

Real-time ray tracing with spatiotemporal reservoir resampling in DirectX

Goals and Outcomes

Inspired by the paper *Spatiotemporal reservoir resampling for real-time ray tracing with dynamic direct lighting* by Benedikt et al, we plan to implement a real-time ray tracer based on this novel sampling techniques using DirectX as well as denoising using Optix for a better result.

Why This Project Matters:

Efficiently rendering direct lighting from millions of dynamic light sources using Monte Carlo integration is a challenging problem. ReSTIR can render such lights interactively at high quality without complex data structure. Our implementation of this work will be a great improvement of our path tracing project.

In addition, DirectX is regarded as a modern high-performance Graphics API and has gained popularity for game developers. We think it would be great to explore this new API. Also, since Unreal Engine has support for it on Windows, it would be easier for us to integrate this new approach into a commercial engine so that we may be able to build games with many dynamic lightings in the future.

API and Platforms:

DirectX, Windows 10, Optix

Timeline

Milestone 1

Read the paper and try to have a solid understanding of its logic. Get familiar with DirectX development and build the base code framework for the project.

Milestone 2

Implement ReSTIR in DirectX and apply OptiX denoiser.

Milestone 3

Reiterate and complete feature implementation, fix any issues, analyze and optimize performance.

Final

A workable real-time renderer.

Reference

Benedikt, et al. "Spatiotemporal reservoir resampling for real-time ray tracing with dynamic direct lighting", ACM Transactions on Graphics Volume 39, Issue 4