Suraj Rao

Hyderabad, India surajrao20@cse.iiitp.ac.in +91 8106250384
linkedin.com/in/surajrao2003 github.com/surajrao2003

EDUCATION

Bachelor of Technology in Computer Science and Engineering 2020-2024
Indian Institute of Information Technology, Pune, India
- ✓ *CGPA*: 8.09
- ✓ *Related coursework*: Data Structure and Algorithm, Object Oriented Programming, Machine Learning, Deep Learning, Database Management System

Higher Secondary (MPC) 2018-2020
Sri Chaitanya Junior College, Hyderabad, India
- ✓ *Percentage*: 96.7

Matriculation (CBSE) 2013-2018
Vikas The Concept School, Hyderabad, India
- ✓ *Percentage*: 87.6

EXPERIENCE

Research Associate Oct 2024 - Present
Indian Institute of Technology, Delhi, India
- ✓ Working on developing a robust algorithm to accurately detect occluded vehicles in Indian road scenarios to enhance autonomous vehicle systems.
- ✓ Conducted performance evaluation of transformer-based detection models, including **DETR**, **DINO**, **Co-DETR**, and **Grounding DINO**, on the RSUD20K dataset to identify model strengths and areas for improvement.
- ✓ Enhanced the RSUD20K dataset to include high occlusion scenarios (>50%) using Grounding DINO model predictions and manual refinement. Developed a Python-based GUI using **Tkinter**, significantly reducing manual annotation time.

Research Associate Intern Dec 2023-June 2024
Mantra Softech India Pvt Ltd, Bangalore, India
- ✓ Worked on improving and optimizing the AI pipeline for video surveillance.
- ✓ Conducted in-depth research to identify an optimal deep neural network for people count and recognition, suitable for constrained edge deployment.
- ✓ Employed optimization techniques such as **model pruning**, **quantization**, **multi-processing**, **frame filtering**, and **batch inference** for optimizing resource allocation and accommodating scalability for multiple cameras.
- ✓ Researched and evaluated open-source **GenAI** models, including **DALL-E Mini**, **Stable Diffusion**, **CLIP**, and various **LLMs**, to identify an effective solution for retrieving videos from a large database using text prompts.

PROJECTS

Smart Crop Yield Prediction GitHub Link
Skills: Python, Numpy, Pandas, Jupyter, Flask
- ✓ Developed a web application that uses **Machine Learning models** to predict the crop yield of over 60 crops.
- ✓ Training dataset (**2007-2020**) comprised parameters like location, soil type, temperature, humidity, nitrogen, phosphorus, potassium values in soil across India.

- ✓ Successfully employed **Random Forest Regression**, **Support Vector Regression**, and **XGBoost** and observed the individual performances.
- ✓ Integrated **XGBoost** with **Flask** framework to build a web application that assists farmers by providing estimates of crop yield.

Secure Cloud using Hybrid Cryptography GitHub Link

Skills: Python, RSA, AES, ECC, Cloudinary, Flask

- ✓ Studied and compared cryptographic algorithms such as **RSA**, **DES**, **AES**, **ECC**, **SHA**, and **Blowfish**.
- ✓ Developed a **Hybrid Encryption** technique that combines **RSA**, **AES**, and **ECC** algorithms to enhance data security and improve run-time efficiency.
- ✓ Designed a secure file storage system that encrypts the input file and stores it in the cloud using hybrid encryption.
- ✓ Integrated the system using **Flask** framework to store files securely in an online cloud storage system **Cloudinary**.

Human Face Detection GitHub Link

Skills: Python, OpenCV, Numpy

- ✓ Studied object detection and tracking techniques provided by the **OpenCV** library.
- ✓ Investigated deep learning alternatives for object detection, including **Fast-RCNN**, **MobileNet-SSD**, **YOLO**.
- ✓ Implemented a machine learning-based **Haar Cascade Classifier** to detect faces and demonstrated the algorithm's real-time performance using a webcam.

SKILLS

Languages

- **C, C++**:
- ✓ Data Structures and Algorithms (DSA) and Object-Oriented Programming (OOPS)
- **Python**:
- ✓ NumPy, Pandas, Matplotlib, Scikit-Learn
- **SQL**:
- ✓ Familiar with writing simple queries and basic operations

Tools

- **Git**
- **Linux OS**
- **VSCode, Jupyter Notebook, Anaconda**

Frameworks

- **PyTorch, TensorFlow, CUDA**:
- ✓ Deep learning and GPU acceleration
- **OpenCV**:
- ✓ Computer vision and image processing
- **NumPy, Pandas, Matplotlib, Scikit-learn**:
- ✓ Data manipulation and visualization
- **ONNX, Nvidia TensorRT, OpenVINO**:
- ✓ Model deployment and optimization
- **NLP and GenAI**:
- ✓ Transformer-based models: BERT, GPT, DETR, DINO, Grounding DINO
- ✓ Large Language Models (LLMs)
- ✓ Open-source generative models: DALL-E Mini, Stable Diffusion, CLIP