Dayal Kumar

Senior Undergraduate | Mathematics and Computing, IIT Delhi

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Degree/Board	Institute	Year	GPA/Marks%
B.Tech in Mathematics and Computing	Indian Institute of Technology, Delhi	2020-Present	8.9
CBSE/AISSCE (XII)	Delhi Public School, Ranchi	2020	97.8
CBSE/AISSE (X)	DAV Public School, Baharagora, JH	2018	93.0

SCHOLASTIC ACHIEVEMENTS

- **JEE Mains & Advanced**: **State Rank 1** in JEE Mains with **100 Percentile in Physics** and **AIR 151 (GE)** among 1.1 million candidates, **AIR 259 (GE)** in JEE Advanced among 200,000 candidates
- **OCSC for IOAA**: Among the **top 50** students selected for Orientation-Cum-Selection-Camp for International Olympiad on Astronomy and Astrophysics (IOAA) based on performance in the **Indian National Astronomy Olympiad (INAO)**
- **KVPY**: Cleared Kishore Vaigyanik Protsahan Yojana scholarship twice with **AIR 602** (SA 2018-19) & **AIR 474** (SX 2019-20)
- **Semester Merit Award**: Received Semester Merit Award for being in **top 7%** in the branch in 1st semester from IIT Delhi

INTERNSHIPS

- **Embedded Software Engineering Intern** | ***Texas Instruments, Bangalore*** *(May'23-Jul'23)*
  - Project: **Evaluation and Benchmarking of C7000 Family of Digital Signal Processors for Future RADAR Devices**
  - Designed and Implemented algorithms for **Matrix Multiplication and Inversion, Local Maxima in a Matrix, Constant False Alarm Rate (Ordered Statistic & Cell Averaging)** to compare the performance of C7x with alternatives
  - Designed **parallel algorithms** using the *Streaming Engines, Streaming Address Generators, specialized instructions, Vectorization and Software Pipelining* for Digital Signal Processing using the C7x architecture
- **Web Developer Intern** | ***Mushin Innovation Labs, Delhi*** *(Jun'22-Jul'22)*
  - Created **NodeJS script to backup data** from MongoDB servers to AWS S3 maintaining a fixed number of backups
  - Added feature to capture changes in parameters in the product lifecycle to **automatically create a revision history**
  - Added features to an open and free **HTML to Excel Parser** saving $1000 for a license of a proprietary alternative
  - Led the team of three to ideate the transition from One-Codebase-One-Client to One-Codebase-Multi-Client model.
  - Explored native javascript and React JSX features to create generic HTML tables and forms retaining customization

COURSE PROJECTS

- **Operating System Components** | ***Operating Systems (Prof. Minati De)*** *(Aug'23-Present)*
  - **Shell**: Designed and implemented a shell program to run *system and custom commands*, with support for **piping**
  - **Scheduler**: Designed prototype for a scheduler to evaluate *First-In First-Out, Shortest Job, Shortest Time-to-Completion, Multi-Level Feedback Queue* strategies against processes generated from different probability distributions
  - **Memory Management Unit**: Designed a **dynamic memory management** library for programs written in C
- **DSCoin Cryptocurrency** | ***Data Structures & Algorithms (Prof. Venkata Koppula)*** *(Sep'21-Nov'21)*
  - Built a cryptocurrency and the software for processing transactions, managing wallets for members efficiently
  - Implemented a **mining infrastructure** which eliminates malicious blocks by distributed concensus among its nodes
  - **Authenticated Tree** serves as the underlying Blockchain where each transaction block consists of **Merkle Trees** to provide an efficient *proof of membership* of a transaction which scales *logarithmically* to the number of transactions
- **Machine Learning Models Implementation** | ***Machine Learning (Prof. Parag Singla)*** *(Aug'22-Oct'22)*
  - Implemented Linear Regression, Logistic Regression (using Newton's Method), Gaussian Discriminant Analysis (linear and quadratic boundaries), Naïve Bayes, Support Vector Machines (different Kernels) and Artificial Neural Networks **from first principles using Numpy** and trained on different datasets with hyperparameter tuning
- **Search Engine** | ***Data Structures & Algorithms and Linear Algebra (Personal Project)*** *(Jul'22-Jul'22)*
  - Used **Tries** to index the pages and **PageRank algorithm** to generate rankings among all the possible search results
  - Used *Power method* to generate PageRank vector as the **eigenvector** of the matrix of hyperlinks between webpages
- **Restaurants Near Me** | ***Data Structures & Algorithms (Prof. Venkata Koppula)*** *(Nov'21-Nov'21)*
  - Created a **2-D tree** data structure to support efficient **range search** (find all points contained in a query rectangle)
  - Traversal using depth first search with worst case time complexity of $O(\sqrt{n})$ where n is the number of restaurants

TECHNICAL SKILLS & RELEVANT COURSES

- **Programming & Scripting Languages**: C, C++, Java, Javascript, MATLAB, Python, LaTeX
- **Frameworks & Tools**: ReactJs, NodeJs, FreeCAD, Linux, Git, NeoVim
- **Competitive Programming**: Rated Expert (1600+) on Codeforces
- **Relevant Courses**: Data Structures & Algorithms, Discrete Mathematical Structures, Analysis & Design of Algorithms, Computer Architecture, Operating Systems, Theory of Computation, Optimization Methods, Algebra, Combinatorics, Game Theory, Linear Algebra, Real and Complex Analysis, Number Theory, Functional Analysis, Data Mining, Statistical Methods, Embedded Systems, Digital Electronics, Econometric Methods, Differential Equations

TEACHING EXPERIENCE

- **Teaching Assistant** | ***Discrete Mathematical Structures (Prof. Amitabh Tripathi)*** *(Jul'23-Present)*
  - Outline of the course: Logic, Set Theory, Number Theory, Abstract Algebra, Combinatorics and Graph Theory
  - Conducted weekly tutorial sessions, graded examinations and assisted the instructor in preparing lecture notes