Utshab Kumar Ghosh

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EDUCATION

B.Sc. in Computer Science & Engineering (CSE)   **Rajshahi, Bangladesh**
Rajshahi University of Engineering & Technology (RUET)   Jan 2017 - Oct 2022
Result (CGPA/4.0): 3.22 (3.48 in last 3 semesters)

EXPERIENCE

Machine Learning Engineer   **Dhaka, Bangladesh**
Nascenia Ltd.   Dec 2022 - present

Led the development of software solutions across multiple projects, specializing in AI-powered applications and full-stack web systems for government and enterprise use cases. My responsibilities include:

- **Conversational AI and RAG Systems for Government Services**
  - Developed and integrated multilingual conversational chatbots (Bengali & English) for government websites using **LangChain** and **Llama-3**, deployed on **AWS**. Performed R&D on several LLM models like Mistral, Bloom, GPT, etc.
  - Designed and implemented a Retrieval-Augmented Generation (RAG) pipeline with LangChain and **ChromaDB**, enabling document-driven question-answering and custom action execution (e.g., user registration, profile updates).
  - Built AI-driven workflows using LangChain and **LlamaIndex**, ensuring context-aware responses by integrating external APIs and knowledge bases for real-time data access.
  - Optimized LLM performance through prompt engineering and model inference techniques.
  - Deployed applications on AWS, utilizing cloud infrastructure for scalability and reliability, and implemented solutions for specific client requirements.
  - Enhanced system efficiency by GPU acceleration and quantization techniques like **LoRA**. The current Llama-3.1 8B model has been deployed with 5-bit quantization.
  - Collaborated with Project Manager, ML engineers, and software developers to integrate AI solutions into client products, conducting bi-weekly meetings to align requirements, clarify expectations, and prevent scope creep.
- **Full-Stack Web Application**
  - Built a full-stack web application with Laravel, implementing secure user authentication, data management, an admin panel, and interactive dashboards to support operational workflows.
  - Ensured security, privacy, and compliance in AI systems by implementing secure user authentication and data encryption, safeguarding sensitive data, and meeting regulatory standards.
  - Continuously optimized backend and frontend code, resolving conflicts and ensuring scalability, while maintaining constant communication with the solution architect to address potential flaws in system design.
- **Industrial Sensor Monitoring App**
  - Developed and released an Android app for hardware sensors using the Modbus protocol, enabling real-time data collection and monitoring for industrial applications, with seamless integration into existing systems.

Mentor   **Dhaka, Bangladesh**
Code Studio Academy   Feb 2023 - present

Running a machine learning boot camp with over 120 enrolled students, covering foundational concepts in Python, math, and statistics for ML, deep learning, hands-on projects, etc. Successfully delivered the curriculum to its first cohort consisting of more than 50 sessions. Some selected classes are also available in YouTube.

AI Research Assistant — **Florida, USA (Remote)**
MyMedicalHUB Int. — Oct 2020 - Sep 2022

Developed an AI system for detecting Parkinson's disease with an accuracy of about 0.98 utilizing pattern recognition, ML models, etc., used in healthcare. Analyzed image and video data of gait and sports with angle-based posture patterns, OpenPose model, etc.

Smart Book Writer — **Dhaka, Bangladesh**
10 Minute School — Oct 2020 - Sep 2022

Comprehensive demystifier to simplify O-level and A-level textbooks.

MACHINE LEARNING COMPETITIONS

- **Ranked 54th out of 2034 Participants (Top 2.6%)**
  HackerEarth ML Challenge: A Fine Windy Day.
- **Ranked 86th out of 2796 Participants (Top 3%)**
  HackerEarth ML Challenge: Fast, Furious and Insured.
- **Ranked 443rd out of 3545 Participants (Top 12.5%)**
  Kaggle PetFinder.my - Pawpularity Contest.
- **Ranked 1019th out of 2109 Participants (Top 48%)**
  Kaggle TensorFlow - Help Protect the Great Barrier Reef.
- **Running**
  DataHack Traffic Forecasting.

PROJECTS

Bone Marrow Cell Classification — Ongoing

Classified bone marrow cells using image processing and machine learning techniques. Last, by fine-tuning the EfficientNetB7, obtained a precision of 0.84-0.90 for some classes, such as Abnormal eosinophils, Artefacts, etc.

NER & POS Tagging — 2024

An NLP project for Bangla sentence processing, tagging Named Entity Recognition and Parts of Speech. This features a FastAPI-powered web application, utilizing deep learning models and comprehensive data preprocessing. Link.

ML Bootcamp — 2023

Mentored over 120 students on Python, data analysis, visualization, mathematics for ML, algorithms, SQL, CNN, etc. Added hands-on projects relevant to the topics so that the students can get some handy experience of the theories. Link.

IMDB Clone — 2023

Created a web application replicating functionalities similar to IMDB using ReactJS. Link.

Time Series Analysis — 2022

Prediction of stock price, air quality, ads currency forecasting, etc. with an accuracy of 0.8-0.9. Link.

E-commerce Site — 2020

Developed an e-commerce website using the Django framework. This project involved building functionalities like product management, user accounts, shopping carts, etc. Link.

PUBLICATIONS

- Rifaat[1], Nahian and **Ghosh[1], Utshab Kumar** and Sayeed, Abu (2022). "Accurate gait recognition with inertial sensors using a new FCN-BiLSTM architecture". In: Computers and Electrical Engineering, 104, p. 10842. **[Q1 journal, first author]**

- **Ghosh, Utshab Kumar** et al. (2022). "Most dominant metabolomic biomarkers identification for lung cancer". In: Informatics in Medicine Unlocked 28, p. 100824. **[Q2 journal, First author]**

Skills

Programming	Python, C, OOP, Data Structures & Algorithms.
Data Science, ML and DL	Data Analysis & Visualization, ANN, CNN, RAG, LLM, Supervised & Unsupervised Learning Algorithms, Pipelines, Feature Engineering, Selection & Extraction, Fine-tuning, Training, Prompt engineering, GPU acceleration, Quantization.
Frameworks and Tools	TensorFlow, PyTorch, Keras, OpenCV, NumPy, Pandas, Scikit-Learn, LangChain, LlamaIndex, OpenAI API, Hugging Face.
Mathematics for ML	Algebra, Statistics, Possibility, Geometry, Matrix.
Web Development	ReactJS, SaaS, Tailwind, JavaScript, Django, Flask.
Database	MySQL, MariaDB, ChromaDB, Redis, Firebase, MongoDB.
Cloud	AWS, Azure, Apache Server, Nginx.
Miscellaneous	Git, Docker, Linux, Gradio, Latex, MS Office, Adobe Illustrator, Premiere Pro.

Accomplishments

- **Kaggle Expert** (x3).
- **300+ Problems solved** in *Codeforces, Codechef, Leetcode, and other Online Judges*.
- **Deep Learning Specialization** in *deeplearning.ai*.
- **Applied Data Science Specialization** in *IBM*.
- **Data Scientist Career Track** in *Datacamp*.
- **AI for Medical Diagnosis** in *deeplearning.ai*.
- **Gold Medalist** in *National High School Programming Contest*.

Activity

- **Blog Writer**, Medium
- **Vice President (Admin)**, *Onuronon, RUET Cultural Club*.
- **Asst. Publication Secretary**, *RUET Career Forum*.
- **Founder, Keyboardist, and Guitarist**, *Plectrum, a Bangladeshi Band*.

Talks

Opportunities in programming career: Talk with the experts   May 2023
IEEE RUET RAS Student Branch Chapter

Languages

Bengali, English, Hindi

References

Available upon request.