Neeresh Kumar Perla

Research Assistant, PhD Student

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EDUCATION

- **University of Massachusetts Dartmouth** Dartmouth, MA
  Ph.D. Student in Computer and Information Science *Jan. 2024 - 2029 (Expected)*
- **University of Massachusetts Dartmouth** Dartmouth, MA
  MSc. in Data Science *Jan. 2023 - Dec. 2023*

RESEARCH INTEREST

• Diffusion Models • Computer Vision • Transfer Learning • Adversarial Machine Learning

ONGOING RESEARCH

I am broadly interested in the intersection of computer vision and deep learning. My research primarily involves controlling the generative process offered by different image generation frameworks.

EXPERIENCE

University of Massachusetts Dartmouth, Dartmouth MA Jan. 2023 - present

- **Research Assistant** *(2023 – present)*
  Mentor: Ming Shao
  - Conducting research to enhance the controllability of generative processes in diffusion models
  - Enhancing transfer learning for time series analysis by developing and applying transformer-based models to boost model performance and prediction accuracy
- **Research Assistant** *(2023)*
  Mentor: Collin D. Capano
  - Utilized Apple Silicon for gravitational wave data analysis on developing an Apple Silicon cluster for gravitational wave astronomy
  - Conducted rigorous benchmarking and performance tuning to achieve superior results in signal detection and data processing, enhancing the precision and efficiency of research in gravitational wave astronomy

Cognizant, Hyderabad, India

- **Programmer Analyst** Mar. 2021 - Dec. 2022
  - Performed data validation and developed tailored SQL scripts, significantly decreasing query execution time
  - Engineered automation scripts to verify accuracy between insurance costs and system-calculated values
- **Data Engineer Intern** Feb. 2020 - Sep. 2020
  - Gathered and processed a substantial dataset comprising movie-related information, encompassing user ratings, movie details, and user profiles, to support comprehensive analysis and research
  - Utilized Apache Spark's MLlib library to implement the ALS algorithm and engineered the data pipeline to transform and preprocess the dataset, ensuring data quality and compatibility with the ALS model

WingfoTech Pvt. Ltd, Hyderabad, India May. 2019 - Jul. 2019

- **Artificial Intelligence Intern**
  - Self-learned and developed a strong understanding of various machine learning algorithms, including decision trees, random forests, support vector machines, and neural networks.
  - Developed data preprocessing pipelines to improve dataset quality and optimized model performance through feature engineering, dimensionality reduction, and hyperparameter tuning

ACADEMIC & PERSONAL PROJECTS

- **Early Sepsis Prediction with Transformers -** ***PyTorch, Transformers, Transfer Learning***
  - Utilized state-of-the-art transformer architectures to diagnose sepsis up to 6 hours before clinical onset
  - Improved model performance by employing domain adaptation techniques to better generalize across patient data between different hospitals
- **Vulnerabilities of Exemplar-Based Class Incremental Learning Models -** ***PyTorch, CNNs***
  - Developed and implemented a novel black-box attack framework targeting the exemplar set of CIL models under conditions where only hard-label predictions were available
  - Conducted extensive experimental evaluations across various exemplar-based incremental learning algorithms, revealing significant vulnerabilities to poisoning-based attacks using a zero-overlapping dataset
- **3D Images Classification -** ***TensorFlow, Video Vision Transformers***
  - Implemented a Multi-View Transformer with cross-view attention and MLP fusion from scratch for video recognition to classify abdominal CT scans
- **Image Captioning -** ***TensorFlow, Text Transformer, Vision Transformer***
  - Developed an Custom Image Captioning model with a pre-trained Vision Transformer for feature extraction and a custom Transformer for generating captions, and built a UI that accepts images and displays the generated captions
- **Patch Attack -** ***PyTorch, CNNs***
  - Identified and manipulated key patches in images using mutual information and input diversity techniques

SKILLS

- **Programming** Python, Java, C, Bash, LaTeX
- **Data Handling** numpy, pandas, matplotlib, seaborn, plotly
- **Tools & Frameworks** Conda, PyTorch, Tensorflow, Azure, AWS

PUBLICATIONS

[1] **NK. Perla**, MI. Hossain, A. Sajeeda and M. Shao. Are Exemplar-Based Class Incremental Learning Models Victim of Black-box Poison Attacks? in Winter Conference on Applications of Computer Vision (WACV 2025) **(ACCEPTED)**