Dr. Tanmay Randhavane

SENIOR SOFTWARE ENGINEER / MACHINE LEARNING RESEARCHER

Redmond, WA, USA

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7 years of researching, developing, and implementing novel solutions to challenging interdisciplinary problems. Expertise in creating simulations and synthetic datasets, designing and applying machine learning algorithms for robotics, autonomous vehicles, and computer vision. Created 100s of datasets to solve the data challenge in ML development and published 30+ highly-cited interdisciplinary scholarly articles.

Expertise

Expertise Software Engineering and Development, Computer Vision, Machine Learning, Artificial Intelligence, Robotics, Autonomous Vehicles, Computer Graphics, Mixed Reality, Synthetic Data, Virtual Agents

Skills Python, PyTorch, Azure ML, C, C++, C#, Java, Maya, Unity, Unreal Engine, MATLAB, LaTeX, Git, Visual Studio, Linux

Work Experience

Microsoft   *Redmond, WA*
SENIOR SOFTWARE ENGINEER   *September 2020 - Feb 2023*
- Built an end-to-end, iterative pipeline to create synthetic computer vision datasets using digital content creation tools (Maya). Implemented algorithms to compute ground truth labels, created synthetic dataset consumption and visualization libraries, and designed efficient and intuitive dataset formats that enable automatic iteration of the computer vision training process.
- Generated $100s$ of synthetic datasets for Microsoft HoloLens and external companies across different industries and scenarios - Entertainment: People Safety, Industrial: Object tracking, Defect Detection. Worked closely with customers to achieve improved accuracy in object detection and human detection scenarios by generating data in challenging environments, corner cases, a variety of lighting conditions, etc.
- Collaborated with Microsoft Research to understand which aspects of the synthetic data generation are important in getting high performance in object detection tasks. This enables synthetic data generators to perform well-informed cost-benefit trade-offs between resource allocation and the trained model accuracy. The analysis and the associated datasets are under review at the biggest computer vision conference.
- Managed a summer intern who built a robotics pipeline that allowed an agile robot to find objects in the wild (99.18% accuracy) and detect defects (75.64% accuracy). The intern achieved all their primary and stretch goals and decided to return to Microsoft for a full-time position.

Microsoft Research   *Redmond, WA (Virtual Internship)*
RESEARCH INTERN   *May 2020 - July 2020*
- Developed a novel algorithm that allows users to puppeteer their virtual avatar by performing normal conversational gestures in front of a webcam. Built MoveBox , an open-sourced toolbox for animating motion captured movements onto the Microsoft Rocketbox library of avatars.

University of Maryland   *College Park, MD*
FACULTY ASSISTANT   *January 2020 - May 2020*
- Developed a novel data-driven metric to detect deception based on gaits and gestures. Released the findings as a dataset (DeceptiveWalk).

GAMMA Research Group, UNC   *Chapel Hill, NC*
RESEARCH ASSISTANT   *August 2015 - December 2019*
- Social Perception of Pedestrians: Developed novel mathematical models for the perception of emotions, dominance, friendliness, and approachability of pedestrians using non-verbal movement cues such as trajectories, gaits, gestures, gazing. These models predicted the social perception characteristics with an accuracy of $> 80\%$ and had an improvement of 21% in pedestrian path prediction.
- Socially-Aware Robot Navigation: Researched novel algorithms for socially-aware robot and autonomous vehicle navigation that incorporate social perception of pedestrians. Robots following this algorithm avoided $10 - 30$ intrusions on the pedestrians' personal/social space compared to the state-of-the-art algorithms with $< 30\%$ overhead on the task completion time.
- Virtual Agent Simulation: Developed novel algorithms for the simulation of virtual agents with different emotions, dominance, and friendliness levels. These algorithms resulted in $5 - 10\%$ improvement in AR/VR experience as measured by the social presence metric.
- Released a labeled dataset of walking gaits (EWalk) and published $20+$ research articles.

Snap Inc.   *Venice, CA*
RESEARCH INTERN   *May 2018 - August 2018*
- Researched novel algorithms to identify emotions from RGB videos using LSTM-based deep features and psychology-based affective features. Developed data-driven algorithms to simulate a variety of emotions for virtual agents using gaits and gazing. A comparative user evaluation showed that they can significantly increase the users' sense of presence.

Amazon Development Center   *Bangalore, India*
SOFTWARE DEVELOPMENT INTERN   *May 2014 - July 2014*
- As part of the Amazon Fulfillment Technologies (AFT) team, developed a user-friendly framework that provided the ability to efficiently create functional and integration tests, generate mock messages, and publish them to corresponding queues.

Education

M.S & Ph.D. in Computer Science   *Chapel Hill, NC*
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL (ADVISOR: PROF. DINESH MANOCHA)   *November 2019*
- **Thesis**: Social Perception of Pedestrians and Virtual Agents Using Movement Features

B.Tech. in Computer Science (with Honors and Minor in Statistics)   *Mumbai, India*
INDIAN INSTITUTE OF TECHNOLOGY BOMBAY   *May 2015*