Ishaan Watts

✉ wattsishaan18@gmail.com ⌗ WattsIshaan 🎓 GScholar 🌐 wattsishaan.github.io in ishaan-watts

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

- Divyanshu Aggarwal[*], Ashutosh Sathe[*], **Ishaan Watts**, and Sunayana Sitaram, **MAPLE: Multilingual Evaluation of Parameter Efficient Finetuning of Large Language Models**, arXiv preprint arXiv:2401.07598   [arXiv]

- Sanchit Ahuja, Divyanshu Aggarwal, Varun Gumma, **Ishaan Watts**, Ashutosh Sathe, Millicent Ochieng, Rishav Hada, Prachi Jain, Maxamed Axmed, Kalika Bali, and Sunayana Sitaram, **MEGAVERSE: benchmarking large language models across languages, modalities, models and tasks**, North American Chapter of the Association for Computational Linguistics (**NAACL 2024**)   [arXiv]

EXPERIENCE

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

  ○ Evaluated multilingual capabilities of LLMs across 22 datasets & 81 languages - **accepted at NAACL 2024**.
  ○ Studied different LoRA configurations for efficient **multilingual PEFT** in LLMs - **submitted at ACL 2024**.
  ○ Extended RTP RAI dataset to 28 languages and testing **LLMs as evaluators** for multilingual **toxicity detection**.
  ○ Building **Indic-LLM evaluation** leaderboard using human and LLM ELO ratings in collaboration with **Karya**.

Guide: Akshay Nambi & Tanuja Ganu | Shiksha CoPilot [article]

  ○ Engineered **Shiksha CoPilot** web app to help teachers create engaging content for students using Gen-AI.
  ○ Deployed CoPilot in **20 schools** across Karnataka and conferred with 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 generic **user-embeddings** from interaction graph for better segmentation.
  ○ Implemented **DeepWalk** as baseline, then built more complex multi-relational & multi-entity interaction graph.
  ○ Applied **Hetero-Graph AutoEncoder** on new graph improving Udaan fraud detection by 2.45% - **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 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 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. *2019*
- Recipient of the prestigious **KVPY Fellowship** (Kishore Vaigyanik Protsahan Yojana), Rank 1281/100,000. *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]*

- Implemented **Eigen-Faces** decomposition to reduce image dimensionality and classified on euclidean distance.
- Proposed different **GNN** architectures for classification by converting images to **point-cloud representations**.
- Benchmarked CNNs with **0.8078** and GNNs with **0.597** (vanilla) & **0.710** (skip connections) ROC-AUC scores.

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]*

- Sourced NIFTY 4 year OHLC data from NSE, India and Yahoo Finance for social network and Covid19 analysis.
- Performed **time-series** decomposition estimating return, visualised stock-split and **40%** log deviation in Covid.
- Visualised stock graphs using Winner Takes All & MST method with Louvain **community detection** via Gephi.

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
- **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.