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Ananjan Nandi

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Education

Master of Science in Computer Science — **Ongoing**
Stanford University — 2023 - 2025

Bachelor of Technology in Computer Science and Engineering — **CGPA 9.877/10**
Indian Institute of Technology Delhi (IITD) — 2019 - 2023

Publications

Simple Augmentations of Logical Rules for Neuro-Symbolic Knowledge Graph Completion — **July 2023**
Ananjan Nandi, Navdeep Kaur, Parag Singla, Mausam — **ACL 2023** Main Conference

Ensembling Textual and Structure-Based Models for Knowledge Graph Completion — **June 2023**
Ananjan Nandi, Navdeep Kaur, Parag Singla, Mausam — In Review

Professional Experience

KnowDis Data Science LLP — **January 2023 - July 2023**
AI Researcher Intern (Part-Time) — *Delhi, India*

- Worked on several projects in domains such as **natural language processing**, **extreme classification**, and **molecular AI**
- Adapted state-of-the-art models to build products such as a robust **language detection system** for code-mixed English-Hindi sentences in the Roman script, a knowledge graph and model zoo for **drug-target discovery**, and a **product recommender system** that can handle millions of labels with sub-millisecond per-query latency.

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

- Worked on the **scaling up** and **optimization** of various services provided by the RISK team, such as serving of firm-wide risk data through APIs and efficient calculation of Value at Risk metrics from TB scale files

Projects

Understanding Structural Grokking in Transformers — **October 2023 - Ongoing**
Prof. Chris Manning (Stanford NLP)

- Investigating **structural grokking** - a phenomenon where transformers generalize out-of-distribution to structurally novel inputs on tasks that require compositional reasoning when trained for long periods of time
- Aim to improve **compositional reasoning and generalization capabilities** of transformers based on results obtained

Improving the CARE Platform — **October 2023 - Ongoing**
Prof. Diyi Yang (Social and Language Technologies Lab)

- Working on improvements to the CARE platform - an AI-driven **chat environment** designed to train peer counselors
- Improving the **backend** infrastructure as well as finetuning **Llama 2** to update the models driving the platform
- Working on creating an **AI patient** for peer counselors to practice with, while giving **AI-generated feedback**

Few-Shot Cross-Lingual Transfer — **November 2022**
Course Project (Prof. Mausam)

- Given a large amount of training data in English and small amounts of training data in 14 other languages, built a **multilingual Natural Language Inference** model for Chinese, Hindi, Swahili and Spanish
- Experimented with pre-trained models such as XLM-RoBERTa and mBERT, and cross-lingual transfer methods such as translate-all and fine-tuning pre-trained adapters; achieving a final test accuracy of over **85%**

Augmentation and Ensembling Techniques for Knowledge Graph Completion — **May 2022 - June 2023**
Prof. Mausam, Prof. Parag Singla (IIT Delhi)

- Worked on improving rule learning and utilization for Neuro-Symbolic Knowledge Graph Completion (KGC) by proposing some simple **rule augmentation** and **pruning** techniques. Accepted as a poster at the main conference for **ACL 2023**.
- Worked on a novel **query-dependent ensembling** approach to unify structure-based and text-based KGC methods. Our method has obtained **state-of-the-art** performance on several standard KGC datasets. Submitted to **EMNLP 2023**.

Land Cover Classification from Satellite Data **January 2022 - July 2023**
Prof. Aaditeshwar Seth (IIT Delhi)

- Used temporal satellite data from Google Earth Engine to perform pixel-level **Land Use-Land Cover classification** on top of existing spatial classifiers in order to get more informative classes as part of a community mapping app
- Worked on the classification of **greenery** into **crops** and **trees**, and further classification of crops based on **cropping intensity** (single/double/triple cropping etc), and **trees** into forests and plantations using efficient pipelines
- Product is currently being used by several **NGOs** to monitor deforestation and cropland status in their areas of operation

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

- Worked on developing a framework to directly learn **coarsened graph** representations for relational data
- To provide a theoretical basis, ensured **spectral invariance** guarantees by devising objectives for the graph Laplacian

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

Constrained Order Prophet Inequality **February-May 2021**
Mini Project (Prof. Ashish Chiplunkar)

- Tried to find the **constrained order prophet ratio** under the forward and reverse order with variable thresholds
- Derived a bound for the 3-variable case and found an example to show that improvement is possible in the general case

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
- Received the **Top 7% Merit Prize** for Semesters 1, 2, 5, 7 and 8 from IIT Delhi with **10 CGPA**
- Awarded a **Specialization** in Data Analytics and Artificial Intelligence alongside major degree, with **10 DGPA**
- 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

Relevant Coursework

- Data Structures and Algorithms, Probability and Stochastic Processes, Fundamentals of Language Sciences, Principles of Artificial Intelligence, Machine Learning, Linear Algebra and Applications, Natural Language Processing Grade: A

Technical Skills

Languages	Python, C++, Java, SML, Prolog, VHDL, MIPS, HTML, JavaScript, Bash, LaTeX
Tools and Libraries	Git, Vim, Jupyter, Keras, PyTorch, PyG, Pytorch-Lightning, HuggingFace, Scikit-learn, FAISS, Tslearn, Dask, FastAPI, AsyncIO, Joblib, shared_memory, OpenMP, MPI, NumPy, Pandas, SDL

Positions of Responsibility

- Teaching Assistant - An Introduction to Artificial Intelligence NPTEL Online Certification Course (January - June 2023)
- Table Tennis - Vice Captain Zanskar House, IITD (2021 - 2023)
- Academic Mentor - Intro. to Computer Science Board of Student Welfare, IITD (Semester 2, 2020-21)

Extracurricular Activities

- Completed 40 hours of **National Sports Organisation** activities at IIT Delhi through Table Tennis 2022
- **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