Sagnik Dey

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Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2017 - Present	B.S	Indian Institute of Technology, Kanpur	8.52/10
2017	CBSE(XII)	Delhi Public School, Navi Mumbai	93.8%
2015	CBSE(X)	Delhi Public School, Navi Mumbai	9.8

Scholastic Achievements

- Granted a branch change to Mathematics department on the basis of academic performance.
- Among **15 students** selected out of 400+ for **Advanced Track Course** in ESC101 course for **C programming**.
- Secured **All India Rank 2549** in **JEE Advanced 2017** among the 1.7 Lakh shortlisted candidates.
- Secured **All India Rank 989** in **JEE Mains 2017** among the 12 Lakh candidates.

Work Experience

- **Software Engineer, Walmart Labs** (*Apr'20 - July'20*)
  Mentor: Sathyanarayanan Jambunathan, Senior Manager II, Software Engineering at Walmart Labs.
  - Made a **Java webapp** that fetches order details from an API according to given parameters and feeds the result into an **ElasticSearch**(ES) database linked to **Kibana** for generating useful visualizations.
  - Made a **python script** that crawls through log files based on a schedule to find and organise relevant data. This is again fed into an ES database through a Java webapp.
  - Both webapps were deployed on a virgin **VM** accessed via **SSH**, requiring setting up of various necessary software on the VM.
  - Added a module to perform **JDBC queries** on an Oracle database on an existing Walmart project. Was working on a streaming function to enable downloading fetched data as a CSV before intern ended.
- **Google Summer of Code Participant** (*May'19 - August'19*)
  Organization: Boost C++
  - Worked on the library Boost.Real which is a C++17 library, attempting to get rid of untracked errors brought about due to truncation in floating point arithmetic by using range arithmetic.
  - Changed the number base used internally from decimal to INT_MAX for optimal space usage when storing numbers as vectors of digits. Redesigned all tests to better address the library functionality after internal representation changes.
  - Added **templating** to the entire library to enable custom variable type for internal real number representation.
  - Contributed towards several bug fixes in adding division operation to the library.
  - Added user defined literal functionality for declaring objects of type Boost.Real.
  - Final report on my github page.
- **Full Time Development Intern, IITK NYC Office** (*May'18 - July'18*)
  Mentor: Prof. Manindra Agrawal, Department of Computer and Science and Engineering.
  - Worked on the backend of a **scalable** web application using **Scala** language with **Akka http** library.
  - Led a team of 4 members during the course of the internship.

Projects

- **Low Rank Matrix Approximations and Algorithms** (*May'19 - June'19*)
  Mentor: Sumit Ganguly, Department of Computer and Science and Engineering.
  - Read up on and implemented **sampling algorithms** for **matrix approximations**.
  - Implemented **length squared sampling based** matrix multiplication.
  - Implemented **CUR method** for matrix sketching.
  - Implemented **low rank approximation** of matrix using sampling algorithms.
- **Personal Audio** (*Dec'18 - July'19*)
  Mentor: Rajesh M. Hegde, Department of Electrical Engineering
  - Aim: To implement adaptive equalization methods to create acoustic contrast controlled personal audio zones.
  - Implemented a generalized **Kalman Filter** for the estimation of channel response in dynamic scenarios.
  - Implemented **BACC** approach to estimate inverse filters for personalized audio zone creation.
- **Scrabble Game** (*Jan'18 - April'18*)
  Project under **Advanced Track** for **ESC101** course
  - Implemented GUI based scrabble game.
  - Algorithmic computer player of three difficulties with greedy selection of current best word.

Technical Skills

- **Programming Languages:** C, C++, Java, Python, MATLAB, CUDA
- **Other Skills:** git, LaTeX

Extra - Curriculars

- **Secretary at Book Club, IIT Kanpur**

Relevant Courses

Introduction to Programming (A)	Probability and Statistics (B)
Data Structures and Algorithms (A)	Complex Analysis (B)
Modern Cryptology (A)	Time Series Analysis (B)
Programming for Performance (A)	Algorithms-II (B)
Parallel Computing (*)	Analysis of Concurrent Programs (*)
Online Courses	
Machine Learning (Coursera Certificate)	I/O-efficient algorithms (Coursera Certificate)
Deep Learning Specialization (Coursera Certificate)	Parallel, Concurrent, and Distributed Programming in Java Specialization (Coursera Certificate)

(*) = ongoing

Undergraduate Projects

- **Visualizing MPI performance on the fly** (*August'20 - ongoing*)
  Mentor: Preeti Malakar, Department of Computer and Science and Engineering.
  - Extending the functionality of library **mpiP**, developed by **LLNL**, to generate reports intermittently, as controlled by a server.
  - Written a **python** script that converts the reports generated into usable csv format on the fly.
  - Working on a **JavaScript** Library based on the **D3** library that presents the profiling data from the csvs as useful **visualisations**.
- **Data Race Detection on GPUs** (*Dec'20 - ongoing*)
  Mentor: Swarnendu Biswas, Department of Computer and Science and Engineering.
  - Exploring whether existing **race detection** techniques can be applied to the **GPU** context.
  - Trying to implement software only versions of existing hardware based race detectors for **GPU** such as **ScoRD**.
  - Implemented a script using the python API of **gdb**, to instrument memory accesses from both host and kernel.
  - Looking into data races caused by newer programming models such as **CUDA** streams and Intel's Unified Shared Memory Model.