Jinrui Zhang

c: +86-188-2344-0767 ● JinruiZhang_uestc@outlook.com ● https://rz-01.github.io

Education

University of Electronic Science and Technology of China (UESTC)　　　　09/2022-06/2026
- B.S. in *Computer Science and Technology* | GPA: 3.96/4.0
- Scholarship: First-Class Student Scholarship by UESTC (Twice, Top 10%)

Research

Trans-GS: High quality reconstruction of transparent objects　　　　08/2024-02/2025
Advised by Dr. Beibei Wang | NJU [poster]
- Analyze the computational advantages of tile-based rasterizer and CUDA kernals compared to NeRF, identifying key factors contributing to its superior performance.
- Design a novel method integrating differentiable raytracing with 2D Gaussian Splatting to achieve high-quality reconstruction of transparent objects, focusing on secondary-ray effects like refraction.
- Implement an efficient normal consistency and smoothness regularization term that improved reconstruction accuracy while reducing computational overhead, validated through robust experimental results.

Optimization of Instant-NGP: A Video-to-Mesh Pipeline　　　　01/2024-02/2024
Advised by Ms. Yifei Li | MIT CSAIL [poster]
- Optimize the Instant-NGP pipeline to convert video into high-quality 3D mesh models, enhancing speed and accuracy through improvements in image filtering, mesh smoothing (Laplacian smoothing), and comparative analysis of traditional NeRF versus Instant-NGP.
- Lead the implementation of NeRF technology in artistic model creation, replicating the Instant-NGP pipeline and managing custom datasets for training and validation, while utilizing Python to automate image processing and optimize rendering speed through multi-scale hash tables.

Auto-Verify: A Plug-and-Play Stepwise Verification and Self-Correction Pipeline　　09/2024-02/2025
Advised by Dr. WoTao Yin | DAMO Academy, Alibaba Group [paper]
- Build a "verify-then-self-correct" pipeline that can be applied to any math reasoning LLM at inference time without additional training. This framework aims to fully harness the model's step-by-step self-refinement capability, guided by a pretrained verifier that evaluates and explains detected errors to identify and mitigate hallucination at each reasoning step.
- Achieve improved verification f1-score of 25% with Gemma2-9b model towards mathematical problems and solutions in MATH and GSM8K dataset. Submit a research paper that demonstrates our methodology and experiment results.

Course Projects

Physics-Based OpenGL Renderer　　　　08/2024-09/2024
Instructor: Prof. Rui Wang
- Developed a real-time Physically Based Rendering pipeline using OpenGL, implementing the Cook-Torrance BRDF model for realistic light reflection and scattering.
- Supported the metallic-roughness workflow by optimizing shader performance and implementing advanced OpenGL 4.5 features, such as Shader Storage Buffer Objects. Generated pre-filtered environment maps for Image-Based Lighting to handle specular reflections at varying roughness levels.

Ray Tracing Renderer with Bare C++　　　　03/2024-05/2024
Instructor: Prof. Hua Yan
- Designed and optimized a ray tracing renderer without using any Graphics Library, implementing multi-resolution rendering, reflective and transparent materials, and environment mapping. Utilized Bounding Volume Hierarchy (BVH) data structures to accelerate ray-object intersection tests, optimizing with the Surface Area Heuristic (SAH) to minimize the cost of traversing the tree, ensuring both performance and accuracy in scene management and light interaction.

Internship

RootGame Studio　　　　10/2022-12/2023
Technical Art Department
- Collaborated on commercial projects for Tencent's Intelligent Transportation System and GAC Group's racing game, contributing to real-time large-scale agent interactions and enabling large-volume video playback in Unreal Engine.

- Supported project planning and task coordination for both technical and art teams, optimizing engine performance and animation production, and improving animation import efficiency by 30% using AI motion capture.

Additional Information

Certificates: 2024 Winter MIT xPRO TechXcelerate Program (01/2024), University-Level Social Practice Excellent Team (03/2023).

Programming: C/C++ (2+ years), Python (1+ year), GLSL (6+ months), OpenGL (1+ year), PyTorch/TensorFlow (6+ months).

Software: Unreal Engine 5 (2+ years), Blender (2+ years), MATLAB (1+ year), JabRef (1+ year).

Languages: Chinese (native), English (proficient, toefl 104).