Arushi Sinha

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EDUCATION

Johns Hopkins University — Baltimore, MD
Master of Science in Electrical and Computer Engineering — May 2024 (Expected)
GPA: 3.7/4

Manipal Institute of Technology — Manipal, India
Bachelor of Technology in Electronics and Instrumentation Engineering — June 2022
GPA: 8.95/10

Courses: Machine Perception, Machine Intelligence, Deep Learning, Machine Learning for Signal Processing, Compressed Sensing and Sparse Recovery, Image Processing and Analysis, Digital Signal Processing, Computer Vision, Neural Network and Fuzzy Logic, Data Structures with C++, Web Programming.

SKILLS

Programming: Python, SQL, C/C++, MATLAB, Bash (Linux Shell Scripting), HTML, CSS

Libraries: PyTorch, Pandas, NumPy, Matplotlib, Seaborn, Scikit-Learn, Hugging Face, Diffusers, PyTorch Lightning, XGBoost, Random Forest, WandB

Techniques: Classification, Regression, Clustering, Feature Engineering, Data Manipulation, Data Visualization, Domain Adaptation, Generative AI

EXPERIENCE

Artificial Intelligence for Engineering and Medicine Lab — Baltimore, MD
Deep Learning Research Assistant Intern (*Adaptive Human-Robot Teaming*) — February 2023 – Present
Advisor : Prof. Rama Chellappa

- Bridging the synthetic-to-real domain gap using conditional Stable Diffusion and Vision-Language model for improved performance of classification and action recognition models.
- Trained Stable Diffusion v1-5 model using DreamBooth and Textual Inversion to learn the features of target domain images.
- Translated synthetic images using this personalized SD v1-5 model conditioned with ControlNet and BLIP captioning.
- Trained a Swin-Transformer model for image classification using these translated images.
- Raised the classification test accuracy by 25.81% when compared with no adaptation method.

Baker Hughes — Mumbai, India
Wireline Logging Services Intern — January 2022– May 2022

- Collaborated with geologists and geophysicists to effectively locate the presence of hydrocarbons (oil and natural gas) in the earth's formation.
- Performed manual data extraction of log data by identifying anomalies.
- Cleaned and pre-processed this data using Borehole correction charts.
- Accurately estimated fluid saturation levels across the depth of oil well by log interpretation to identify the hydrocarbon zone.

ACADEMIC PROJECTS

Predicting Ejection Fraction of heart using Segmentation guided Video Vision Transformers — Spring 2023

- Automated the process of predicting heart diseases using echocardiogram video analysis.
- Segmented the left ventricle region in 10,031 echocardiogram videos using DeepLabv3 segmentation model.
- Trained a video vision transformer on these segmented videos to predict the Ejection Fraction (EF) per frame.
- Achieved a mean absolute error (MAE) of 5.81 with this method when compared with the ground truth EF.
- Achieved an area under the curve (AUC) of 93% on using these predictions to classify healthy and at-risk patients by using an EF of 35 as threshold.

Image Quality Enhancement Using Machine Learning — Fall 2022

- Trained a diffusion model to upscale face and endoscopic images while maintaining image quality.
- Achieved a 10.47% decrease in RMSE on upscaling face images using this method compared to the baseline RDN method.
- Achieved a 7.77% decrease in RMSE on endoscopic images when compared with RDN method.

Defense Mechanisms Against Adversarial Attacks in Computer Vision — Fall 2022

- Developed a robust image classification model resistant to adversarial attacks.
- Achieved a test accuracy of 80% using this ResNet18 model on CIFAR-10 test set without adversarial attacks.
- Implemented several adversarial attacks: Gaussian Noise, Fast Gradient Sign Method, Carlini-Wagner, and Projected Gradient Descent on this model.
- Built a defense algorithm against gaussian noise attack which improved test classification accuracy by 8.33%.