Ishaan Watts

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Education

Indian Institute of Technology (IIT), Delhi, India *July 2019 - May 2023*
Bachelor of Technology; ***Major:*** *Engineering Physics;* ***Minor:*** *Computer Science;* ***Department Rank:*** *4/49* ***CGPA:*** *8.996/10*

Publications

- **PARIKSHA: A Scalable, Democratic, Transparent Evaluation Platform for Assessing Indic LLMs** [Preprint]
  Ishaan Watts*, Varun Gumma, Aditya Yadavalli, Vivek Seshadri, Swami Manohar, Sunayana Sitaram*
- **RTP-LX: Can LLMs Evaluate Toxicity in Multilingual Scenarios?** [Preprint]
  Adrian de Wynter, ***Ishaan Watts****, Nektar Ege Altıntoprak, Tua Wongsangaroonsri, Minghui Zhang, Noura Farra, Lena Baur, Samantha Claudet, Pavel Gajdusek, Can Gören, Qilong Gu, Anna Kaminska, Tomasz Kaminski, Ruby Kuo, Akiko Kyuba, Jongho Lee, Kartik Mathur, Petter Merok, Ivana Milovanović, Nani Paananen, Vesa-Matti Paananen, Anna Pavlenko, Bruno Pereira Vidal, Luciano Strika, Yueh Tsao, Davide Turcato, Oleksandr Vakhno, Judit Velcsov, Anna Vickers, Stéphanie Visser, Herdyan Widarmanto, Andrey Zaikin, Si-Qing Chen*
- **MAPLE: Multilingual Evaluation of Parameter Efficient Finetuning of LLMs** [ACL Findings 2024]
  Divyanshu Aggarwal[*], Ashutosh Sathe[*], ***Ishaan Watts****, and Sunayana Sitaram*
  The 62nd Annual Meeting of the Association for Computational Linguistics
- **MEGAVERSE: Benchmarking LLMs across languages, modalities, models and tasks** [NAACL 2024]
  Sanchit Ahuja, Divyanshu Aggarwal, Varun Gumma, ***Ishaan Watts****, Ashutosh Sathe, Millicent Ochieng, Rishav Hada, Prachi Jain, Maxamed Axmed, Kalika Bali, and Sunayana Sitaram*
  2024 Annual Conference of the North American Chapter of the Association for Computational Linguistics

Experience

Research Intern, Microsoft Research India May 2023 - Present
Guide: Sunayana Sitaram | Multilingual Evaluation of LLMs *Bengaluru, India*

- Benchmarked multilingual capabilities and contamination of 20 LLMs across 22 datasets & 81 languages - **NAACL'24**.
- Studied **QLoRA** configurations and cross-lingual transfer for efficient **multilingual PEFT** in LLMs - **ACL Findings'24**.
- Transcreated RTP dataset to 28 languages and tested **LLMs as evaluators** for multilingual **toxicity detection** - **Preprint**.
- Built **Indic-LLM evaluation Leaderboard** via hybrid Human-LLM evaluators in collaboration with **Karya** - **Preprint**.

Guide: Akshay Nambi & Tanuja Ganu | Shiksha CoPilot

- Engineered **Shiksha CoPilot** web app to aid teachers in creating engaging content for students using Gen-AI with **RAG**.
- Deployed CoPilot in **20 schools** across Karnataka to **100 teachers** and bagged 1st prize in Microsoft Hackathon 2023.

Machine Learning Engineer Intern, Torch Investment Management Sept 2022 - Dec 2022
Mentor: Amit Sharma | Stock Price Modelling *Noida, Uttar Pradesh*

- Refactored LightGBM model codebase to predict Top30 US S&P500 stocks and modelled Saudi market data.
- Curated a new feature using NLP techniques determining correlation between stock price and tweet sentiment.
- Scraped Twitter using snscrape, **topic-based filtering** using BART and **sentiment analysis** using FinBERT.

Data Scientist Intern, Udaan May 2022 - July 2022
Mentor: Pranjal Singh | Holistic User-Embeddings via GNNs *Bengaluru, India*

- Developed framework to generate holistic **user-embeddings** from buyer-seller interaction graph for better segmentation.
- Built complex multi-relational & multi-entity graph and modeled **Hetero-Graph AutoEncoder** with a novel loss function.
- Improved Udaan **fraud detection** by **2.45%** using generated embeddings in the deployed PAFv2 model - **offered PPO**.

Research Intern, Griffith University May 2021 - July 2021
Guide: Saiful Islam | Malware Detection *Queensland, Australia*

- Performed **malware detection** and **program analysis** of binaries from VirusShare using machine learning.
- Constructed Control Flow Graphs from binaries through static analysis and used opcodes as features for nodes.
- Applied tf-idf vectorisation on dataset & designed **Graph Convolutional Network** to achieve **89.1%** accuracy.

