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Nilesh Kulkarni

Education

University of Michigan, Ann Arbor, USA — Sept. 2019 - April 2024 (Expected)
Ph.D. in Computer Science, EECS
- Advisors: Prof. David Fouhey, Prof. Justin Johnson

Carnegie Mellon University, Pittsburgh, USA — Aug. 2017 - Aug. 2019
Masters in Robotics, Robotics Institute, School of Computer Science
- CGPA: 4.05/4.0
- Advisor: Prof. Abhinav Gupta

Indian Institute of Technology Bombay, Mumbai, India — Jul. 2011 - Jul. 2015
Bachelor of Technology (B.Tech), Computer Science and Engineering with Honours
- CGPA: 8.77/10
- Minor in Electrical Engineering
- Advisor: Prof. Suyash Awate, Prof. Ganesh Ramakrishnan

Interests

My research interests are to understand and learn the 3D structure and interactions in the visual world with minimal supervision from images, and raw data. Topics: *Computer Vision, Machine Learning*

Professional Experience

Waymo Research, Mountain View, CA	Jun. 2023 - Aug 2023
Research Intern, Preception Research	Xinchen Yan and Charles Qi
Google Research, Mountain View, CA	May. 2022 - Dec 2022
Research Intern, Scene Understanding Team	Prof. Leonidas Guibas
Samsung Research, Seoul, South Korea	Sept. 2015 - Jun. 2017
Research Engineer, AI Lab	Prof. Jihie Kim
Samsung Research, Seoul, South Korea	May 2014 - Jul. 2014
Research Intern, AI Lab	Choonoh Lee
Technical University of Braunschweig, Branunschweig, Germany	May 2013 - Jul. 2013
Research Intern, Algorithms Group	Prof. Sándor P. Fekete

Publications

NIFTY: Neural Object Interaction Fields for Guided Human Motion Synthesis
Nilesh Kulkarni, Davis Rempe, Kyle Genova, Abhijit Kundu, Justin Johnson, David F. Fouhey, Leonidas Guibas
Arxiv, 2023

Learning to Predict Scene-Level Implicit 3D from Posed RGBD Data
Nilesh Kulkarni, Linyi Jin, Justin Johnson, David F. Fouhey
CVPR, 2023

What's Behind the Couch? Directed Ray Distance Functions (DRDF) for 3D Scene Reconstruction
Nilesh Kulkarni, Justin Johnson, David F. Fouhey
ECCV, 2022

Collision Replay: What does bumping into things tell you about the scene geometry?
Alexander Raistrick, **Nilesh Kulkarni**, David F. Fouhey
BMVC, 2021 (Oral)

Implicit mesh reconstruction from unannotated image collections
Shubham Tulsiani, **Nilesh Kulkarni**, Abhinav Gupta
Preprint, 2021

Articulation-Aware Canonical Surface Mapping
Nilesh Kulkarni, Abhinav Gupta, David F. Fouhey, Shubham Tulsiani
CVPR, 2020

Canonical Surface Mapping via Geometric Cycle Consistency
Nilesh Kulkarni, Abhinav Gupta*, Shubham Tulsiani*
ICCV, 2019

3D-RelNet: Joint Object and Relational Network for 3D Prediction
Nilesh Kulkarni, Ishan Misra, Shubham Tulsiani, Abhinav Gupta

ICCV, 2019

On-Device Neural Language Model based Word Prediction
Seunghak Yu*, **Nilesh Kulkarni***, Haejun Lee, Jihie Kim
27th International Conference on Computational Linguistics: System Demonstrations (COLING 2018)

Syllable-level Neural Language Model for Agglutinative Language
Seunghak Yu*, **Nilesh Kulkarni***, Haejun Lee, Jihie Kim
Empirical Methods in Natural Language Processing, Workshop on Subword and Character Level Models, (EMNLP 2017)

Robust Kernel Principal Nested Spheres
Suyash Awate*, Manik Dhar*, **Nilesh Kulkarni***
23rd International Conference on Pattern Recognition (ICPR 2016)

Research and Development of Matsya 4.0, Autonomous Underwater Vehicle
Technical Report, International Robosub Competition, 2015

* – Shared Authorship

Achievements

- Secured an **All India Rank 77** in IITJEE-2011 (amongst 0.5 million students)
- Certified as among the **Top 1%** in India, in the Indian National Chemistry Olympiad and Indian National Physics Olympiad, 2011
- Awarded Institute Technical Color (**7** among 9000), 2014
- Awarded Institute Technical Special Mention (**15** among 9000), 2013
- Awarded the Tata Welfare Trust Scholarship for Graduate Studies, 2017

