

Divij Khaitan

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TECHNICAL SKILLS

Languages: Java, Python, C, SQL, JavaScript, HTML/CSS, R, \LaTeX
Frameworks: React, Express, TensorFlow/Keras, PyTorch
Developer Tools: Git, Docker, VS Code, Shell scripting
Libraries: Pandas, NumPy/Scipy, Matplotlib, OpenCV, NetworkX, Scikit-Learn

EDUCATION

Ashoka University Sonapat, Haryana
Diploma in Advanced Studies and Research in Computer Science Aug. 2024 – May 2025

- Relevant Coursework: Advanced Algorithms, Quantitative Finance
- Undergraduate Thesis: Robustness of Deep Neural Networks (Advisor: Prof. Subhasis Banerjee)

Ashoka University Sonapat, Haryana
Bachelor of Science with Honours in Mathematics and Computer Science, Magna Cum Laude Aug. 2021 – May 2024

- CGPA: 3.81/4.0 (95%), highest GPA for Mathematics and Computer Science
- Relevant Coursework: Linear Algebra and Matrix Analysis, Numerical Algorithms and Optimisation, Elementary Differential Geometry, Graph Neural Networks for Single Cell Biology, Geometric Deep Learning for Genomics

EXPERIENCE

Research Assistant May. 2024 – Present
Centre for Data, Learning and Decision Sciences Sonapat, Haryana

- Conducted comprehensive statistical analysis of weather data to identify trends and extreme values in python
- Trained time series models including CNNs and Transformers to enhance skill of heatwave forecasting using torch
- Evaluated anomaly detection algorithms and techniques on graph structured data for identifying financial fraud
- Implemented portfolio optimisation methods including mean-variance and Sharpe ratio minimisation strategies and backtested the returns using seven historical datasets with upto 20 years of data and 1300+ stocks using jax

Undergraduate Research Assistant Dec. 2023 – Feb 2024
Koita Center for Digital Health - A Sonapat, Haryana

- Built and fine-tuned deep learning models including U-Nets for the segmentation of 3D medical images in torch
- Trained ML models including SVMs and MLPs for the regression and classification of 3D medical images, leading to a 12% skill score improvement
- Constructed docker images for the deployment of the models to a remote platform for testing under constraints
- Engineered features by analysing cell networks present in 100X histopathology images, improving accuracy by 10%

Student Researcher Sep. 2023 – Dec. 2023
Ashoka University Sonapat, Haryana

- Engineered graph-based models to predict single cell differential expression given a categorical variable
- Implemented deep generative models for the imputation of single cell perturbation data for DE analysis
- Automated differential expression analysis for almost 150 different groups using python, R and bash

Undergraduate Research Assistant May 2023 – Aug. 2023
ML2CT, Ashoka University Sonapat, Haryana

- Wrote and deployed code to profile memory and time consumption during training and inference for a 110 million parameter model on 6.7 million datapoints on an HPC cluster and a workstation to benchmark the hardware
- Built models for protein sequences using transformer architectures originating from NLP written in tensorflow and pytorch to predict functional annotations
- Fine-tuned transformer-based models for DNA promoter sequences to predict gene expression

TEACHING

Teaching Assistant

Aug. 2023 – Dec. 2023

Ashoka University

Sonepat, Haryana

- Assisted Professor Rajendra Bhatia with the course Linear Algebra and Matrix Analysis
- Held weekly office hours and graded assignments for a class of 15 students
- Taught weekly discussion sections to solve problems and clear student doubts

Teaching Assistant

Aug. 2024 – Dec. 2024

Ashoka University

Sonepat, Haryana

- Assisted Professor Subhamoy Maitra (ISI Kolkata) with the course Data Structures
- Held weekly office hours, graded assignments and helped with the preparation of exams for a class of 35 students
- Taught specialised topics and solved problems in weekly discussion sections

Teaching Assistant

Jan. 2024 – May. 2024

Ashoka University

Sonepat, Haryana

- Assisted Professor Partha Pratim Das (IIT Kharagpur) with the course Discrete Mathematics
- Held weekly office hours, graded assignments and helped with the preparation of exams for a class of 160 students
- Taught topics such as graph theory, finite automata, modular arithmetic and combinatorics in discussion sections of 20 students

PROJECTS

Big Number Package | *Python*

April 2022

- Developed a toy package for handling big numbers in python from scratch for cryptographic applications
- Implemented the basic arithmetic operations of addition, subtraction, multiplication and division for a custom number representation
- Wrote various algorithms such as the extended greatest common divisor algorithm, modular exponentiation and the miller-rabin using the given arithmetic system
- Built a simple RSA encryption scheme on top of the given number system for encrypting and decrypting messages

Consistent Hash | *C*

December 2022

- Built a consistently-hashed binary search tree of linked lists from scratch in C
- Wrote code for various algorithms corresponding to the dynamic addition, deletion and shifting of nodes and keys for this data structure commonly used in load balancing for distributed services

RandNLA | *Rust*

Ongoing

- Implemented randomised algorithms for numerical algebra and translated portions of an existing codebase from C++ to Rust
- Identified relevant literature that presented algorithms with a suitable trade-off between performance and accuracy
- Wrote automated tests and used github actions for continuous delivery

Latent Semantic Indexing and Eigenfaces | *Python, Numpy*

October 2023

- Created and cleaned a private dataset of around 200 images taken from an assortment of acquaintances
- Programmed the Eigenfaces algorithm for face recognition and tested it on the same dataset to achieve a test accuracy of 93%
- Implemented a latent semantic indexing scheme using singular value decomposition for information retrieval on a library of 20 textbooks from the fields of Computer Science and Mathematics

Overfitting of Deep Neural Networks | *Python, Numpy, Torch, Scipy, OpenCV*

Ongoing

- Investigating the phenomenon of overfitting in deep neural networks
- Currently trying to formalise the idea of overfitting and create a framework to detect it

AWARDS AND HONOURS

Dean's List: Monsoon 2021, 2022, 2023, Spring 2023 (CGPA ≥ 3.65 , no pass/fail)

Academic Excellence Award in Mathematics: Best graduating student from the Mathematics Department

Magna Cum Laude, Ashoka University: Second highest graduating honours awarded by Ashoka University, only student from Computer Science and Mathematics to receive it in my batch

Silver Award, HKIMO: Finished 97th in the world in the Hong Kong International Math Olympiad 2020