Ninad Khargonkar

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EDUCATION

Doctor of Philosophy, Computer Science, University of Texas at Dallas, GPA: 3.8/4.0   **Aug 2019 — May 2024**
Master of Science, Computer Science, University of Massachusetts Amherst, GPA: 3.9/4.0   **Aug 2017 — Jun 2019**
Bachelor of Science, Mathematics & Computing, Indian Institute of Technology (IIT), Kanpur, GPA: 8.4/10.0   **Jul 2013 — Jun 2017**

TECHNICAL SKILLS

Programming Languages   Python, C++, C# (Unity), R
Frameworks/Libs   PyTorch, ROS, Unity, OpenCV, OpenGL
Tools & Software   Git/GitHub, LaTeX, VsCode, Pandoc, Linux
Relevant Coursework   Machine Learning, Deep Learning, Computer Vision, Optimization, Robotics, Computer Graphics.

RESEARCH EXPERIENCE

Internship: R&D Engineer at Kitware Inc.   **Summer 2022**
- Summer research internship on an open-ended problem of 3D medical data analysis. Experimented with deep learning models for 3D images (voxels) and point clouds.
- I worked on novel algorithms for skeltonization of 2D and 3D inputs with applications to hippocampi and leaflets data. Prepared technical report for submission to IEEE ISBI.

Encoding Robot Grasps on Objects   **2022 —**
- Working on learning a representation for object-centric grasps to encourage a similarity measure and interpolation on the encoding.
- Creating a new data set for object-gripper pairs across kinematically different robot grippers and utilizing the simulation software *GraspIt!* to generate candidates for feasible grasps.

Remote Strength Assessment & Pose Estimation   **2021 — 2022**
- Developed exergame system for contact-less assessment for human body joints via Kinect based force estimation.
- Force estimated via tracking joint angles from Kinect and feeding to an inverse dynamics solver. Providing visual feedback via exercise games developed with Unity C#.

Submodular Information Measures   **2020 — 2021**
- Investigated properties of submodular set measures inspired from information theory and associated optimization problems in the context of applications towards robust machine learning.
- The proposed measures were shown to be applicable for tasks like data subset selection with robustness to outlier data, query based summarization, clustering and partitioning.
- Studied the optimization problem of Data Subset Selection via validation data loss. Used gradient approximation schemes in algorithm design and showed utility on logistic regression and deep neural network image classifiers.

PUBLICATIONS

- NeuralGrasps: Learning Implicit Representations for Grasps of Multiple Robotic Hands. In Conference on Robot Learning (CoRL) 2022.
- Virtepex: Virtual Remote Tele-Physical Examination System. In ACM Designing Interactive Systems Conference (DIS) 2022.
- Generalized Submodular Information Measures: Theoretical Properties, Examples, Optimization Algorithms, and Applications. In IEEE Transactions on Information Theory, 2021.
- Submodular combinatorial information measures with applications in machine learning. In Algorithmic Learning Theory, 2021.

CODING PROJECTS

Faster Chow-Liu Tree Inference   **Python, Numpy**
- Designed & analyzed approximate algorithms for faster inference in Chow-Liu tree graphical model. The approaches focused on sub-quadratic time minimum weight spanning tree computation and compared well against the optimal setting. Report & Code

Marching Cubes – 3D Surface Reconstruction   **C++, OpenGL**
- Coded a base version of marching cubes algorithm for 3D iso-surface extraction in OpenGL with a GUI (nano gui) for selecting the grid resolution, and iso-value for the volumetric data. Improved the visual results via a better representation for vertex normal by averaging over faces for the vertex. Report & Code

Random Sampling for Joins   **Python, Numpy**
- Implemented the "*Random sampling over joins revisited*" paper (Acm Sigmod 2018). Runtime performance of three sampling methods (rejection sampling and random-walk like schemes) was compared to the full-join case. Report & Code