkle Trees benchmarking | *Cryptocurrencies and Decentralized ledgers* **Fall 2022**

- Implemented Verkle, Patricia-Merkle, and Binary-Merkle in C++. Compared the proof sizes, proof generation time, and proof verification time for varying key sizes for all the three trees.
- Compared two vector commitment schemes KZG and IPA in our Verkle Trees. For each of them, we compare multiple width versions of them. [Report] [GitHub]

Real time Bus Routing Algorithm | *Inter IIT Tech Meet 2019* **Oct. 2019 – Dec. 2019**

- Developed a heuristic algorithm for the NP-Hard School Bus Routing Problem (SBRP) in dynamic edge weight graphs
- Implemented metaheuristic Tabu search algorithm to get the initial routes. On edge weight change, applied genetic algorithm to converge to a new solution, which converged rapidly in few iterations [GitHub]

PintOS | *Operating Systems Lab, IIT Guwahati* **Sep. 2018 – Nov. 2018**

- Implemented a multi-level feedback queue scheduler, system calls for user programs and virtual memory management module for an instructional operating system framework - PintOS

Achievements and Leadership

Google: Awarded 2 spot bonuses & 3 peer bonuses for leading the project and helping engineers onboard. Consistently rated "Strongly Exceeds Expectations" in performance reviews.
Academics: AS(Outstanding) grade in *Combinatorics* and *Formal Languages and Automata*
ACM ICPC 2022: Team ranked 25thth in Greater New York Region, Team name : NYU-Oorike
Topcoder / Codeforces: Div.1 in Topcoder and Codeforces with ELO rating of 1624 (yellow) and 2023 resp.
Inter IIT Tech Meet 2019: Represented IIT Guwahati in the event - BOSCH Route Optimization and won Gold Medal amongst 19 participating IITs for designing approximate solution for a variant of NP-Hard Bus Routing Problem
Google Kick Start: Ranked 36th globally in Google Kick Start Round F 2019 and 58th globally in round G 2019
Intern Host: Guided an intern in summer 2021 to work on improving translation models which lead them to receive a return offer from Google