

ARPON KAPURIA

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EDUCATION

National Institute of Technology Tiruchirappalli

B.Tech in Computer Science & Engineering

Tiruchirappalli, India

December 2020 – June 2024

Courseworks: Data Structures and Algorithms · Operating Systems · Database Management Systems · Computer Networks · Machine Learning · Artificial Intelligence · NLP · Image Processing · Augmented and Virtual Reality · Technical Writing

Kushtia Government College, Kushtia

HSC (Science) | GPA: 5 / 5

Kushtia, Bangladesh

2019

Kushtia Zilla College, Kushtia

SSC (Science) | GPA: 5 / 5

Kushtia, Bangladesh

2017

RESEARCH INTERESTS

Deep Learning, Natural Language Processing, Representation Learning, Human-Level AI

EXPERIENCE

Advanced Machine Intelligence Research Lab

Research Intern | Advisor: Prof. M. Firoz Mridha

Dhaka, Bangladesh

February 2025 – Present

- Investigate LLM reasoning capabilities to improve performance on complex tasks, with a focus on reducing hallucinations and applications of Retrieval Augmented Generation.

Indian Institute of Technology Bombay

Research Intern | MeDAL Lab | Advisor: Prof. Amit Sethi

Mumbai, India

May 2023 – July 2023

Project 1: Enhancing Self Supervised Learning framework - BYOL

- Conducted an in-depth survey on self-supervised learning, focusing on contrastive learning frameworks and their core principles.
- Reproduced BYOL and simCLR in **PyTorch** to establish a baseline for improvements.
- Introduced changes to BYOL by incorporating a novel loss function, algorithmic modifications and architectural adjustments to improve representation learning.

Project 2: Radiology DICOM Image Anonymization

- Created a user-friendly **Flask** based system for DICOM image processing and anonymization using Pydicom, ensuring HIPAA-compliant privacy across **5,000+ medical scans**.
- Evaluated the CRAFT model for text detection in X-ray images and extracting clinically relevant annotations.

National Institute of Technology Tiruchirappalli

UG Research Assistant | Industrial Automation Lab

Tiruchirappalli, India

October 2022 – February 2023

Project: Assam Smart Home Automation

Advisors: Prof. M. Brindha, Prof. G. S. Ilango

- Developed a **Flutter** app to automate energy operations and digital billing for a solar-powered microgrid in Assam, India, serving **200+ households**.
- Integrated Flutter frontend with Django-based REST API and deployed an MQTT broker enabling real-time data exchange with **50+ IoT sensors** for energy consumption and control.
- Project supported by the Ministry of Science & Technology, Government of India, under the initiative **SUSTENANCE** to achieve Novel Carbon Neutral Energy Communities.

OPEN SOURCE CONTRIBUTIONS

- Huggingface/[transformers](#) | LangChain/[langchain](#) | PyTorch/[pytorch](#)

SKILLS

- **Programming Languages:** C, C++, Python, Dart, JavaScript, SQL, Bash
- **Frameworks & Libraries:** PyTorch, Hugging Face, LangChain, FastAPI, Flutter, Unity
- **Databases/Vector Stores:** PostgreSQL, MongoDB, Vector Database
- **Tools & Platforms:** Linux, Docker, Git, Postman, Android Studio, LaTeX
- **Languages:** Bengali (Native), English (IELTS 7.5), Hindi (Verbal), German (A1.1)

SELECTED PROJECTS

Cold Email Generator

Python, LangChain, FAISS, RAGAS, Llama-4, BeautifulSoup (BS4)

April 2025

- Automated and end-to-end multimodal RAG system to streamline graduate application outreach by aligning applicant profiles with professor research via web scraping, text parsing, and CV image analysis, achieving a **92.6% relevance score** (RAGAS).
- Designed a LangChain-based pipeline leveraging **LLaMA-4 Maverick (Groq AI)**, **Jina Embeddings v3**, and **FAISS**, leveraging multimodal embeddings to generate contextually personalized cold emails.
- Incorporated **Cohere Reranker v3.5**, achieving a **Precision@K of 87.3%**, with robustness validated across diverse input formats (PDFs, HTML, images).

NoSmokeZone: AI for Smoker Detection in Public Spaces

Python, TensorFlow, Keras, OpenCV, FastAPI, Docker

December 2023 – January 2024

- Engineered a real-time smoker detection system with minimal human intervention leveraging CNN models (EfficientNetV2, VGG16, ResNet-50) and Vision Transformer, achieving **93% accuracy**.
- Fine-tuned models and applied data augmentation techniques, reducing false positives/negatives by **around 7%** compared to baseline models, significantly minimizing misclassifications.
- Built API endpoints and deployed the system for reliable **model serving** using **FastAPI**, containerized with **Docker** for scalability and smooth integration.

Malicious Website Detection Using Machine Learning

Python, Scikit-Learn, Flask, Docker, JavaScript

October 2022 – November 2022

- Implemented and deployed a machine-learning model via **Flask** and **Docker**, achieving **94% accuracy** for real-time malicious website detection.
- Trained and benchmarked **4 models** – KNN, SVM, LR & MLP – and optimized hyperparameters, resulting **14% enhancement** in model performance .
- Built a Chrome extension using JavaScript to extract **27 real-time features** (e.g., URL length, domain authority) from webpages and integrated user feedback collection, used by **100+ test users**.
- Applied a continual learning pipeline that retrains the model every **24 hours** on the feedback data, reducing false positives by **almost 6%** and increasing detection robustness.

ACHIEVEMENTS

- 2020 **ICCR Scholarship** – Ministry of External Affairs, Government of India; awarded for academic excellence and promoting cultural exchange.
- 2017 **Academic Excellence Award** – Chamber of Commerce, Kushtia; SSC Board (10th) Results.
- 2015 **General Grade Scholarship** – Government of Bangladesh; JSC Board (8th) Results.
- 2012 **1st Place** – Zilla Shilpkala Academy, Kushtia; Art Competition (Independence Day).
- 2011 **2nd Place** – Bangladesh Udichi Shilpigoshthi, Kushtia; Art Competition (Bengali New Year 1418).

REFERENCES

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