Ananjan Nandi

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Education

Bachelor of Technology in Computer Science and Engineering — **CGPA 9.84/10**
Indian Institute of Technology Delhi (IITD) — 2019 - 2023

Central Board of Secondary Education (Class XII) — **96%**
Bhagat Public School, Kota — 2019

Central Board of Secondary Education (Class X) — **CGPA 10/10**
Birla High School, Kolkata — 2017

Professional Experience

D. E. Shaw India Private Limited (Front Office Tech) — **June - July 2022**
Technical Intern (Strategy Tech) — *Hyderabad, India*

- Evaluated performance under high concurrent request load of uWSGI and ASGI based internally developed frameworks for API development and deployment.
- Identified an issue related to Python's Global Interpreter Lock causing significant slowdown in FastAPI's handling of concurrent requests to synchronous methods, and implemented a workaround using Dask
- Optimized calculation of Value at Risk metrics from large files using Dask and Joblib for concurrency and shared_memory for eliminating read latency from disk, achieving more than 10X speedup over pure NumPy code.

Projects

Neuro-Symbolic Knowledge Base Completion — **May 2022 - Ongoing**
Prof. Mausam, Prof. Parag Singla (IIT Delhi)

- Working on ways to combine symbolic rule learning with neural embedding based approaches to improve upon existing methods for knowledge base completion and reasoning on knowledge graphs.
- Showed utility of abduction and rule inversion as rule augmentation techniques for Neuro-Symbolic Knowledge Graph models, with up to 25% MR and 4 point MRR gains over base models with no additional training required.

Land Cover Classification from Satellite Data — **January 2022 - Ongoing**
Prof. Aaditeshwar Seth (IIT Delhi)

- Using satellite time series data from Google Earth Engine to perform pixel-level land cover classification on top of exising spatial classifiers (IndiaSat) in order to get more informative classes as part of a community mapping app.
- Obtained F1-Score above 0.95 for the classification of the greenery class into farmland and forest without significant increase in training or prediction time using a Time Series Forest based classifier.
- Currently working on similar classification of other classes, such as identification of cropping cycles from cropland.

Graph Coarsening for Graph Neural Networks — **September-December 2021**
Prof. Sandeep Kumar (IIT Delhi)

- Worked on developing a framework to directly learn coarse graph representations for given data without compromising on accuracy while further training GNNs on the resulting graph.
- To provide a theoritical basis, ensured spectral guarantees by devising objectives for the graph Laplacian.

Policy Learning for the Taxi Domain Problem — **November 2021**
Course Project (Prof. Rohan Paul)

- Implemented offline and online policy learning methods to control a taxi that can pick up and drop passengers in a grid world, formulated as an MDP.
- Used algorithms such as Value and Policy iteration, Q-Learning and SARSA and evaluated their performance.

Text Extraction from Rotated Images **November 2021**

Course Project (Prof. Parag Singla)

- Used a CNN encoder and RNN decoder to localize unrelated text embedded in rotated images and extract them.
- Utilized techniques such as teacher forcing, beam search, Attention and LSTMs in PyTorch for implementation.

Constrained Order Prophet Inequality **February-May 2021**

Mini Project (Prof. Ashish Chiplunkar)

- Tried to find the constrained order prophet ratio under forward and reverse order with variable thresholds.
- Derived a bound for the 3 variable case and showed that this bound can be improved in the general case.

Multiplayer Game **April 2021**

Course Project (Prof. Rijurekha Sen)

- Created a multiplayer PvPvE top-down shooter with features such as enemy loot drops, manually animated sprites, event driven sound and escalating game difficulty.
- Used SDL as the game engine and sockets to implement a multiplayer server using TCP for networking.

Traffic Density Estimation **March 2021**

Course Project (Prof. Rijurekha Sen)

- Used OpenCV to process video from a traffic intersection and estimate stationary and dynamic densities of traffic.
- Utilized homography, optical flow and background subtraction with noise removal to perform the computation.
- Utilized multithreading with pthreads to speed up processing of the video.

Academic Achievements

- Secured All India Rank **73** in General category in **JEE Advanced** 2019 among 0.24 million candidates.
- Secured All India Rank **100** in General category in **JEE Mains** 2019 among 1.2 million candidates.
- Secured a score of **338/340** (170 - Quantitative, 168 - Verbal) in the **Graduate Record Examinations** organised by ETS .
- Secured a score of **118/120** in the **Test of English as a Foreign Language** organised by ETS .
- Department Rank **4** in a batch of 104 students (Department of Computer Science, IIT Delhi).
- Awarded the **Endowment Merit Scholarship** for 2022-23 by the IIT Delhi Endowment Fund as part of the top **15** best performing male students in the batch of 2019 entry students.
- Received the **Top 7% Merit Prize** for Semesters 1, 2 and 5 (**3/5** sems) from IIT Delhi with **10 CGPA**.
- Pursuing a **Specialization** in Data Analytics and Artificial Intelligence alongside major degree, with **10 CGPA** so far.
- Selected in the Indian team for the **Asian Physics Olympiad** 2019 among top **5** students.
- Selected for the Indian Team Selection Camp for the **International Physics Olympiad** 2019 among top **35** students.
- Secured All India Rank **144** in the **Google Hash Code Qualifiers** 2021 with team Breaking Code.
- Awarded the **KVPY** Fellowship with AIR **78** in SA stream and **NTSE** Scholarship by Government of India.

Technical Skills

Received certificates for completing the following courses from **Coursera**: Natural Language Processing with Probabilistic Models, Natural Language Processing with Classification and Vector Spaces, Fundamentals of Reinforcement Learning, Sample-based Learning Methods, Neural Networks and Deep Learning, Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization, Convolutional Neural Networks and Sequence Models

Languages	Python, C++, Java, SML, Prolog, VHDL, MIPS, HTML, JavaScript, Bash, LaTeX
Tools and Libraries	Git, Vim, Jupyter, Keras, PyTorch, Sklearn, Sktime, Tslearn, Dask, FastAPI, AsyncIO, concurrent.futures, Joblib, shared_memory, OpenMP, MPI, NumPy, Pandas, SDL

Positions of Responsibility

- Table Tennis - Vice Captain — Zanskar House, IITD (2021 - present)
- Academic Mentor - Intro. to Computer Science — BSW, IITD (Semester 2, 2020-21)

Extracurricular Activities

- **International Rank 1** in the **International English Olympiad** — 2017
- Recipient of the 5th **Scholarship of Excellence in English** from the Science Olympiad Foundation — 2015-16
- **4th** Rank in the National Level Pre-Finals of the **Wiz National Spell Bee** — 2011-12
- Selected as an **Atmadeep** Young Scholar by the Times of India group — 2013,2014,2015,2016