Rithvika Tiruveedhula

CSE (4th yr) student at School of Computer Sc & Engg (SCOPE), VIT Chennai, India

Ph: 9538232897 **Email:** rithvika.tiruvee@gmail.com **Linkedin:** linkedin.com/in/rithvikat **GitHub:** rithvika7495 **MyWebsite**: shorturl.at/wG4NN

EDUCATION :

- **B.Tech** **Computer Science & Engineering, Vellore Institute of Technology (VIT), Chennai, India** **2021 - '25** **7.7/10**
- **Class 12** **ALLEN Career Institute /GRV Pre-University College (PUC Board), Bangalore, India** **2019 - '21** **93.0 %**
- **Class 10** **Sri Chaitanya Techno School (CBSE), Bangalore, India** **2018 - '19** **88.2 %**

SKILLSET :

- **Languages:** Python, Java, C/C++, R ; **Web:** CSS, HTML, JavaScript, Flask ; **Data Base:** MySQL, PL/SQL & MongoDB
- **AI/ML , Data Analysis:** Pandas, NumPy, SciPy, Scikit-Learn, Natural Language Toolkit (NLTK), SpaCy, Transformers, Hugging Face
- **Deep Learning :** PyTorch, TensorFlow, Keras, OpenCV; **LLMs :** ChatGPT, Gemini, Grok & Perplexity
- **IDE/NoteBook:** Visual Studio Code, PyCharm, Google CoLab, Jupyter Notebook, Kaggle
- **Non-Technical:** Analytical Thinking & Problem-solving, Self-motivated, Creative & Innovative, Time Management, Communication and Interpersonal skills, Collaborative & Teamwork.

EXPERIENCE & PROJECTS :

INDUSTRY INTERNSHIP at TCS: Currently working as an **AI/ML Intern** at **Tata Consultancy Services (TCS)**, Bangalore ***(31st Dec 2024 – till the date)***

PROJECT: ***"Fine Grain Image Similarity (FGIS) Techniques for the Application of Retail Apparel Similarity Matching Requirement in the TCS Optumera Product Suite"*** **(**TCS Optumera is a cloud-based **AI platform** that helps retailers and Consumer Packaged Goods(CPG) companies optimize merchandising, inventory, pricing, and promotions)

Key Contributions:

- **Built a hybrid deep learning model** (**ResNet50** + **Attention Mechanism** + **Attention Erasure**) that **improved image similarity precision** by **20%** over baseline methods.
- **Achieved 90% retrieval accuracy**, with **98% similarity** across top-5 image matches, enabling near-duplicate apparel detection in a dataset of **32,190 images**.
- **Applied offline augmentation techniques** to increase **dataset size** by **99%** (from **16,170** to **32,190**), and **designed custom L2-normalized embedding heads** for scalable deployment.
- **Collaborated** with the **TCS Optumera** team to deliver a deployable **AI solution**, **boosting catalogue uniqueness** and **reducing manual review** efforts by an estimated **30–40%.**

Tools & Technologies: Python, TensorFlow, Keras, OpenCV, Grad-CAM, CNNs, Ensemble Learning, Transfer Learning

CAPSTONE PROJECT-2: ***"ChestVision-Lung Disease Classification using Ensemble Transfer Learning & Grad-CAM for Visualization"*** ***(15th Dec 2024 – 2nd April 2025)***

Key Contributions:

- **Developed a deep learning ensemble** of **5 CNN** models (InceptionResNetV2, MobileNet, DenseNet121, EfficientNetB2, InceptionV3) in **TensorFlow/Keras**, achieving **89.7% multi-label accuracy** and **79.1% AUC-ROC** on the **NIH CXR dataset**.
- Integrated **Grad-CAM with OpenCV** to generate heatmaps for model interpretability, enhancing clinical explainability and supporting radiologist validation.
- **Applied data augmentation** (rotation, flip, contrast) to **112,120 X-rays**, that **improved minority class representation** and **boosted recall** by **14%**.
- **Engineered multi-label classification heads** with **50% dropout** and **sigmoid activation**, enabling the **detection** of **14 different Lung conditions**, including pneumonia and fibrosis etc.,

Tools & Technologies: Python, TensorFlow, Keras, OpenCV, Grad-CAM, CNNs, Ensemble Learning, Transfer Learning

CAPSTONE PROJECT-1: ***"Ship Detection using SAR (Synthetic Aperture Radar) Images for Maritime Vigilance" (20th Jul – 20th Nov, 2024)***

This work has been Accepted & Published at, International Conference on Data Science, Agents and Artificial Intelligence (ICDSAAI) 2025

Key Contributions:

- **Developed a SAR-optimized detection algorithm** that **improved detection accuracy by 22.3%** and **reduced false positives** in high-noise maritime zones, outperforming Faster R-CNN.
- **Improved** detection of small and occluded vessels by **28%** using a **custom feature extraction framework**. This framework incorporated **Swish+TanH activations, highlighted weight maps**, and **Particle Swarm Optimization**.
- Enhanced image clarity by up to **31.5%** using Median and Sobel filtering with pseudo-RGB mapping, significantly improving precision in cluttered coastal and port scenarios.
- Outperformed YOLOv4 and SSD on the SSDD benchmark, achieving significant improvements **in precision** by **+9.2%**, **recall** by **+11.4%**, and **F1-score** by **+13.7%**. This confirms strong robustness against SAR-specific challenges like speckle noise and gray scale distortions.

