VARSHINI REDDY

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EDUCATION

MS in Data Science

Harvard University · Cambridge, MA · GPA - 3.89

B Eng in Computer Science & Engineering National Institute of Engineering • India • GPA - 3.94

WORK EXPERIENCE

Machine Learning Intern Memorable AI

• Developed an automated recommendation system which leveraged object segmentation, image in-painting, and saliency techniques to analyze the importance of elements in a frame and make personalized recommendations for improving memorability of image and video advertisements. Achieved a significant improvement of 15% in the memorability score.

Research and Teaching Fellow

Harvard University

• Applied convolutional and sequential language models to predict the physical parameters of a black hole with an R square of 0.98. • Understanding how uncertainty is quantified in various Deep Bayesian models like Spectral-Normalised Neural Gaussian Process and Monte Carlo Dropout to help identify and classifying images as OoD and/or adversarial.

Research and Teaching Fellow Univ AI

· Developed and implemented a reinforcement learning-based approach to classify and prioritize transient objects, enabling informed decision-making regarding the allocation of limited spectroscopic resources among other resources.

• Worked with Prof. Achuta Kadambi and Prof. Protopapas to develop an ML and AI based academic program for working professionals.

Research Associate

Indian Institute of Science

• Predicted churn with an AUC of 0.98 using various ML models by analyzing the behavior of customers through features based on social influence and changes in call usage patterns and social groups.

• Employed community detection algorithm to system call graphs to extract features from the communities using social network properties like centrality measures (degree, betweenness, eigenvector, etc.) to predict malware classes with an accuracy of 0.97.

• Proposed a novel approach to hash PE 32 files to form n-grams for the bloom filter to be used as feature vectors to compare different ML techniques for the detection and classification of malware variants of known malware families. An accuracy of 97.31% was achieved.

Research and Development Intern Hewlett Packard Enterprise

· Performed a Forensic Analysis of Security Attacks through a comprehensive survey of attack types, mode of occurrence and efficient methods to analyze them. Proposed an efficient and scalable algorithm to prevent a DoS attack which reduced necessary compute by 13%.

PUBLICATIONS

Mask Conditional Synthetic Satellite Imagery

11th International Conference on Learning Representations, 2023 (Accepted), DOI: 10.48550/arXiv.2302.04305

Success of Uncertainty-Aware Deep Models Depends on Data Manifold Geometry International Conference on Machine Learning. PMLR 162 (2022)

Malware detection and classification using community detection and social network analysis Journal of Computer Virology and Hacking Techniques, 1-14, DOI: 10.1007/s11416-021-00387-x

Hybrid Behavioural Features for Churn Prediction in Mobile Telecomm Networks with Data Constraints Proceedings of the Second International Conference on Security and Privacy, ISEA-ISAP 2018, DOI: 10.1007/978-981-13-7561-3

Simulation of Lane-switching in Self-Driving Automobiles IJSRCSEIT 2018, DOI: 10.32628/CSEIT184634

SKILLS

Python, C, C++, Javascript, HTML, Tensorflow, PyTorch, Pandas, Numpy, Scikit-Learn, OpenCV, Keras-RL, OpenAi Gym, Matplotlib, MySQL, MongoDB, CSS, Git, AWS

August 2018 - January 2020

Iune 2022 - August 2022

September 2021 - Present

June 2020 - July 2021

August 2016 - March 2017

2014 - 2018

2021 - 2023

RELEVANT PROJECTS

Mask Conditional Synthetic Satellite Imagery

Microsoft AI for Good Lab · September 2023 - December 2023

• Generated high resolution synthetic satellite images using the SPADE GAN architecture and verified the results using downstream object segmentation task.

Understanding the Effects of Biological Predispositions in Human Vision in Thwarting Adversarial Attacks

MIT · February 2022 - May 2022

• Developed and implemented a novel approach that leveraged insights from human vision to learn more robust feature representations for object recognition tasks.

· Achieved a 15% increase in accuracy against adversarial attacks compared to previous state-of-the-art models.

Log Polar Vision Models

MIT · February 2022 - May 2022

· Leveraged insights from human vision to develop a model that more closely mimics the visual processing of the human brain.

• Achieved a 23% increase in classification precision through appropriate human trials, demonstrating the effectiveness of the log polar approach.

Uncertainty Quantification for Feature Selection using Multi-Armed Bandits

Harvard University • September 2021 – December 2021

• Developed an effective feature selection process for datasets with large predictors but few data-points using multi armed bandits, which reduced the classification uncertainty by 19%.

Geographic Topology Extrapolation using Generative Adversarial Networks

Indian Institute of Science · April 2019 - November 2019

• Developed a GAN model that extrapolated the topology of a city to locate potential hot-spots for new lakes to be dugout to recharge groundwater & reduce the likelihood of flooding of low-lying areas.

Botnet Prediction

Indian Institute of Science • January 2018 – July 2018

• Created and deployed an algorithm to predict the presence of botnets or botmaster targets in a network of interconnected user systems with an accuracy of over 93% using sensor fusion networks.

Quantum Machine Learning to Mitigate the Machine Learning Adoption Barriers

National Institute of Engineering • June 2017 - August 2017

• Investigated potential applications of quantum machine learning algorithms to overcome challenges in large data processing, training overhead, and other areas of machine learning.

• Studied the mathematics governing the quantum annealing, quantum topological algorithms and quantum NN classification.

Analysis of Similarity Measures for Collaborative Filtering Recommendation

December 2016 - March 2017

• Implemented a User-Based Collaborative Filtering (CF) mechanism to determine ideal similarity indices (Manhattan distance, Pearson Correlation etc) for different data forms by comparing the Mean Average Recall.