ARPON KAPURIA

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Summary

Computer Science graduate with a deep passion for technology, research, and teaching. My goal is to inspire the next generation of learners and augment human intelligence with more capable artificial intelligence to improve our day-to-day life. Outside of this, I like traveling.

Research Interests

Deep Learning, Representation Learning, LLM Reasoning, RAG

Education

National Institute of Technology, Tiruchirappalli December 2020 - June 2024 B.Tech in Computer Science & Engineering | CGPA 7.75/10 (First Class) Tamil Nadu, India Kushtia Government College, Kushtia 2019 HSC (Science) | GPA 5/5Kushtia, Bangladesh Kushtia Zilla School, Kushtia 2017SSC (Science) | GPA 5/5**Relevant Courseworks**

- Operating Systems
- Computer Networks Database Management Systems

• Data Structures and Algorithms

- Technical Writing
- Linear Algebra and Calculus
- Machine Learning TechniquesAugmented and Virtual Reality

Experience

Advanced Machine Intelligence Research Lab

Research Intern

• Investigating LLM reasoning capabilities to improve performance on complex tasks, with a focus on reducing hallucinations and applications of Retrieval Augmented Generation in Medical AI.

Indian Institute of Technology Bombay

Research Intern | MeDAL Lab

Project 1: Enhancing Self Supervised Learning framework - BYOL

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

Project 2: Radiology DICOM Image Anonymization

• Created an user-friendly Flask-based system for DICOM image processing and anonymization using Pydicom, ensuring medical data privacy.

National Institute of Technology Tiruchirappalli

UG Research Assistant | Industrial Automation Lab

Project: Centralized Power Cluster Home Automation

- Developed a Flutter app to automate the operations and billing for a power cluster in Assam, India, serving 200 homes.
- Integrated Flutter front-end with API developed in Django and used an MQTT server for IoT communication.
- This project was funded under SUSTENANCE, a Government of India initiative for carbon-neutral energy communities.

February 2025 - Present

• Artificial Intelligence

• Deep Learning Techniques

Natural Language Processing

Image Processing and Applications

Dhaka, Bangladesh

Mumbai, India

May 2023 - July 2023

October 2022 – February 2023

Tiruchirappalli, India

Kushtia, Bangladesh

Projects

Cold Email Generator for Graduate applications

Python, LangChain, FAISS, Llama-4, Jina Embeddings v3, Cohere Reranker v3.5

- Automated a LangChain based Retrieval Augmented Generation (RAG) system that scrapes and processes data from professor and applicant websites, matching research interests for graduate applications.
- Designed a pipeline that leverages Llama-4 Maverick LLM, Jina embeddings and vector database (FAISS) to generate personalized and contextually relevant cold emails.
- Incorporated Cohere reranker to fine-tune similarity searches, boosting the precision and impact of the emails for improved response rates.

NoSmokeZone – AI for Smoker Detection in Public Spaces

Python, TensorFlow, Keras, OpenCV

- Engineered a real-time smoker detection system with minimal human intervention leveraging advanced CNN models (EfficientNetV2, VGG16, ResNet-50) and Vision Transformer, achieving 93% accuracy.
- Fine-tuned models and applied data augmentation techniques, enhancing robustness and reducing false positives/negatives by 7% compared to baseline models, significantly minimizing misclassifications.

Malicious Website Detection Using Machine Learning September 2022 – November 2022

Python, Flask, JavaScript, Chrome Extension tools

- Implemented a machine-learning model with around 94% accuracy to detect malicious websites.
- Trained and compared various classification algorithms, including supervised and neural network-based methods, to achieve a robust performance.
- Built a chrome extension using JavaScript to extract the features from the webpage to test the website against the trained model to classify if it is malicious or not. Added a feature to receive user feedback.
- Adopted a continual learning approach to store the user feedback and retrain the model daily to improve performance.

Skills

Programming Languages: C, C++, Python, Dart, JavaScript, SQL
Frameworks: PyTorch, LangChain, FastAPI, Flutter, Unity
Database: PostgreSQL, MongoDB, ChromaDB, FAISS
Miscellaneous: Linux, Docker, Prometheus, Git, Postman, VS Code, Android Studio, Google Colab, Latex
Languages: Bengali (Native), English (Proficient), Hindi (Verbal), German (A1.1)
Standarized Test Scores: GRE - 307, IELTS - 7.5 (2024)

Achievements

- **2020** Recipient of the prestigious ICCR Scholarship by the Ministry of External Affairs, Govt. of India, for academic excellence and promoting cultural exchange.
- 2017 SSC Board Merit Order Scholarship from the Chamber of Commerce, Kushtia, Bangladesh.
- **2015** JSC General Grade Scholarship from the Government of Bangladesh.
- 2012 1st position, Zilla Shilpakala Academy Kushtia organized Art competition for Independence Day.
- 2011 2nd position, Bangladesh Udichi Shilpigoshthi Kushtia organized Art competition for Bengali New Year ' 1418.

References

 Dr. M. Brindha Associate Professor, Department of Computer Science & Engineering NIT Trichy, India - 620015 brindham@nitt.edu

 Amit Sethi, PhD Professor, Department of Electrical Engineering IIT Bombay, India - 400076 asethi@iitb.ac.in

April 2025

December 2023 – January 2024