Sudhanva Manjunath Athreya

Github | LinkedIn | Website | Email ID | +1 801-634-3173

Research Interests

Foundational Machine Learning, Recommender Systems, TinyML, Computational Topology, Computational Biology, AI in Healthcare

Summary

I'm a lifelong student who's highly interested in technology and mathetmatics.

Education

2020 - 2024 Bachelor's in Computer Science at **Reva University, Bangalore** (GPA: 8.9/10)
2024 - 2026 Master's in Computer Science at **University of Utah, Salt Lake City** (GPA: 3.8/4)

Work Experience

MTN Biometrics - Machine Learning Intern Jan 2025 - Present

- Worked on "Summit," an ETL pipeline for processing and cleaning high-volume biometric data streams.
- Designed interactive visualization components for real-time monitoring and analysis of biometric data.
- Designed and deployed a RESTful API for the Summit platform, enabling seamless data and pipeline access for downstream applications.

Scientific Computing and Imaging (SCI) Institute - Student Researcher Jan 2025 - Present

- Working under Prof. Paul Rosen to interpret deep learning models using techniques from computational topology.
- Used persistent homology to analyze the structure of activation spaces in models like Vision Transformers (ViTs) and ResNets.
- Created multiple visualization techniques based on Sankey diagrams, Dendrograms, and Force-directed graphs to visualize the topological features.
- Presented this work as a poster at SCI-X 2025, titled "Interpreting Deep Learning Models using Persistent Homology".
- Currently developing a Python package and dashboard to make these methods a standard tool for model-agnostic explainability and interpretability.

Medical Machine Intelligence Lab - Student Researcher Dec 2024 - Present

1. Working under Prof. Warren Pettine to build EHR and Genomic Foundational models.
2. Developed a Mixture-of-Experts (MoE) based foundational model to efficiently predict patient timelines from EHR data.
3. Presented this work as a poster at AI Summit 2025, titled "Efficient EHR Foundational Models: A Mixture-of-Experts Approach for Patient Timeline Prediction".

Siemens - Computer Vision Research Intern Jun 2023 - Jun 2024

- EdgeAI : A research project where the bridged domains of ML and Compilers were explored.
  1. Created a unified file-format for Siemens for model storage and faster loading using protobuf.
  2. Created pipelines incorporating techniques such as chunking, memory-mapping & lazy-loading to reduce memory-consumption during inference.
  3. Created inference and quantization pipelines.
- AI4Safety Edge : A Siemens monitoring application for edge ecosystems.
  1. Setup Deepstream pipeline and components on Jetson Orin Nano and Siemens Edge cameras.
  2. Coupled a rule engine which recorded violations.
  3. Quantized detection and zero-shot models and integrated it into the Deepstream pipeline.
  4. Created Gstreamer plugins to integrate Owl-ViT into Deepstream.
  5. Created a scene understanding pipeline using LVMs (CLIP)
  6. Explored VisualSLAM, ORB-SLAM, SfM, Photogrammetry, COLMAP, NeRF, Gaussian Splatting for 3d-Scene reconstruction.
- AI4Safety : A Siemens Surveillance product for factories and logistics environments.
  1. Dataset curation, training & evaluation.
  2. Created custom Discrete Correlation Filter-based tracker and integrated it with the Deepstream pipeline.
  3. Model optimization - Pruning, Quantization & Palletization
  4. Data de-duplication, Denoising & Augmentation pipelines
  5. Actively contributed in the creation of a rule-engine
  6. Created Homography pipeline to perform object tracking in a BEV (Birds-Eye-View) plane.
  7. Created and tested Deepstream plugins
- SpeCT Analysis : Scintillation Crystals defect analysis framework.
  1. Created a MLops dasboard, API, datastore and containerized the application.
- Domains : Computer Vision, Deep Learning, Software development
- Technologies : OpenCV, Nvidia Deepstream, Nvidia TensorRT, YOLO, Pytorch, C++, Docker, Kafka