Tools & Technologies: Python, ResNet50, Feature Pyramid Networks (FPN), Guided Attention, Particle Swarm Optimization (PSO), SAR Imagery

SUMMER INTERNSHIP-2 At **IOTA Analytics Pvt Ltd, India** ***(15th Nov 2023 – 15th Jan, 2024)***

PROJECT: ***Personal Identifiable Information (PII) Recognizer*** *&* ***Named Entity Recognition (NER)*** *in* ***Natural Language Processing (NLP)***

Key Contributions : Gained hands-on experience in AI/ML with practical insights into NLP and Generative AI applications. And following are the list of tasks done in this Internship project:

- Built a **PII recognition engine** using **Named Entity Recognition (NER)** and custom **Regex patterns**, achieving **98% precision** in redacting sensitive fields (e.g., names, emails, IDs) across **10K+ enterprise documents**.
- Developed a **privacy-preserving NLP pipeline** to sanitize unstructured text, reducing manual compliance efforts by **~60%**.
- Integrated a **Retrieval-Augmented Generation (RAG)** system using **Hugging Face LLMs**, enabling accurate domain-specific question answering with **<2s average response time**.
- Engineered modules for **semantic embedding**, **dynamic chunking**, and **prompt templating**, **improving LLM output** relevance by **~35%** in evaluation benchmarks.
- Deployed scalable **RESTful** APIs using **Flask**, with endpoint testing and validation in **Postman**, ensuring **100% functional coverage** before integration.

Tools & Technologies: Python, Natural Language Toolkit (NLTK), Transformers, Hugging Face LLMs

SUMMER INTERNSHIP-1: At **Chakralayaa Analytics Pvt Ltd (**a **VIT,Chennai** Campus incubated **Startup)** ***(Jun – Aug, 2023)***

PROJECT: **SMIS (Supply Market Intelligence System)**

Key Contributions : In this Internship, I learned **how real-time business intelligence solutions** empower buyers' purchasing decisions and provide **key performance indicators (KPIs)** for company executives' decision-making.

- Worked on **SMIS (Supply Market Intelligence System)** for real-time business intelligence.
- Analyzed purchasing **KPIs** and buyer trends using **Python**-based **ML** solutions.

PROJECTS DONE DURING COURSEWORK:

1. Arrhythmia Detection Using ECG Signals :

- **Developed a 1D-CNN** for **classifying 5 arrhythmia types**, achieving **95.2% accuracy**, **93.8% F1-score**, and **0.96 ROC-AUC** on **109K ECG signals**. The model utilized **Z-score normalization** and **R-peak segmentation**, with validation performed using per-class metrics for both rare and common conditions.

2. RAG + AES: Secure AI Chatbot for Confidential Documents :

- **Developed a secure RAG pipeline** utilizing **quantized Hugging Face models, llama-index**, and **AES (Fernet) encryption**. This enabled **document-aware Q&A** with **87% top-1 accuracy**. Semantic retrieval was enhanced by approximately **32%** through **SBERT**, **chunking**, and **prompt tuning**, with the solution **deployed via Flask API** achieving **less than 2-second latency**.

3. Building a Chatbot using PyTorch and Natural Language Processing (NLP) :

- This project builds a **PyTorch-based chatbot** that uses **NLP** for **interactive**, **personalized** user engagement. It's applicable in various settings, including **customer service**, **online support**, or **personal assistance**.

PAPER PUBLICATIONS/CONFERENCE PRESENTATIONS :

- **Rithvika T**, Monish P, *"Ship Detection using SAR Images for Maritime Vigilance"*, **IEEE International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI)**, Chennai, India, 2025. *(Note: Prof. Poonkodi M. contributed as a co-author)*
  DOI: 10.1109/ICDSAAI65575.2025.11011861.
- **Rithvika T**, Monish P, Poonkodi M, *"Lung Disease Classification using Ensemble Transfer Learning and Grad-CAM for Visualization"*, submitted to **INSPECT 2025 – International Conference on Intelligent Systems, Pattern Recognition, and Edge Computing** *(under review)*.

CERTIFICATIONS :

- Introduction to Big Data | University of California at San Diego through Coursera
- Python for Data Science and Machine Learning Bootcamp | Udemy
- The Data Science Course 2023: Complete Data Science Bootcamp | Udemy
- SQL – MySQL for Data Analytics and Business Intelligence | Udemy

SCHOLASTIC THINGS :

- Selected for Smart India Hackathon (SIH)'23 for VITC : Team Lead & Finished 11th among 35 final teams out of 276 total teams from VITC Campus.
- Academic Topper during 9th Std
- Vice- Captain, Viking House, in 8th std

CLUBS & NON-ACADEMIC AFFILIATIONS :

- Treasurer, Board Member at IEEE Robotics & Automation Society, VIT Chennai
- Social Media Team Member, IEEE Women in Engg (WiE),VIT Chennai
- Management Team Member, IEEE Photonics Society Student Chapter, VIT Chennai
- Startup & Ideas Team Member, at Entrepreneur Cell (E-Cell),VIT Chennai
- Social Media Coordinator, PAN IIT Alumni Leadership Series(PALS),VIT Chennai

LANGUAGES KNOWN :

- English • Hindi • Telugu (Mother Tongue) • German (A-Level)

Sd/- (Rithvika Tiruveedhula)