

EDUCATION

University of Southern California

Doctor of Philosophy (PhD), Electrical Engineering Advisor – C.-C. Jay Kuo

Research interests – 3D point cloud analysis and compression

Aug. 2020–May 2023

Los Angeles, CA

University of Southern California

Master of Science (Honors), Electrical Engineering GPA – 3.91

Relevant coursework – Multimedia Compression, Computer Vision, Machine Learning, Deep Learning

Aug. 2018–May 2020

Los Angeles, CA

Savitribai Phule Pune University

Bachelor of Engineering, Electronics and Telecommunication GPA – 3.90

Aug. 2014–May 2018

Pune, India

RESEARCH EXPERIENCE

Sony

Applied Research Intern

Aug. 2022–present

San Jose, CA

- Developed a sparse convolution based predictor network for inter-prediction in dynamic dense point cloud compression.
- Achieved rate control in deep learning based point cloud compression methods using rate conditional convolutions.
- Proposed unified neural network architecture and joint training strategy for I- and P-frame compression.

InterDigital

Research Intern

May 2022–Aug. 2022

New York, NY

- Designed intra-/inter-mode decision module for dynamic point cloud compression.
- Proposed training of scene flow estimation methods with unsupervised RD loss for dynamic point cloud compression.
- Improved performance of conventional G-PCC method for dynamic LiDAR compression using deep learning techniques.

USC Media Communications Lab

Research Assistant

May 2019–May 2022

Los Angeles, CA

- Collaborated in research and development of unsupervised and feedforward feature learning method for 3D point clouds.
- Proposed methods for scene flow estimation, LiDAR odometry, point cloud registration and pose estimation.

PROJECTS

Multimedia compression algorithms | C++

- Implemented compression algorithms like Shannon Fano, Huffman, Adaptive Huffman coding, Binary Arithmetic Coder, QM Coder and JPEG.
- Experimented with different motion estimation and rate control methods in H.264 video compression.

Structure from Motion (SfM) for 3D reconstruction | Python, OpenCV

- Reconstructed 3D point clouds of historic structures from pairs of images.
- Performed keypoint matching using SIFT and kNN, pose estimation from essential matrix and SVD, and triangulation.

Region based photorealistic image style transfer | Python, PyTorch

- Trained PSPNet on MIT ADE20K dataset for semantic segmentation of content and style images.
- Implemented segment-wise image stylization using Whitening and Coloring transform.

TECHNICAL SKILLS

Languages – Python, C++, Matlab, LaTeX

Libraries – PyTorch, Open3D, Minkowski Engine, OpenCV, Scikit-learn

Certifications – Deep Learning Specialization (Coursera)

RECENT PUBLICATIONS

- PCRP: Unsupervised Point Cloud Object Retrieval and Pose Estimation. *IEEE International Conference on Image Processing (ICIP), 2022* [Paper]
- GreenPCO: An Unsupervised Lightweight Point Cloud Odometry Method. *IEEE International Workshop on Multimedia Signal Processing (MMSP), 2022* [Paper]
- R-PointHop: A Green, Accurate and Unsupervised Point Cloud Registration Method. *IEEE TIP, 2022* [Paper]
- 3D Point Cloud Analysis: Traditional, Deep Learning and Explainable Machine Learning Methods. *Springer* [Book]

ACHIEVEMENTS AND SERVICE

Awards – Masters Honors Fellowship, Best Project in Deep Learning

Teaching Assistant – Digital Image Processing (Spring'22), Linear Algebra (Fall'21)

Reviewer – IEEE ICIP, Springer Nature, APSIPA TSIP, ISPRS Journal on Photogrammetry and Remote Sensing