

BENRAN HU

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EDUCATION

Carnegie Mellon University

Master of Science in Computer Science | GPA: 4.2/4.3

Pittsburgh, PA

Dec 2024

The Hong Kong University of Science and Technology

Bachelor of Science in Data Science and Technology, and in Computer Science | GPA: 4.14/4.3

Hong Kong SAR

Jun 2023

- Major GPA: 4.19/4.3. First Class Honors. Recipient of the Academic Achievement Medal.

SKILLS

Programming Languages: C, C++, Python, C#, Java, JavaScript, HTML

Frameworks and Tools: PyTorch, TensorFlow, CUDA, OpenMP, OpenMPI, Vulkan, WebGL, Unity, Blender

WORK EXPERIENCE

Research Intern

Snap Inc.

Jun 2024 - Aug 2024

Santa Monica, CA

- Improved transformer-based video autoencoders and latent diffusion models for better video and image generation.
- Boost the post-training performance of the latest large-scale video generation model at Snap with checkpoint aggregation.

RESEARCH EXPERIENCE

Uncertainty Quantification in Differentiable Rendering

Sep 2023 - Present

- Proposed a general and efficient method to quantify the aleatoric and epistemic uncertainty with respect to the parameters in various inverse rendering tasks via uncertainty propagation.

Segment Anything for NeRF [CVPR'24] |

Apr 2023 - Nov 2023

- Proposed a novel method combining Segment Anything Model and Neural Radiance Field to perform high-quality interactive 3D object segmentation with state-of-the-art performance.
- Experimented different large vision models, distillation methods, and losses to improve NeRF 3D segmentation.

NeRF 3D Instance Segmentation [ICCV'23] |

Dec 2022 - Jul 2023

- Proposed one the first 3D instance segmentation methods in NeRFs by optimizing a Neural Instance Field.
- Trained an end-to-end 3D segmentation model on voxel representations based on Mask R-CNN.

Temporally Adaptive Shading Scheduling

Sep 2022 - May 2024

- Maximized rendering quality under framerate or bandwidth constraints by adjusting local temporal shading rates with cost and error-aware reprojection.
- Developed custom Render Features and a testing framework on Unity for efficient reprojection and profiling.

3D Object Detection in NeRF [CVPR'23] |

May 2022 - Nov 2022

- Proposed the first significant 3D object detection method in Neural Radiance Fields using only multi-view RGB.
- Created the first large synthetic indoor dataset for NeRF 3D object detection using Blender and public assets.

TECHNICAL PROJECTS

Point-based 3D Gaussian Manipulation with Diffusion

3D Gaussian Splatting, Diffusion, Scene Editing

- Developed a 3D Gaussian manipulation method based on point-guided image editing with diffusion models.

Wavefront Path Tracing

CUDA, GPU Programming, Path Tracing

- Implemented a CUDA path tracer with wavefront design and wide BVH which achieves a maximum speedup of 1.79x compared to megakernel implementation, and 8.20x compared to multi-thread CPU implementation.

Vulkan Mesh Shading and Culling

Vulkan, Mesh Shading, Culling

- Built a highly efficient meshlet shading and culling pipeline in Vulkan utilizing mesh shaders and task shaders.