Radha Krishna Deshpande
MS by Research, CSE
IIIT Hyderabad (2025–2028)

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Education

•MS by Research in Computer Science and Engineering *July 2025 – Present*
International Institute of Information Technology, Hyderabad

•Bachelor of Technology (B.Tech) - DTDP (IT Specialization) *July 2019 – June 2023*
Jawaharlal Nehru Architecture and Fine Arts University, Hyderabad June 2023

Work Experience

•Project Technical Personnel (L1), Junior Engineer
Center for Visual Information Technology, IIIT Hyderabad (On-site) August 2024 – Present

- **OCR Model Fine-Tuning:** Fine-tuned CRNN-based OCR models on domain-specific data, improving recognition accuracy for diverse and noisy inputs.
- **Large-Scale OCR Pipelines:** Built high-throughput pipelines to perform OCR on large corpora, enabling efficient, scalable text extraction from thousands of document images.
- **Search Engine Optimization:** Designed and optimized Elasticsearch-based search systems with custom analyzers and schema tuning for fast, accurate retrieval of OCR outputs.
- **Performance & Efficiency:** Reduced inference latency and improved model throughput through architecture-level optimizations and batch processing strategies.
- **End-to-End Automation:** Developed automated workflows for data preprocessing, model training, evaluation, and deployment, minimizing manual intervention.
- **Production Integration:** Collaborated with research teams to integrate OCR systems and search backends into real-world applications, ensuring usability and robustness.
- **Documentation & Reproducibility:** Maintained detailed technical documentation and modular codebases to ensure transparency, reusability, and smooth handoff.
- **Continual Innovation:** Explored emerging ML techniques, tools, and frameworks to iteratively enhance system capabilities and address evolving research needs.

•Junior Engineer
Center for Visual Information Technology, IIIT Hyderabad (On-site) May 2024 – August 2024

- **Web Scraping & Data Collection:** Developed efficient web scraping scripts to extract and organize large datasets from various websites, ensuring clean and usable data for model training and analysis.
- **Model Development & Fine-Tuning:** Built and fine-tuned machine learning models for different tasks, optimizing performance and accuracy through iterative testing and adjustment. Applied pre-trained models and adapted them to specific problems to achieve better results.

•Subject Matter Expert
Chegg India (Part-time, Remote) Feb 2024 – May 2024

- Provided expert guidance and support in various subjects in CSE, including open-source software and computer networks. Assisted students with complex problem-solving and in-depth understanding of course material, contributing to their academic success through detailed explanations and tailored assistance.

Projects

•Navigating Multilingual Printed Archives with OCRs and Language Models

- **Problem:** Enable accurate and reliable information retrieval from large-scale multilingual document archives (Hindi, English, Punjabi) where traditional IR systems fail due to OCR noise, language mismatch, and lack of contextual grounding.
- **Solution:** Designed CLiGRA, a hybrid cross-lingual retrieval and question-answering pipeline integrating lexicon-based search with LLM-based reasoning. The system retrieves relevant multilingual documents using keyword and semantic similarity, and generates grounded answers in the user's query language, reducing hallucination and improving contextual accuracy.
- **Tech Stack:** Python, NLP, OCR, FAISS, Vector Databases, Django REST API, NLTK.

•Tamil Handwritten Character Recognition .

View on Github

- **Problem:** Tamil handwritten character recognition is challenging due to the large number of character classes, variations in individual handwriting styles, and similarities between visually related characters. Existing systems often lack accuracy, user interaction, or real-time prediction capabilities for handwritten Tamil script recognition.
- **Solution:** To address this problem, we developed a Tamil handwritten character recognition system using a Convolutional Neural Network (CNN). The model is trained on the uTHCD Tamil handwritten character dataset containing 156 character classes. The system accepts handwritten input through a drawing canvas or uploaded images and predicts the corresponding Unicode Tamil character along with confidence scores. A Streamlit-based web application is integrated to provide an interactive and user-friendly interface with features such as freehand drawing, image upload, practice mode, and sample predictions.
- **Tech Stack:** Python, OpenCV, NumPy, scikit-image, CNN , Machine learning strategies .

•Image Processing for Detecting Gravitational Lensing Features .

View on Github

- **Problem:** Detect gravitational lensing features such as Einstein rings and arc-like structures from astronomical images, which are difficult to identify due to noise, low brightness, and complex backgrounds.
- **Solution:** Developed a fully automated image-processing pipeline integrating preprocessing, background subtraction, edge detection, Hough Transform, and contour-based geometric analysis to accurately detect and extract arc-like lensing features.
- **Tech Stack:** Python, OpenCV, NumPy, scikit-image, Image Processing, Hough Transform.

Publications

•Label-Free Adaptation of Indic Printed OCR (ICVGIP-2025)

- **Problem Statement:** Indic OCR systems require large labeled datasets, which are difficult and expensive to obtain for many low-resource Indic scripts.
- **Solution:** Proposed a self-supervised, label-free adaptation approach to improve OCR performance without relying on annotated training data.
- **Paper Focus:** Focused on domain adaptation, self-supervised learning, and improving recognition accuracy for multilingual Indic printed text OCR systems.
- Link for paper

•Reading Beyond OCR Noise: Robust Cross-Lingual RAG for Legislative Archives (CVIP-2026)

- **Problem Statement:** Historical legislative archives contain degraded scanned documents with complex layouts, multiple scripts, and visual noise, making accurate OCR and information retrieval challenging.
- **Solution:** Developed an end-to-end framework combining vision-based layout segmentation, multi-script OCR, and an agentic Retrieval-Augmented Generation (RAG) pipeline to improve information extraction and question answering.
- **Paper Focus:** Focused on robust OCR, document layout understanding, cross-lingual information retrieval, and agentic RAG for historical legislative archives. Evaluated the framework on the 200,000-page Punjab Vidhan Sabha archive.
- Link to Paper

Achievements

•Pre-Regional Math Olympiad Qualification

- Qualified for the Pre-Regional Math Olympiad during the second year of Intermediate studies, underscoring mathematical aptitude and commitment to academics.

Skills

Languages: Pseudo Code, C, C++, Java, Python, HTML, CSS
Machine Learning & CV: Model Development, Fine-Tuning, Machine Learning, Deep Learning, Computer Vision, TensorFlow, PyTorch, OpenCV
Web & Backend: Flask, Django, REST API, Bootstrap
Databases: SQL, MongoDB, MySQL, FAISS, Vector Databases
DevOps & Tools: Git, GitHub, AWS, Docker, VS Code
Core CS: Data Structures & Algorithms, Computer Networks, DBMS, Operating Systems
Soft Skills: Project Management, Communication, Leadership, Time Management, Adaptability, Problem Solving, Teamwork, Creativity