SRSSIS

Super-Resolution Screen Space Irradiance Sampling for Lightweight Collaborative Web3D Rendering Architecture

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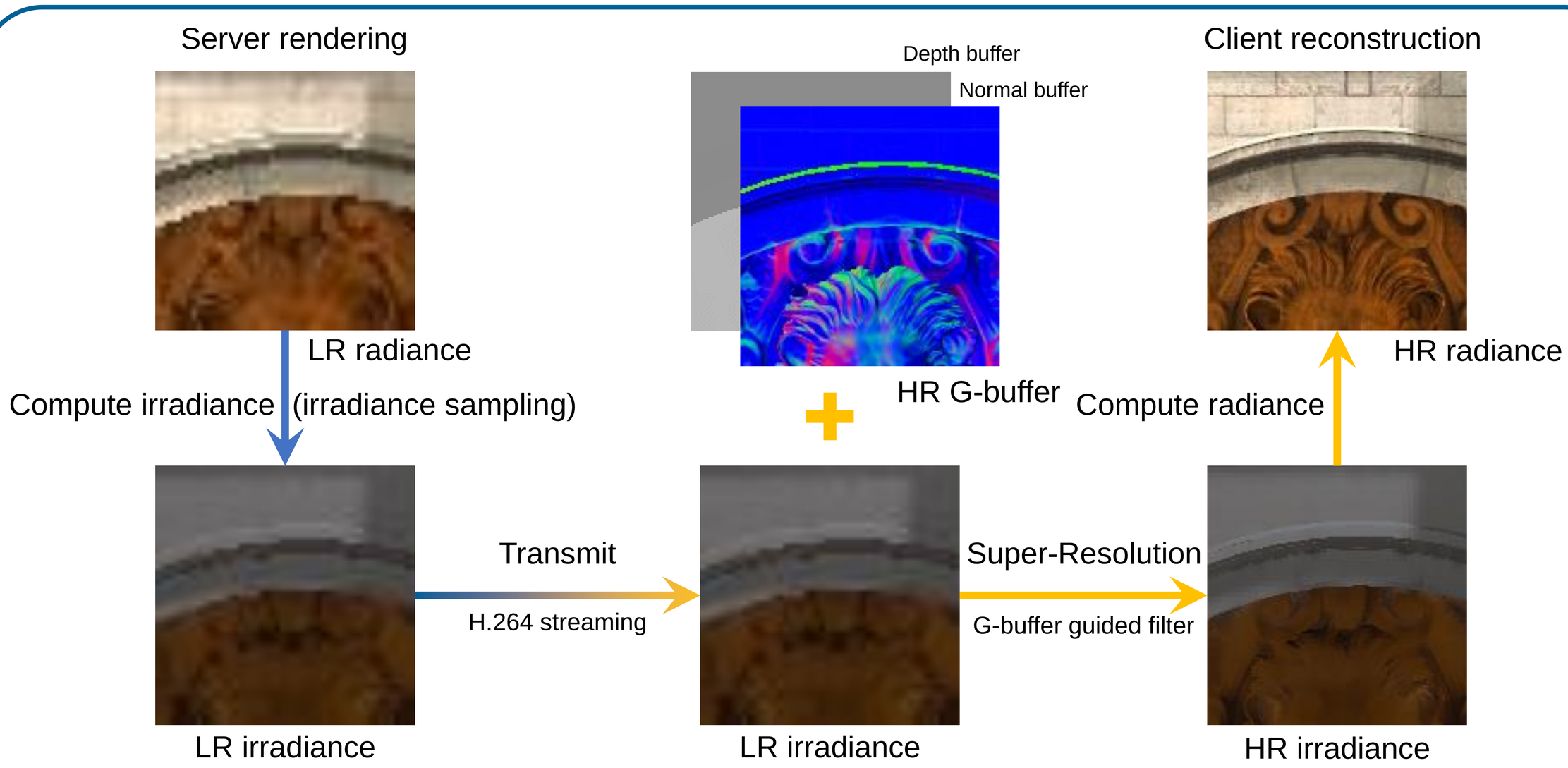
System Architecture



- LR and HR indicates the lower image resolution and the original resolution, respectively.
- The example images are cut out from the results of our system's 3x3 upsampling technique.

Background

- For cloud rendering, it requires high server computing and transmission costs.
- Collaborative rendering makes full use of the computing power of the client devices, which is a rendering system that computes indirect lighting on the server, direct lighting on the client, and blends them to output.
- For previous collaborative rendering, it requires high performance requirements on client device.

Our method

- Inspired by Shao W et al.[1], it is feasible to only use the screen space illumination information. We render and transmit lower resolution irradiance(comprising both direct and indirect lighting) on the server, and then reconstruct the image through super-resolution on the client.
- To improve the super-resolution effect, we use a separately-rendered-in-negligible-time original resolution G-buffer to guide the reconstruction.[2]

Result

- Ideally, our real-time super-resolution effect can achieve state-of-the-art level, thanks to the original resolution G-buffer guidance.
- As for **3x3** upsampling, It can save an average of **66%** bandwidth (compared to streaming original resolution frames) and **67%** computational consumption (measured by GPU time).

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References

1. Shao, W., Liu, C., Jia, J.: Lightmap-based gi collaborative rendering system for web3d application. Journal of System Simulation 32(4), 649 (2020)
2. Dammertz, H., Sewtz, D., Hanika, J., Lensch, H.P.: Edge-avoiding a-trous wavelet transform for fast global illumination filtering. In: Proceedings of the Conference on High Performance Graphics. pp. 67–75 (2010)
3. Bauszat, P., Eisemann, M., Magnor, M.: Guided image filtering for interactive high-quality global illumination. In: Computer Graphics Forum. vol. 30, pp. 1361–1368. Wiley Online Library (2011)
4. Crassin, C., Luebke, D., Mara, M., McGuire, M., Oster, B., Shirley, P., Wyman, P.P.S.C.: Cloudlight: A system for amortizing indirect lighting in real-time rendering. Journal of Computer Graphics Techniques Vol 4(4), 1–27 (2015)