Xuyi MENG

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University of Pennsylvania, U.S.

EDUCATION

University of Pennsylvania, U.S. Aug 2023 – (Expected) May 2025
M.S. in Computer and Information Science

Nanyang Technological University, Singapore Aug 2019 – May 2023
B.S. in Computer Science (with Highest Honor Distinction)

RELEVANT MODULES: Linear Algebra (A+), Probability and Statistics (A+), Discrete Math (A+), Advanced Algorithms (A+), Algorithms (A+), Data Structures (A+), Operating Systems (A), Advanced Computer Architecture (A+), Data Science and Artificial Intelligence (A), Neural Network & Deeplearning (A), Computer Vision (A)

RESEARCH INTERESTS

3D scene representation, 3D content generation, point cloud detection and segmentation, computer graphics, robotics; algorithms.

RESEARCH EXPERIENCE

Graduate Research Assistant Aug 2023 – Present
GRASP Lab (General Robotics, Automation, Sensing, & Perception Lab @ University of Pennsylvania), U.S.

- Investigated the integration of advanced and efficient mathematical representations to enhance the speed of 3D scene content generation.
- Conducted experiments to assess the feasibility of this approach, particularly focusing on head avatars within the developed 3D generation pipeline.

Final Year Project Jan 2023 – May 2023
MMLab (Multimedia Laboratory @ Nanyang Technological University), Singapore

- Developed a novel approach aimed at acquiring a 3D representation of the human body from monocular videos, optimized for real-time rendering on lightweight mobile devices.
- Successfully mitigated the need for extensive computational resources, enabling deployment on diverse lightweight mobile devices, including mobile phones, iPads, and laptops, achieving impressive speeds of up to 108 FPS.
- Reconstructed a flexible mesh representation for the human body, facilitating seamless animation even for unseen poses.

Undergraduate Research Program Mar 2022 – May 2023
MMLab (Multimedia Laboratory @ Nanyang Technological University), Singapore

- Studied the encoder-based 3D GAN inversion problem. Analyzed failure cases in existing GAN inversion methods and addressed their advantages and limitations.
- Proposed to retrofit GAN as supervision to alleviate data sparsity problem; applied pixel-level feature alignment for high-fidelity inversion and designed a series of strategies to facilitate training.
- Submitted the study to CVPR 2023 as the second author, as the first public project to study encoder-based 3D GAN inversion and achieve high-quality performance.

Student Research Intern June 2022 – Nov 2022

Su Lab, University of California San Diego, United States

- Led a project of 3D geometry and material learning through 2D supervision, fostered the material properties and local structures learning of 3D particles in the physics simulation process.
- Proposed a differentiable 3D super-resolution rendering module using sparse 3D point clouds to produce high-quality 2D renderings. The rendering quality is comparable with water-tight mesh and can be generalized to multiple categories without extra computational cost.
- Submitted the study to CVPR 2023 as the first author.

WORK EXPERIENCE

Visual Intelligence Scientist Intern May 2021 – Dec 2021

*Agency for Science, Technology and Research (A*STAR), Institute for Infocomm Research (I2R), Singapore*

- Simplified 3D point cloud instance segmentation from the current two-stage methods to one-stage, further integrated with semantic segmentation using the same pipeline.
- Replaced traditional point aggregation on euclidean distance, introduced implicit 3D instance embedding learned from attention mechanism.
- Achieved comparable 3DIoU scores with the state-of-the-art methods on ScanNet-v2 benchmark using minor computational cost.

ACADEMIC PROJECTS

Real-time Face Swapping and Sticker Decorations Nov 2023 – Dec 2023

- Developed a cutting-edge Generative Adversarial Network (GAN)-based model for achieving high-fidelity face swapping in video.
- Implemented facial expression triggers to dynamically apply stickers to target regions.
- Engineered a comprehensive pipeline capable of seamlessly processing webcam video streaming in real-time.

Robotic Arm for Remote Control in Bio-Chemistry Lab May 2021 – Sep 2021

- Designed a prototype robotic arm that can be remotely controlled to perform elementary operations in the biology and chemistry labs, such as adding solvents to the given amount, heating, water bath, shaking and moving test tubes.
- Implemented a user-friendly graphic interface and used Wi-Fi to send control signals.

Algorithm Innovation: Find Top-K Nearest Hospitals Oct 2020 – Nov 2020

- Proposed a multiple-marking mechanism to return an input number of nearest hospitals for each location in a city represented by a directional unweighted graph, significantly reduced time. complexity from $O(N^N)$ of the original searching algorithm to $O(N + E)$ as well as saved space complexity.
- Introduced an idea of object-oriented node representation to the graph to store necessary information.

PUBLICATIONS

Self-Supervised Geometry-Aware Encoder for Style-Based 3D GAN Inversion
CVPR 2023 accepted (project page)
SPNR: Generalizable Sparse-Point Neural Rendering
CVPR 2023 submission

EXTRACURRICULAR ACTIVITIES

NTU Chinese Orchestra 2019 – 2023

- Held special concert "Winter to Spring" at Sigapore SOTA hall in memory of the covid era.
- Served as the Publication and Publicity committee to organize concerts and events.
- Participated in international competitions and awarded Gold with Distinction, first prizes.
- Performed at annual concerts and other events.

NTU Chinese Dance Club 2019 – 2023

- Performed at annual concerts each year.

SCHOLARSHIP & HONORS

NTU President Research Scholar 2020 – 2023
NTU Science and Engineering Scholarship 2019 – 2023

SKILLS

Languages: Chinese (Native), English (Fluent), French (Basic), Malay (Basic), Indian (Basic)
Programming languages and frameworks: PyTorch, Python, SQL, C, Java, JavaScript, Arduino, React-JS, Prolog, LaTex