



Abschlussvortrag Masterarbeit René Kern

„Real Time Indirect Lighting using Spatiotemporal Resampled Photon Mapping“

Calculating the global illumination of a given scene in real-time is still a challenge, even with hardware raytracing, as a substantial number of rays is needed. Direct light for many light sources can be efficiently calculated using ReSTIR from Bitterli et al. [Bit+20] by reducing the number of rays needed with spatial and temporal (spatiotemporal) resampling. While similar resampling algorithms for indirect light also exist, they are either limited in the number of indirect hits or have performance unsuited for real-time applications. We introduce two novel indirect light algorithms based on the global illumination technique Photon Mapping that uses spatiotemporal resampling to reduce the number of samples needed. One is based on distributing many small indirect light sources via Photon Mapping into the scene that are sampled and resampled using ReSTIR (ReSTIR-P). The other is based on Final Gathering, where a ray is distributed from the surface to calculate the indirect light coming from that direction. When the ray hits another surface, previously distributed photons are collected to determine the sender radiance. The Final Gather samples are then resampled similarly to ReSTIR (ReSTIR-FG). Our methods are faster than existing algorithms in calculating the indirect light while maintaining the same quality, especially with many indirections. Additionally, our methods can display caustics that all similar existing resampling techniques fail to find. This also allows for correctly rendered scenes where the light source is encased by glass, which is impossible for existing resampled indirect light techniques.

Betreuer der Arbeit: Prof. Dr. Thorsten Grosch (Institut für Informatik), Prof. Dr. Rüdiger Ehlers

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