Hrishikesh Viswanath | CV

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Education

Purdue University, West Lafayette
PhD in Computer Science, GPA - 3.80/4 — *January 23 - Present*

Purdue University, West Lafayette
MS in Computer Science, GPA - 3.83/4 — *August 2021 - May 2023*

PES University, Bangalore
B. Tech In Computer Science And Engg, CGPA – 9.03/10 — *August 2017 - May 2021*

Work Experience

ResconAI
Machine Learning Intern — *Summer 22*

Experimented with Neural Operator architectures in Python(Pytorch) for solving general elliptic PDEs. Collaborated with researchers from MIT and Cambridge University. The end goal was to design Neural Operator based models to solve general elliptic and other forms of PDE.

Purdue University
Graduate Teaching Assistant — *Jan 2022 - Present*

GTA for CS 502 Compilers course at Purdue University. Mentoring students with LLVM based USCC compiler project, built with C++
GTA for CS 590VR - Guided students with rendering Unity generated scenes on Oculus
GTA for CS251 - Data structures

Cisco Systems
Technical Undergraduate Intern — *Jan - Jul 2021*

- Built a web based service to automatically analyze router performance data
- Engineered an alerter service with NodeJS frontend Listener service and Webex plugins to ping engineers on Webex. Built a frontend with Django
- Implemented an NLP engine with python to allow users to obtain router testbed details through an interactive chatbot
- Developed an orchestrator service to process Cisco's project-wide Allure and Jenkins logs and a mediation service to connect the chatbot and the frontend dashboard
- Improved efficiency and reduced man hours of the team by having approximately 60% of the sanity runs successfully auto analyzed
- Won the "Connected Recognition" award for building a tool that benefited everyone on the team

Research Projects

Trajectory Prediction for Robot Navigation using Flow-Guided Markov Neural Operator
Summer 23

- Modelled the movement of crowds as a dissipitative chaotic system
- Designed a markov process to determine the positions of individuals as a function of current time step
- Integrated a neural operator based architecture to model the markov process for robot navigation
- https://arxiv.org/pdf/2309.09137.pdf

Graph-based Decentralized Task Allocation for Multi-Robot Target Localization
Summer 23

- Integrated elements of Graph Neural Operator with Graph Attention Network to capture long range interactions between agents
- Enabled a fully decentralized communication architecture in partially observable multi-agent multi-target task allocation and path planning jobs.
- https://arxiv.org/pdf/2309.08896.pdf

ARTEMIS: AI-driven Robotic Triage Labeling and Emergency Medical Information System
Summer 23

- Designed a lightweight neural network based architecture for mobile search and rescue robots for automatic triage labeling
- Built an end-to-end prototype for triage labeling and communicating with emergency responders
- https://arxiv.org/pdf/2309.08865.pdf

AffectEcho: Speaker Independent and Language-Agnostic Emotion and Affect Transfer for Speech Synthesis
Summer 23

- Designed a Vector Quantized codebook for representing emotions with better interpretability in terms of valence, arousal and dominance
- Enabled Language agnostic and speaker independent translation of emotion that allows the model to mimic the reference speaker's information in the same valence-arousal-dominance space as the reference speaker, but with the same style as the input speaker
- https://arxiv.org/pdf/2308.08577.pdf

AdaFNIO: Adaptive Fourier Neural Interpolation Operator for video frame interpolation
Fall 22

- Designed Neural Operator based architecture for interpolating video frames in a resolution independent manner and beat SOTA architectures
- Combined flow based neural rendering with neural operator for better generalization at higher resolution
- https://arxiv.org/pdf/2211.10791.pdf

FairPy: A Toolkit for Evaluation of Social Biases and their Mitigation in Large Language Models

Fall 22

- Developed a plug and play python package for detecting and mitigating social biases (gender, race etc.) in large pretrained Language Models (BERT, GPT-2 etc.)
- The purpose of the toolkit was that there was a lack of generalized multi purpose mathematical tools that were available for direct use. Converted existing mathematical tools from specific purpose to general purpose by decoupling them from datasets and Language models.
- Decoupled detection metrics, models, bias-type and template datasets to allow greater interoperability
- Built template classes and wrapper classes for further expansion of the codebase, with the intent of creating a large open source package similar to Cafy and Scikit Learn
- Improved accessibility of various mathematical tools and techniques to machine learning end users
- https://arxiv.org/pdf/2302.05508.pdf

Rendering 2d images to 3d point clouds (Python, Tensorflow)

Fall 2020

- Designed Neural Network Architectures (CapsNet, GAN, Autoencoder) to generate depth maps from RGB images and render point clouds.
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- Improved the quality of the point clouds at the blindspots of 2d images using Kinekt sensors.

Publications

Trajectory Prediction for Robot Navigation using Flow-Guided Markov Neural Operator
Bhaskara R., Viswanath H., Bera A (2023)

Graph-based Decentralized Task Allocation for Multi-Robot Target Localization
Peng J., Viswanath H., Tiwari K., Bera A. (2023)

ARTEMIS: AI-driven Robotic Triage Labeling and Emergency Medical Information System
Kotha S., Viswanath H., Tiwari K., Bera A (2023)

AffectEcho: Speaker Independent and Language-Agnostic Emotion and Affect Transfer for Speech Synthesis
Viswanath H., Bhattacharya A., Jutras-Dube P., Gupta P., Prashanth M., Khaitan Y., Bera A. (2023)

AdaFNIO: Adaptive Fourier Neural Interpolation Operator for video frame interpolation
Viswanath, H., Rahman, M. A., Bhaskara, R., Bera, A. (2023).

Neural Operator: Is data all you need to model the world? An insight into the impact of Physics Informed Machine Learning
Viswanath, H., Rahman, MA., Vyas, A., Shor, A., Medeiros, B., Hernandez, S., Prameela, S.E., Bera A., (2023).

FairPy: A Toolkit for Evaluation of Social Biases and their Mitigation in Large Language Models
Viswanath, H., Zhang, T., (2022).

Twitter Spam Review Detection Using Hybrid Machine Learning Techniques.
Viswanath, H., Singh, R., & Gupta, V. (2022). In ICDSMLA 2020 (pp. 331-342). Springer, Singapore.

Study of using hybrid deep neural networks in character extraction from images containing text.
Preethi, P., Mamatha, H. R., & Viswanath, H. (2021). Trends Comput Sci Inf Technol, 6(2), 045-052.

Video Frame Rate Doubling Using Generative Adversarial Networks.
Bharadwaj, A. R., Gourisaria, H., & Viswanath, H. (2021). In Computer Communication, Networking and IoT (pp. 463-474). Springer, Singapore.

Skills

Strengths: Machine Learning, Neural Operators, Graphics, Deep Learning, Computer Vision, Neural Audio Rendering, Large Language Models

Deep Learning: Transformers, Attention Learning, Large Language Models, VQ-VAE, StyleGAN, Graph Attention Networks, Neural Operators, Diffusion, Consistency models, NeRF

Programming Languages: C++, C, Python3, Java, Javascript

Machine Learning Frameworks: Keras, Tensorflow, ScikitLearn, Pandas, Numpy, Transformers, Pytorch, Huggingface

Web Frameworks: NodeJS, NPM, Vue, React, Flask, Django, REST APIs, Chai, Mocha

Graphics: Unity

Cloud Computing: RabbitMQ, Zookeeper, AWS, MongoDB, Docker

Dev: Git, Allure, Jenkins, Google Colab