Arpon Kapuria

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Summary

A recent graduate in Computer Science 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, Reasoning in AI Models (Language + Image)

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 5/5 — *Kushtia, Bangladesh*

Kushtia Zilla School, Kushtia — **2017**
SSC (Science) | GPA 5/5 — *Kushtia, Bangladesh*

Relevant Courseworks

- Operating Systems
- Database Management Systems
- Data Structures and Algorithms
- Computer Networks
- Linear Algebra and Calculus
- Augmented and Virtual Reality
- Technical Writing
- Artificial Intelligence
- Machine Learning
- Deep Learning Techniques
- Natural Language Processing
- Image Processing and Applications

Experience

Advanced Machine Intelligence Research Lab — February 2025 - Present
Research Intern — *Dhaka, Bangladesh*

- Investigating LLM reasoning capabilities to improve performance on complex tasks, with a focus on reducing hallucinations and achieving human-like decision-making.

Indian Institute of Technology Bombay — May 2023 – July 2023
Research Intern | MeDAL Lab — *Mumbai, India*

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 — October 2022 – February 2023
UG Research Assistant | Industrial Automation Lab — *Tiruchirappalli, India*

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 Govt. of India initiative for carbon-neutral energy communities by the Dept. of Science and Technology and the Ministry of Science and Technology.

Projects

NoSmokeZone – AI for Smoker Detection in Public Spaces **December 2023 – January 2024**

Python, TensorFlow, Keras, OpenCV

- Automated 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.

9 Box Puzzle - Android App **December 2022**

Java, A* Algorithm

- Designed and programmed an engaging 9-puzzle game in Java, featuring a 3x3 grid of numbered boxes from 1 to 8, with a missing 9th box in random order.
- Provided comprehensive in-app resources, including a home menu, how-to-play guide, optimal solution visualization, and a performance tracking system for user statistics and puzzle difficulty based on the minimum moves required.
- The optimal solution window displays step-by-step moves needed to solve the puzzle most efficiently, utilizing an AI-based algorithm (A* Algorithm).

Malicious Website Detection Using Machine Learning **September 2022 – November 2022**

Python, Flask, HTML/CSS, JavaScript

- Implemented a machine-learning model with around 94% accuracy to detect malicious websites.
- Trained and compared different models using K-Nearest Neighbor, Support Vector Machine, Logistic Regression, and Multi Layer Perceptron to obtain a better 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: MySQL, MongoDB, Chroma (Vector DB)
Miscellaneous: Linux, Docker, Prometheus, Git, VS Code, Android Studio, Google Colab, Latex
Languages: Bengali (Native), English (Advanced), 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 fully funded undergraduate studies, awarded 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

1. Dr. M. Brindha
   Associate Professor,
   Department of Computer Science & Engineering
   NIT Trichy, India - 620015
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2. Amit Sethi, PhD
   Professor, Department of Electrical Engineering
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