Aritra Bandyopadhyay

Machine Learning Researcher · Software Engineer
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Education

Indian Institute of Engineering Science and Technology (IIEST)
Shibpur, West Bengal

Bachelor of Technology in Computer Science
2021 - 2025

CGPA: 9.86/10 (Till 6th Semester)

Experience

Technical University of Munich
Munich, Germany

Machine Learning Research Intern - DAAD WISE
May 2024 - Present

- Received the prestigious DAAD WISE Scholarship to work as a Research Intern at CAMP Research Group, TUM
- Working on multi-modal Ultrasound point cloud registration

Indian Institute of Technology (IIT), Kharagpur
Kharagpur, West Bengal

Machine Learning Research Intern
May 2023 - Present

- Worked on fraud and attack detection using Transformers on real-world datasets
- Performed a literature survey on application of Transformer Attention models on time series data
- Researched time-series data analysis for fraud detection in Electric Grid systems using Smart Grid data
- Explored Explainable AI techniques like LIME and SHAP for robust justifications and interpretability of models
- **Tech Stack: PyTorch, Tensorflow, TSLearn, SciPy, Scikit-learn, NumPy, Pandas**

Mercor
California, US (Remote)

Machine Learning Engineer
May 2023 - Aug. 2024

- Led a radical improvement in the Information Retrieval pipeline using LLM-assisted semantic search
- Developed robust LLM-driven agents refining automated hiring and enabling scalable vetting
- Worked on developing SOTA infrastructure for using fine-tuned LLMs in production for tools like AI Interviewer and GitHub Analyzer
- Leveraged fine-tuning, RAG and prompt engineering strategies to improve task-specific performance of LLMs
- **Tech Stack: LLMs, LangChain, Vector DBs, Python, SQL, Azure, GCP, TypeScript, Next.js**

Indian Statistical Institute (ISI), Kolkata
Kolkata, West Bengal

Quantum Computing Research Intern
July 2023 - Sept. 2023

- Studied HHL Algorithm and various methods of implementation of Quantum Phase estimation
- Implemented Iterative HHL and Quantum Phase Estimation Algorithms
- Explored and implemented various Quantum Algorithms like Deutsch-Josza Algorithm, Grover's Algorithm, Bernstein-Vazirani Algorithm, Quantum Fourier Transform and Quantum Phase estimation
- **Tech Stack: IBM-Qiskit Runtime, NumPy**

Publications

Dhar, S.; Sen, A.; **Bandyopadhyay, A.**; Jana, N.; Ghosh, A. and Sarayloo, Z. (2023). **Differential Evolution Algorithm Based Hyper-Parameters Selection of Convolutional Neural Network for Speech Command Recognition**. In Proceedings of the 15th International Joint Conference on Computational Intelligence, ISBN 978-989-758-674-3, ISSN 2184-3236, pages 315-322.

Projects

MOVIE++
A Movie Recommender Web App
Sept. 2022 - Oct. 2022

- Developed an item-based Collaborative Filtering based Recommender System using Singular Value Decomposition
- Developed a modern frontend to display information about movies using external APIs
- **Tech Stack: Flask, Python (Scikit-learn, Surprise), ReactJS**

EEG Motor Signal Classification

Classifying motor movement from EEG signals *Jan. 2023 - Apr. 2023*

- Implemented a model for classification of motor movement from EEG Signal (time series data) using MATLAB, Python
- Applied various signal processing techniques like STFT, Wavelet Transform
- Used power-spectrum features and SVM to classify movement according to brain activity in various power bands
- **Tech Stack: Python, SciPy, MATLAB**

BrainQuery

Whitepaper AI Semantic Search Web App *April 2023*

- Implemented Semantic Search using the ArXiv dataset by Cornell University and built a modern frontend for it
- Extracted text embeddings from the abstracts of the whitepapers using OpenAI's ada-002 model
- Implemented a modern and intuitive frontend, seamlessly integrated with the Flask backend and OpenAI APIs
- **Tech Stack: Pinecone Vector DB, Flask, OpenAI APIs, ReactJS, Tailwind CSS**

Achievements

2024 **DAAD WISE 2024 Scholar**, One out of 200 people in India to receive the prestigious DAAD WISE Scholarship
2024 **Perfect 10/10 Grade in 2 Semesters**, Scored a perfect 10/10 SGPA in my 6th and 3rd Semesters
2023 **1st in BrainDead**, Team secured 1st place in IIEST's Inter-University ML Hackathon BrainDead
2023 **5th in RootAccess CTF**, Team secured 5th place in IIEST's Inter-University CTF RootAccess
2023 **University Rank 1 (Till 4th Semester)**, Current CGPA: 9.86/10

Certifications

2023 **Advanced Learning Algorithms**, Coursera - Stanford
2022 **Supervised Machine Learning: Regression and Classification**, Coursera - Stanford
2023 **Open Source Software Development Methods**, The Linux Foundation
2022 **CS50's Introduction to Computer Science (CS50x)**, CS50 - Harvard

Research Interests

Mechanistic Interpretability, Computer Vision, LLMs and Agents, Quantum Computing, Algorithms and Optimization, Cryptography, Theoretical Computer Science

Skills

ML Libraries PyTorch, Tensorflow, Scikit-learn, LangChain, SciPy, NumPy, Pandas, Surprise, Librosa
Languages Python, C, C++, Java, JavaScript, TypeScript, MATLAB, LaTeX, SQL
Tech Stack Flask, Django, Vector DBs, ReactJS, NextJS, tRPC, PostgreSQL, MySQL
Relevant Courses Data Science, Theory of Computation, Discrete Structures, Design and Analysis of Algorithms, Data Structures (University studies are in English language)
Others LLMs, Hugging Face Transformers, Google Cloud Platform (GCP), Azure, Firebase, Linux, Git