Haolan Xu

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EDUCATION

University of Florida — Gainesville, FL, USA
Master in Computer Science; GPA: 3.88/4.00 — Sept.2022 - Present

Sichuan University — Chengdu, SC, China
B.E. in Chemical Engineering and Technology; GPA: 3.74/4.00 — Sept.2018 - June.2022

RESEARCH

Reconstruct shape and spatially-varying reflectance from a singular image — Aug. 2023 - Present

Advisor: Prof. Jorg Peters, University of Florida and Dr. Kaleb Smith, Nvidia

- Utilized robust data prior in StyleGAN2-Ada to generate SVBRDF maps
- Integrated a SOTA differentiable renderer (Mitsuba3) in the network to optimize geometric properties
- Fine-tuned the unified framework to reconstruct high-quality objects from a single image

Rendering the smooth contours using point normal triangles — June. 2023 - Present

Advisor: Prof. Jorg Peters, University of Florida

- Identified contours using orthogonality checks between shading normal and the view direction
- Employed curved Point Normal patches for the efficient smooth approximation of surfaces
- Constructed the entire contour using piecewise Bézier Curves derived from each triangle

Parametric modeling of smooth biological cells — Jan. 2023 - May. 2023

Advisor: Prof. Jorg Peters, University of Florida

- Modeled the parametric surface of axisymmetric spread cell using the cubic Bézier curve
- Simulated the flattening process by adjusting the control polygon of curves
- Devised heuristics based on constant mean curvature to extend the methodology to general cells

Predict performance of organic photovoltaic materials using deep learning — Oct. 2020 - Oct. 2021

Advisor: Prof. Li Zhou, Sichuan University

- Leveraged the innate strength of Bi-LSTM network models for sequential data to process language-like descriptor inputs
- Introduced the attention mechanism to weigh each segment of materials for elevating interpretability
- Used volume rendering techniques to visualize simulation-derived material data

PROJECTS

Denoise in real-time ray tracing — Aug. 2023 - Sept. 2023

- Denoised per frame using the Joint Bilateral Filter which is then accelerated using A-Trous Wavelet
- Implemented Temporal Accumulation with Motion Vector projection for smoother transitions

Precompute radiance transfer with spherical harmonics rotation — July. 2023 - Aug. 2023

- Used spherical harmonics (SH) to implement Precomputed Radiance Transfer (PRT) in the Nori framework
- Achieved real-time rendering of the Stanford bunny across various scenes by PRT
- Further Enabled dynamic light rotation leveraging the rotationally invariant properties of SH

Implement soft shadow using PCF & PCSS — June. 2023 - July. 2023

- Implemented a robust hard shadow system with the adaptive shadow bias algorithm that solves shadow Acne
- Developed soft shadow using Percentage Closer Filtering (PCF) and Percentage Closer Soft Shadows (PCSS)
- Extended to the multiple dynamic light sources

A tiny software path tracer rendering cornell box — May. 2023 - June. 2023

- Built a path tracer using Russian Roulette and light source sampling, optimized by Multi-threaded acceleration
- Explored Microfacet materials with different Bidirectional Reflectance Distribution Functions

SKILLS SUMMARY

Programming: Python, C/C++, JavaScript, Julia

Tools: Pytorch(3D), Mitsuba, Optix7, Open(Web)GL, Blender, Cmake, LaTeX, git

Platforms: Windows, Ubuntu, MacOS

HONORS AND AWARDS

University of Florida Achievement Award Scholarship — 2022

Outstanding Graduates of Sichuan University — 2022

The General Scholarship in Sichuan University — 2019, 2020, 2021