Professional Service

Reviewer
- CVPR 2020, 2021, 2022, 2023
- ECCV/ICCV 2019, 2020, 2022
- NeurIPS 2020, 2021
- 3DV 2019, 2022

Teaching
- AI4ALL 2021

Research Projects

Articulation Canonical Surface Mapping Jun. 2019 - Dec 2019
Research Assistant, University of Michigan Advisor: David Fouhey
- Designing a method to recover shape and pose without keypoint supervision
- Uses the structure of template category shape to get the articulated versions of the template shape

Canonical Surface Mapping Oct. 2018 - Mar 2019
Research Assistant, Robotics Institute Advisor: Abhinav Gupta
- Designing a method to perform correspondence matching without keypoint or multi-view supervision
- Uses the structure of mean category shape to map pixels in the image to mean-shape in 3D

3DRelNet, Joint Object and Relationship Network for 3D Mar. 2018 - Sept 2018
Research Assistant, Robotics Institute Advisor: Abhinav Gupta
- Improved 3D Reconstruction given a single image of the scene on standard metrics by 6 mAP points on the SUNCG dataset and by 3 mAP points on the NYUv2 dataset
- Designed a method to incorporate inductive biases set in indoor-scenes.

Conversational Modelling, Customer Care Assistant Dec. 2016 - Jun. 2017
Samsung Research, Seoul, South Korea
- Designed a siamese network with multi-objective cost to improve classification for in-domain data along increasing robustness to out-of-domain data
- Researched on various deep learning conversational models to improve conversation contexts

Natural Language Modelling, Smart Input Panel Mar. 2016 - Nov. 2017
Samsung Research, Seoul, South Korea
- Designed language models for English and Korean using Recurrent Neural Nets (RNNs)
- Optimized the model for memory and inference time constraints on mobile devices

• Obtained better on-device keyboard predictions benchmarks than existing solutions and was rolled out to millions of users and deployed on all Samsung smart phones paper1 paper2

Distributed Linear Programming Boost (LPBoost) Jul. 2014 - May 2015
Undergraduate Dissertation, IIT Bombay Advisor: Ganesh Ramakrishnan
• Designed a distributed LP Boost (D-LPBoost) algorithm
• Implemented the algorithm using two paradigms: data and hypothesis space parallelism
• Formulated a master-slave solution with each slave working on a subset of hypotheses. report code

Kernel Principal Nested Sphere (KPNS) Jul. 2014 - May 2015
Undergraduate Research Project, IIT Bombay Advisor: Suyash Awate
• Designed KPNS, a kernel space statistical procedure
• KPNS transforms data to independent un-correlated modes of variation called Principal Spheres
• Achieved better results on downstream tasks of model-compactness, dimensionality reduction, classification paper

Online Triangulation using a Swarm of simple Robots May 2013 - Jun. 2013
Research Intern, Technical University of Braunschweig Advisor: Sándor P. Fekete
• Improved algorithms for exploring unknown areas using a swarm of simple robots
• Minimized overall error in navigation and localization, allowing for complicated maneuvers

Matsya, a Autonomous Underwater Vehicle(AUV) Jun. 2012 - Jul. 2015
IIT Bombay & Naval Research Board, India Advisor: Leena Vachhani
• Developed an Autonomous Underwater Vehicle to compete at International Robosub
• Team Leader - 2014: Led a 40 member team across three suv-divisions: Electronics, Software & Mechanical
• Software Leader - 2013: Led a sub-division of 5 members, to ensure full-stack software development for the AUV
• Three time semi-finalist at Robosub - 2013, 2014, 2015 paper website

Teaching & Mentoring

• Teaching Assistant CS 210 Logic Design, IIT Bombay
• Teaching Assistant Workshop on Parallel Programming conducted by NVIDIA at IIT Bombay
• Technical Mentor mentored 4 teams on technical projects
• Department Academic Mentor mentored 9 sophomores
• Electronics Club Coordinator club catering to hobby electronics at IIT Bombay

Salient Courses

• **CMU**: Introduction to Machine Learning (10701), Visual Learning and Recognition (16824), Computer Vision (16720), Math Fundamentals for Robotics (16811)
• **IITB**: Topics in Machine Learning, Digital Image processing, Artifical Intelligence, Algorithms, Signal processing, Medical Image Processing