BENRAN HU

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EDUCATION

Carnegie Mellon University   *Pittsburgh, PA*
Master of Science in Computer Science | CGA: 4.2/4.3   *Dec 2024 (Expected)*

Hong Kong University of Science and Technology   *Hong Kong SAR*
Bachelor of Science in Data Science and Technology, and in Computer Science | CGA: 4.14/4.3   *Jun 2023*
- Major CGA: 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   *Jun 2024 - Aug 2024*
Snap Inc.   *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 - Present*
- Maximized rendering quality under frametime 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.