

Sampling and Reconstruction of Visual Appearance: From Denoising to View Synthesis

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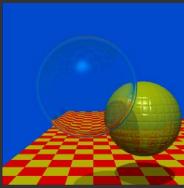
Real-Time Rendering

- Previous reconstruction methods high overhead
- What about real-time for games, interactive?
- Ray/Path-Tracing interactive at low sample counts (e.g., NVIDIA Optix), used in games
- Need real-time reconstruction (simpler filters)
 - Area my group started 10 years ago (papers today)
- Axis-Aligned Filtering (Mehta et al. 12, 13, 14)
 - Faster than sheared filters, can run in real-time
- Fast Sheared Filtering (Yan et al. 15)
- Multiple Axis Aligned Filtering (Wu et al. 17)

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Impact: Real-Time

- Extend AAF, FSF, MAAF: Predict Filter based on Deep Learning (sample and AI-based denoising)
- NVIDIA software (OptiX 2017), hardware (RTX 2018)
- 40-year journey: ray tracing curiosity to every pixel



Whitted 79 (74 min 512x512) NVIDIA RTX 2018. OptiX: Pixar real-time previewer

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From SIGGRAPH 18



Real Photo: Speaker and Turner Whitted at SIGGRAPH 18

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Impact: Real-Time



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Real-Time in Practice

- Major practical advances in recent years
- Latest papers machine learning + 1 sample per pixel
- Recent commercial product release: NVIDIA Optix 5 with denoising, NRD <https://youtu.be/OC637pfAJs8>
- Essentially feels like magic nowadays (has brought real-time path tracing decade[s] earlier than expected)
- Today: presentation of 3 papers precursors
 - But note that these papers are still clunky, barely real-time

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