Tata Elxsi - NLP Intern Jul 2022 - Oct 2022

- LMS Recommendation System : Recommendation system for Tata Elxsi LMS platform
  1. Used SLiM (Sparse Linear Methods) for collaborative-filtering.
  2. Creation of Responsive React UI for the recommendation page.
  3. Creation of Flask API, mongoDB user database integration & containerization.
- VideoPeek
  1. Created a search page similar to Google Key moments for LMS platform
  2. Made use of Haystack framework & Milvus DB to setup semantic search pipeline
  3. Setup Whisper pipeline to transcribe new courses & add it to the vector DB
- Domains : NLP, Software development
- Technologies : Python, Haystack, Pytorch, ReactJS, MongoDB

Reva University - Junior Research Fellow @ NLP Lab Dec 2022 - May 2024

- Revival of Sharada scripture (funded by DST under SHRI)
  1. Ongoing project which aims to revive Sharada scripture used in the Kashmir region by the Kashmiri Pandits to write Sanskrit and Kashmiri Manuscripts
  2. Creation of HTR system using CTPN-CRNN & CTC loss.
  3. Creation of custom customized augmentation pipeline specific to handwritten text.
  4. Transliteration of Sharada Scripture.
  5. Creation of a web portal for awareness.
- Domains : Computer Vision, NLP, Deep Learning
- Technologies : OpenCV, Tesseract, YOLO, Pinecone, Tensorflow, Pytorch, Pillow

Projects

DS-Checker Domain : NLP, Software Development

Created as a year-end Project (1st year Bachelors). It calculates the similarity between documents and displays it. It was mainly created to check the plagiarism among the project papers submitted by the students. Initially, the documents were embedded using TF-IDF values and then passed through a cosine similarity function to determine their similarity. The system allowed users to upload documents through a PHP-based website. Later, the project was migrated to utilize Longformer embeddings, and the user interface was revamped using streamlit.

Big Lens Domain : Computer Vision, Deep Learning, Web Development

Created as a year-end Project (2nd year Bachelors). This open-source reverse-image search engine was designed to emulate popular services like Google, Yandex, Bing, and Tineye. Initially, it made use of APIs of previously mentioned services. Eventually, the project was transitioned to employ Content-Based Image Retrieval (CBIR), similar to the approach used by Yandex. A VGG19 model was for feature extraction and streamlit interface could be used to interact with the model. hsnwlib along with sqlite was integrated which allows for a fast nearest neighbor search.

Kailāsaḥ Domain : NLP, Deep Learning, Web Development

Created as a project for the Sambhasha Sanskrit Conference. Kailāsaḥ is a website which performs Sanskrit Sandhi split. Sandhi's are similar to contraction in English, used extensively in Sanskrit to speak quickly and smoothly by condensing large sentences. It is one of the projects done for DST, Govt. of India. It makes use of a CRNN model to perform word splitting. The project has a streamlit interface. It also provides with the required contextual meaning of base words.

Hestia Domain : NLP, Software Development

Hestia is an extension for your browser which allows you to search your bookmarks and bookmark folders. The extension can be downloaded from the Firefox add-on store. The extension performs a search on the bookmarks to return the results

Publications

"Using Deep Learning Techniques to Evaluate Lung Cancer Using CT Images" (Jan. 2022). In: *SN Computer Science*. URL: https://doi.org/10.1007/s42979-022-01587-y.

"Machine Learning Techniques to Detect DDoS Attacks in IoT's, SDN's: A Comprehensive Overview" (June 2023). In: *International Journal of Human Computations and Intelligence*. URL: https://doi.org/10.5281/zenodo.8027034.

Events

Paninian Grammar and its Applications	Demonstrated Kailāsaḥ tool (14th Feb 2023)
SIEMENS Shift healthcare hackathon finalist (Nov 2022)	Led a team where we built a hospital bed queueing and allocation linear model. We also build a React based dashboard to manage the hospital. (18th Nov 2022)
Generative AI and Cybersecurity FDP Seminar (Jul 2023)	Gave a talk on Zero-shot learning in Computer Vision Applications during the 5-day Faculty Development Program.

Honors & Grants

DST SHRI 2022

- DSP/TDT/SHRI-14/2021
- Date: 13 December 2021
- An Artificial Intelligence based system for the preservation,restoration and translation of the prominent Sharda literature of Jammu and Kashmir
- Working under Dr. Nimrita Koul on the project funded by the Govt. Of India, Department of Science and Technology(DST) - Science and Heritage Research Initiative (SHRI)

Others

JLPT N5 2022 - Japanese Language Proficiency Test