Rachaell Nihalaani

385-457-9192 | Personal Website | rachaellnihalaani@gmail.com | linkedin.com/in/rachaell-nihalaani | github.com/RachaellNihalaani

Education

University of Utah — Salt Lake City, UT
Masters in Computer Science, Thesis Track, 3.77 GPA — *Aug 2022 – May 2024*
Relevant Courses: Advanced Algorithms, Machine Learning, Artificial Intelligence, Human-AI Alignment

Thadomal Shahani College of Engineering — Mumbai, India
Bachelors in Computer Engineering, 9.43 GPA — *Aug 2018 – May 2022*
Relevant Courses: Data Structures and Algorithms, Computer Networks, Database Management

Indian Institute of Technology, Madras — Remote, India
Diploma in Data Science — *Nov 2020 – Dec 2022*
Relevant Courses: Predictive Analysis, Data Visualization, Business Analytics, Statistical Modeling

Indian Institute of Technology, Madras — Remote, India
Diploma in Programming — *Nov 2020 – May 2022*
Relevant Courses: Full Stack Development, Advanced SQL, Database Design, Web and API Development

Technical Skills

Programming Languages: Python, HTML, CSS, Java, C/C++
Developer Tools: Git, Docker, GPT-4, OpenAI, CUDA, Apache Kafka
Libraries: PyTorch, TensorFlow, NumPy, Pandas, Matplotlib, Keras, SciPy, Scikit-Image, SimpleITK, OpenCV, Pillow, Monai
Additional Skills: Experience with VTK, ParaView, SQL, PowerBI, and Hugging Face
Research Skills in: Deep Learning, Computer Vision and Machine Learning

Professional Experience

Graduate Research Assistant — Aug 2022 – Present
Scientific Computing and Imaging (SCI) Institute, University of Utah — *Salt Lake City, UT*

- Initiated and led collaborative projects under Dr. Shireen Elhabian, focusing on advancing 3D medical image analysis through developing and refining semi-supervised image registration networks, significantly enhancing segmentation propagation techniques on complex 3D medical imaging data.
- Spearheaded a study on the integration of 5 uncertainty quantification (UQ) methods into 2 slice propagation methods for medical image analysis. This study focused on enhancing the trustworthiness of these methods with minimal expert supervision. Demonstrated that incorporating UQ improves predictive accuracy and confidence estimation.
- Mastered a toolkit including Python, PyTorch, TensorFlow, on a 24GB RAM NVIDIA GPU A4000, employing OpenCV and Scikit-Image to develop imaging solutions with expertise in deep learning and 3D computer vision.

Machine Learning Intern — Nov 2020 – Feb 2021
Bristlecone India Ltd. — *Mumbai, India*

- Engineered the use of Power Automata flows, automating complex workflows and dramatically increasing productivity and efficiency for 2 clients across diverse sectors.
- Demonstrated proficiency in leveraging automation tools and machine learning concepts to devise high-impact solutions.

Projects

Estimation of Slice Propagation Uncertainty in 3D Anatomy Segmentation | *Masters Thesis* — Aug 2022 – Present

- Authored a pioneering study on integrating uncertainty quantification (UQ) into slice propagation for 3D anatomy segmentation to enhance trustworthiness with minimal expert supervision. The paper is under review at *The Medical Image Computing and Computer Assisted Intervention Society (MICCAI) 2024*.
- Implemented five UQ methods, demonstrating significant improvements in model trustworthiness and segmentation accuracy, with methods like Concrete Dropout showing a notable increase in Dice Similarity Coefficient (DSC) by up to 1.04% over baseline models.
- Revealed critical failure modes through detailed uncertainty analysis, providing actionable insights for model improvement. Our evaluations showed a pronounced performance drop in accuracy by over 10% when propagating segmentation beyond 20mm from the annotated slice, highlighting areas for future enhancements.
- Currently collaborating on extensions to this work to explore domain variation impacts on uncertainty estimation and adapt UQ techniques for better handling slice propagation challenges.

Shared Control for Assistive Manipulation — Jan 2024 – Present

- Modeled an advanced shared control system for assistive devices by leveraging sophisticated computer vision algorithms, enhancing real-time object detection and tracking precision by over 30% in dynamic environments.
- Collaborated with a cross-disciplinary team to integrate this system into robotic manipulators, improving system responsiveness and user control accuracy in test scenarios, leading to a 25% increase in manipulation efficiency for assistive tasks.