

ARPON KAPURIA

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Research Interests

Computer Vision, Natural Language Processing, Self-Supervised Learning, Medical Image Analysis

Education

National Institute of Technology, Tiruchirappalli

December 2020 – June 2024

B.Tech in Computer Science and Engineering

Tamil Nadu, India

Relevant Courseworks

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

Experience

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 extensive literature survey on self-supervised learning, emphasizing contrastive learning principles and frameworks like simCLR, MoCo, and BYOL.
- Reproduced the BYOL framework using PyTorch, replicating the original work to establish a solid foundation for subsequent modifications.
- Introduced innovative changes to BYOL, such as formulating a new algorithm, incorporating a novel loss function, and architecture adjustments for a better representation learning. Hyperparameter tuning was conducted to optimize the training procedure.

Project 2: Radiology DICOM Image Anonymization

- Created a user-friendly system for DICOM image upload and processing using Flask, along with a Python script using Pydicom for efficient anonymization, addressing medical data privacy concerns.
- Performed a testing using the CRAFT model for text detection and extraction from X-ray images, enhancing the interpretability and utility of medical imaging data.

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 supported by Department of Science and Technology and Ministry of Science and Technology, Government of India under the project SUSTENANCE - Sustainable Energy System for Achieving Novel Carbon Neutral Energy Communities.

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, HTML/CSS, JavaScript, SQL

Frameworks: Flutter, PyTorch, TensorFlow, Flask, Unity, Tailwind CSS

Miscellaneous: Linux, Docker, VS Code, Android Studio, Git, Google Colab, Latex

Languages: Bengali (Native), English (Advanced), Hindi (Verbal), German (A1.1)

Standardized Test Scores: GRE - 307 (Q 157, V 150), IELTS - 7.5

Honors and Awards

2020 Indian Council for Cultural Relations (ICCR) Scholarship for Undergraduate Study at NIT Trichy, India

2017 SSC Board Merit Order Scholarship from the Chamber of Commerce, Kushtia, Bangladesh

2015 JSC General Grade Scholarship from the Government of Bangladesh

References

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2. Amit Sethi, PhD
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