Veeraraju Elluru

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I am a Junior pursuing Computer Science and Engineering at the Indian Institute of Technology, Jodhpur. I love AI research and Math. My main areas of interest are Generative Modeling and 3D Computer Vision, including GANs, diffusion models, scene understanding, MoCap, pose estimation, and Face Recognition on realistic distributions.
"AI may be the solution to the "Meta-problem" which unlocks solutions to countless other problems."
∼ Andrej Karpathy.

Experience

Image Analytics and Biometrics Lab   **IIT Jodhpur**
Undergraduate Research Assistant, PI - Dr.Mayank Vatsa   *October 2024–Present*

- Project Statement - "Controllable and guided Face synthesis to tackle in-the-wild Face Recognition"

CDA, University of Illinois Urbana Champaign   **UIUC**
Undergraduate Research Intern, PI - Dr. Tiago Bresolin   *May 2024–Aug 2024*

- Led a research project - "Towards Self-supervised Latent Representations for Livestock Image Segmentation".
- Developed two Image Segmentation pipelines leveraging few-shot, self-supervised algorithms on general cattle datasets, to mitigate the need for extensive human annotations. These pipelines incorporated non-contrastive learning algorithms like **Bootstrap Your Own Latent**, and **Generative Modeling**, to generate precise masks for out-of-distribution cattle, at scale. Stitched a parallel regression network for several downstream tasks like body weight and feed intake prediction.
- Achieved **SoTA** on the data-specific segmentation - a 6% improvement in mean Jaccard scores, against Supervised models on the cross-species proprietary datasets.

Fluxgen Technologies   **Bengaluru**
Machine Learning and Data Analyst Intern   *June 2023–July 2023*

- Converted raw data from the live dashboard to an analyzable dataset - end-to-end EDA.
- Used historical data for training of models like **Isolation Forest** and **OC-SVM** to obtain anomaly labels. Compared this with statistical analytics, and performed Anomaly Detection using KMeans.
- Created high-impact industry standard decks with in-depth solutions for water level optimization for clients like Tata Steel, and achieved **14%** (avg.) water conservation m/o/m at 3 different plants.

Education

Academic Qualifications

Indian Institute of Technology Jodhpur   **Jodhpur**
Bachelor of Technology Computer Science and Engineering , CGPA: 9.45   *2022–2026*
Sri Kumaran Children's Home   **Bengaluru**
High School, 97%   *2018–2022*

Projects

- **Research Project(Ongoing):** *'Flow-based generative models for simulating nuclear particle showers'*
  In collaboration with Conseil Européen pour la Recherche Nucléaire (CERN)

- **Project Focal:** *An automated Image Tagging Application for ATREE*

  ATREE, a prestigious NGO with research scientists and botanists who have captured the taxonomy of the diverse Indian Flora, is actively funded by Nandan Nilekani while being headed by Prof. Kamaljit Bawa (UMass Boston). This project focused on building an algorithm to tag millions of proprietary images. The feature developed was integrated into the upcoming Plants of India website. Latency for image retrieval via search from the **EC2** databases was reduced by 23%.

- **Software Engineering Course Project:** *'RTCams'*

  Worked on an end-to-end real-time camera-based attendance management leveraging the **Django** framework (with MySQL server). The Facial Recognition system comprises **dlib, OpenCV, and a pre-trained ResNet101 model** for real-time attendance monitoring and feature extraction, mitigating the need to capture attendance manually. Key features also include a **proprietary proxy detection algorithm** and 3-way attendance status (Present, Absent, Proxy). The developed model achieved a **multi-class precision of 0.94** (across all courses) with an **inference time** of **50ms** for face recognition. [GitHub]

- **Pattern Recognition and Machine Learning Course Project:** *'Comprehensive analysis of feature extractors and classifiers for multi-class classification on the LFW dataset'*

  The goal of the project was to investigate various feature extraction methods, such as Histogram of Oriented Gradients (HOG), Local Binary Patterns (LBP), and Convolutional Neural Networks (CNNs), and their combinations for face recognition. Additionally, we explored the performance of different machine learning classifiers, including K-Nearest Neighbors (KNN), MLPs, Naive Bayes, Support Vector Machines (SVM), and tree-based algorithms like XGBoost on the standard LFW dataset. [GitHub]

Technical skills

- **Languages:** Python, C, C++ | HTML, CSS, JS | SQL
- **Frameworks:** PyTorch (well-versed), Tensorflow | Standard Machine Learning libraries suite, OpenCV | Django
- **Industry Software Skills:** Git and VCS | Hugging Face | Figma | HPCs - NVIDIA GPUs, Slurm
- **Other:** Agile with SCRUM, Cloud - AWS (EC2) and Hadoop

Coursework

- Pattern Recognition and Machine Learning: Grade: A
- Mathematics for Computing (Intro to Discrete Mathematics). Grade: A-
- Probability, Statistics, and Stochastic Processes. Grade: A, Linear Algebra. Grade: A

Certifications

- **Advanced Computer Vision with Tensorflow**: Stanford, Coursera
- **Machine Learning Specialization**: Stanford, Coursera
- **Deep Learning A-Z 2023**: Udemy

Miscellaneous

- Spearheaded the AI and ML Events veritcal at IIT Jodhpur's annual, national level, technical festival - Prometeo '24. Gathered 2000+ registrations, and gave away prizes worth INR 100000.
- Volunteered at Asia's Premier and Leading Edge Product Engineering Practices Conference - Agile India 2023, Bengaluru, India