NINAD KHARGONKAR

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EDUCATION

2019 - Present: **University of Texas at Dallas**, *Ph.D. in Computer Science* - Intelligent Robotics and Vision Lab

2017 - 2019: **University of Massachusetts, Amherst**, *M.S in Computer Science*

2013 - 2017: **Indian Institute of Technology (IIT) Kanpur**, *B.S. in Mathematics and Scientific Computing*

WORK EXPERIENCE

Machine Learning/AI Internship – *Covariant.ai*

Jan 2024 - May 2024 | Emeryville, CA

- Worked as a researcher in problem domain of AI-based robotics for warehousing and logistics operations
- Explored generative models like VAE and Latent Diffusion for robot grasp generation from real-world inputs
- Building robot foundation models that can deal with multi-modal inputs like text and images

Research and Development Internship – *Kitware Inc.*

Jun 2022 - Aug 2022 | Remote

- Researched machine learning algorithms for approximating medial skeleton of point clouds & voxels
- Implemented UNet based segmentation models for skeletonizing 2D images and adapted them for 3D setting
- Demonstrated improved results via point-cloud skeletonization on data from hippocampi and leaflet regions

Graduate Research Assistant – *University of Texas at Dallas*

Aug 2019 - Present | Dallas, TX

- Researcher in Intelligent Robotics & Vision Lab, working on robot grasping, 3D vision and learning from humans
- Concurrent research on interactive perception for unseen object segmentation in cluttered environments
- Prior work on submodular information measures for machine learning problems in data selection & active learning
- Involved in mentoring students, working as a teaching assistant and taking guest lectures in selected courses

Mitacs Globalink Research Internship – *University of Manitoba, Winnipeg*

May 2016 - Jul 2016 | Winnipeg, Canada

- Studied the problem of graph sampling and extracting relevant statistics like clustering coefficient
- Implemented scale-down sampling with like Metropolis-Hastings and Jump random walks in R
- Statistical models like ERGM were used for producing model fits and simulating random networks
- Worked on second project for simulating team performance and biases in a football tournament structure

TECHNICAL SKILLS

Programming Languages: Python, C/C++, R

Frameworks/Libraries: PyTorch, ROS, CUDA, IsaacGym, Unity, OpenGL

Development Tools: Git/GitHub, Docker, VS Code, Vim, Tmux, LaTeX, Pandoc

RESEARCH PROJECTS

Interactive Perception | *Unseen Object Segmentation*

- Leveraging long term robot interaction with objects for real world unseen object segmentation
- Proposed self-supervised data collection method to improved real world segmentation performance

- Extended the method to utilize uncertainty in segmentation for minimizing number of interactions

Object Manipulation | *Robust Grasping & Skill Transfer*

- Learning a common representation across different robot gripper grasps for efficient skill transfer
- Proposed object contact-based metric learning constraints for effective learning in common space
- Demonstrated applications for human to robot grasp trasnfer via our encoding + retrieval pipeline

Robot Benchmarking | *Perception, Grasping & Motion Planning*

- Developed an intuitive method for replicable, real-world scenes of objects for robot benchmarking
- Implemented scene generation pipeline in simulation with focus on cluttered but graspable scenes
- Extened 10 existing methods across pose estimation, segmentation and grasping for real world experiments

Submodular Information Measures | *Robust Machine Learning*

- Proposed novel information theoretic measures for submodular set functionsin context for robust machine learning
- Theoretical properties backed up with applications on outlier aware subsets, summarization & clustering tasks
- Follow up works demonstrated computer vision applications in active learning for object detection

RELEVANT PUBLICATIONS

1. MultiGripperGrasp: A Dataset for Robotic Grasping from Parallel Jaw Grippers to Dexterous Hands, *In IEEE International Conference on Intelligent Robots and Systems (IROS) 2024*.
2. RISeg: Robot Interactive Object Segmentation via Body Frame-Invariant Features, *In IEEE International Conference on Robotics and Automation (ICRA) 2024*.
3. SceneReplica: Benchmarking Real-World Robot Manipulation by Creating Replicable Scenes, *In IEEE International Conference on Robotics and Automation (ICRA) 2024*.
4. CIS2VR: CNN-based Indoor Scan to VR Environment Authoring Framework, *In IEEE International Conference on AI & extended and Virtual Reality (AIxVR) 2024*.
5. Self-Supervised Unseen Object Instance Segmentation via Long-Term Robot Interaction. *In Robotics: Science and Systems (RSS), 2023*.
6. Skeletal Point Representations with Geometric Deep Learning. *In IEEE International Symposium on Biomedical Imaging (ISBI), 2023*.
7. NeuralGrasps: Learning Implicit Representations for Grasps of Multiple Robotic Hands. *In Conference on Robot Learning (CoRL), 2022*.
8. Virtepex: Virtual Remote Tele-Physical Examination System. *In ACM SIGCHI Conference on Designing Interactive Systems (DIS), 2022*.
9. Submodular combinatorial information measures with applications in machine learning. *In International Conference on Algorithmic Learning Theory (ALT), 2021*.

OTHER EXPERIENCE

Professional Service:

- Reviewer for CoRL, ICRA, IROS, IEEE VR, ACM MM, ICMR, ICHI
- Workshop organizer for Workshop for Neural Representation Learning for Robot Manipulation at CoRL 2023

Teaching Assistant: Machine Learning, Robotics, Computer Graphics, NLP, Statistics for Data Science

Mentorship: Peer mentor for new PhD students at UT-Dallas and member of Counselling Service at IIT Kanpur

ACHIEVEMENTS & AWARDS

- Awarded the competitive IEEE RAS Travel Grant and UTD Graduate Student Assembly travel award.
- Recipient of Inspire scholarship awarded by Govt. of India for academic performance at IIT Kanpur.
- Awarded the Mitacs Globalink scholarship for summer research internship in Canada.
- Secured a percentile score of 97.7 in JEE (Advanced)-2013 and a percentile score of 99.8 in JEE (Main)-2013 national engineering entrance examinations.