# Rithvika Tiruveedhula

**Undergraduate BTech CSE (2021 - 25) student** at **School of Computer Sc & Engg (SCOPE),**
**Vellore Institute of Technology (VIT), Chennai, India.**
( **Linkedin:** https://www.linkedin.com/in/rithvikat ; **Personal Website**: https://shorturl.at/wG4NN )


**To,**
**The Head of the Group/Manager.**

**Sub: Highly Motivated** & **Enthusiastic individual seeking an opportunity, like any Jr AI ML Enggr / Jr Data Science Enggr roles.**

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**Respected Sir/Ma'am,**
**Greetings.**

I am Rithvika T, currently pursuing my **BTech Computer Science & Engineering** (2021-25) from **V**ellore **I**nstitute of **T**echnology (**VIT**), at Chennai campus, India , graduating by July, 2025.

I am reaching out to explore **any Junior AI/ML Engineer** or **any Junior Data Science Engineer** opportunities where I can make a valuable contribution to the team and hence the organization.
My academic background, hands-on internship experiences, and various academic and technical projects have equipped me with the technical expertise and adaptability required for these roles. (Please find all my project details are available on my Personal Website @ https://shorturl.at/wG4NN ).

1. I am **currently** an **AI/ML Intern** with the **TCS Optumera Retail Product** Team :
   Currently, as an AI/ML Intern in the TCS Optumera Retail Product Team, I have developed ***"Fine Grain Image Similarity (FGIS) Techniques for the Application of Retail Apparel Similarity Matching Requirement in the TCS Optumera Product Suite". For which developed*** a **Hybrid Deep Learning Model** - achieved **90% retrieval accuracy** for the image similarity matching problem.

2. Implemented an **AI/ML** based ***"ChestVision Tool to detect couple of Lung Diseases"*** **(Capstone Project-2)**
   *This work is under **Review** for **publication** at: IEEE International Conference on Intelligent Signal Processing & Effective Communication Technologies, INSPECT-2025*

3. Implemented an **AI/ML** based ***"Ship Detection using SAR Images for Maritime Vigilance"*** **(Capstone Project-1)**
   *This Work has been presented & **published** at: International Conference on Data Science, Agents and Artificial Intelligence (ICDSAAI) 2025.*

4. **Summer Internship** at **IOTA Analytics Pvt Ltd.,**
   During Nov'23 - Jan'24, I completed a **Summer Internship** at **IOTA Analytics Pvt Ltd.,** ( www.iotaanalytics.com) where I worked on AI, ML, and NLP projects, gaining practical exposure to cutting-edge algorithms and real-world data challenges. I have developed a Personal Identifiable Information(PII) recognizer & Named Entity Recognition (NER) system using Natural Language Processing (NLP) :
   - Implemented NLP algorithms for sensitive information extraction
   - Explored RAG-based generative AI/retrieval methods
   - Engaged in audio detection & eDiscovery tasks
   - Also built an UI & conducted API testing

Please find my CV following this Cover Letter for your kind consideration. I am very enthusiastic and eagerly look forward to find an opportunity to make a valuable contribution to the team and hence the organization **Sir/Ma'am**.

**Best Regards,**

Rithvika T,
BTech 4th Year Undergraduate Student (2021-25),
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# Rithvika Tiruveedhula

## CSE (2021 - 25) student at School of Computer Sc & Engg (SCOPE), VIT Chennai, India

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## 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 Apr, 2025)***

*This work is under Review for publication at: IEEE International Conference on Intelligent Signal Processing & Effective Communication Technologies, INSPECT-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. *( 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 **IEEE International Conference on Intelligent Signal Processing and Effective Communication Technologies, INSPECT-2025** ***(Under Review)***.

## CERTIFICATIONS :

- Introduction to Big Data | University of California at San Diego through Coursera
- The Data Science Course 2023: Complete Data Science Bootcamp | Udemy
- Python for Data Science and Machine Learning 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
- Management Team Member, IEEE Photonics Society Student Chapter, VIT Chennai
- Social Media Coordinator, PAN IIT Alumni Leadership Series(PALS),VIT Chennai
- Social Media Team Member, IEEE Women in Engg (WiE),VIT Chennai
- Startup & Ideas Team Member, at Entrepreneur Cell (E-Cell),VIT Chennai

## LANGUAGES KNOWN :

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

Sd/- (Rithvika Tiruveedhula)