Relevant Coursework

- **Programming**: Data Structures and Algorithms | Digital Electronics | Machine Learning | Special Topics in Computer Applications (Social Computing) | Computer Networks | Analysis and Design of Algorithms
- **Mathematics and Physics:** Linear Algebra and Differential Equations | Calculus | Probability and Stochastic Processes | Signals and Systems | Mathematical Physics | Computational Physics | Statistical Physics

Major Awards & Achievements

- Bagged **1st position** in Topic Challenge and Honours in Executive Challenge at annual Microsoft Global Hackathon. *2023*
- Secured **6th position amongst 5000** teams all over India in the Amazon ML Challenge 2023. *2023*
- Granted **Merit Award** in 3 semesters for ranking in top 3 students out of 49 in Physics Department, IIT Delhi. *2021-2022*
- Achieved Rank 1635 in JEE-Advanced & 99.94 percentile in JEE-MAINS from over 1.4 million candidates across India. *2019*
- Recipient of the prestigious **KVPY Fellowship** (Kishore Vaigyanik Protsahan Yojana) given by DST, Government of India. *2018*

Selected Technical Projects

Particle Identification using Eigen Faces, CNNs and GNNs (B.Tech Project - 2) Jan 2023 - May 2023
Guide: Prof. Abhishek Iyer, IIT Delhi *[Code] [Report]*

- Studied **Eigen-Faces** decomposition from first principles and reduced image dimensionality to classify photon & z-Boson.
- Experimented **GraphConv and GCN** for classification by converting images to **point-cloud graphical representations**.
- Benchmarked existing CNNs (ResNet-15) and trained GNNs to classify electron-photon data obtained from LHC detectors.

Anomalous Signal Detection at Large Hadron Collider (B.Tech Project - 1) Aug 2022 - Nov 2022
Guide: Prof. Abhishek Iyer, IIT Delhi *[Code] [Report]*

- Utilized CERN's ROOT framework to obtain energy and momenta of proton collision for **anomaly detection**.
- Inspected features derived applying physics to calculate 2.719 signal discovery significance of distributions.
- Designed Neural Networks and **Auto-Encoders** with **96.3%** and **80%** accuracy and optimized using Optuna.

Peer Server Peer (PSP) Networks (Computer Networks) Sep 2022 - Oct 2022
Guide: Prof. Abhijnan Chakraborty, IIT Delhi *[Code]*

- Implemented PSP file sharing system with **LRU cache** in server to facilitate efficient data storage and retrieval.
- Used **socket programming** abstraction ensuring secure file transmission to clients using TCP & UDP Protocol.
- Applied concurrency principles for efficient load balancing between clients and analysed scalability with size.

Social Network Analysis of the Indian Stock Market (Social Computing) Jan 2022 - May 2022
Guide: Prof. Abhijnan Chakraborty, IIT Delhi *[Code] [Report]*

- Scraped NIFTY stock-price data to analyse correlation between industries and market behvaiour during Covid-19 crisis.
- Detrended stock-price **time-series** data to estimate returns, verify stock-split & visualise impact of Covid (40% deviation).
- Constructed market-graphs, centrality measures & Louvain **community detection** to analyse which sectors trade together.

Yoga Pose Estimator using CNNs (Machine Learning) Sep 2021 - Nov 2021
Guide: Prof. Rahul Garg, IIT Delhi *[Code]*

- Designed **Deep CNN** model using **transfer learning** in PyTorch to detect yoga pose at different camera angles.
- Transformed images containing 19 Asanas to avoid background misrecognition & better feature interpretation.
- Developed hybrid Densenet121 architecture achieving **83%** accuracy leveraging GPU acceleration using HPC.

Skills

- **Languages**: Python, Java, SQL, Bash, C, C++, LaTeX, Spark **Technologies**: Git, Docker, ROOT, Azure, Databricks, LLMs, RAG
- **Libraries**: PyTorch, TensorFlow, OpenCV, Numpy, Pandas, Matplotlib, Ploltly, Streamlit, Langchain, LlamaIndex

Extra Curricular Activities

- **Reviewer** for AI-ML Systems 2023, an Indian conference on Systems Engineering and Artificial Intelligence.
- Attended **Winter School on Deep Learning** organised by Indian Statistical Institute (ISI), Kolkata in Spring 2023.
- Mentored six freshmen undergraduates for their academic wellbeing through **BSW Student Mentorship Program**.
- Prepared Care-Packages comprising poems & articles under **NSS Mental Health Project** during the pandemic.
- Completed **A1 level course in Spanish** as non-credited course of the Humanities and Social Sciences Department.