Feature Generation for Adaptive Gradient-Domain Path Tracing (Supplementary Report)

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1. Equal-Time Comparisons.

We have compared different reconstruction results within the gradient-domain path tracing (G-PT) framework [KMA+15]. Specifically, we show the L₁ reconstruction [KMA+15] that directly outputs a final image using both the input image color and gradients from G-PT. We have also tested a regularized L₁ reconstruction [MVZ16], which adapts the L₁ by adding a constraint term formed by rendering-specific features (e.g., texture, normal, world coordinates and ambient occlusion buffers). In addition, a recent adaptive rendering method, i.e., adaptive polynomial rendering (APR) [MMMG16], is tested with a different set of features (i.e., G-buffers, our feature, and both features). APR with only G-buffers can be performed without image gradients, and thus this method uses a standard path tracer so that it can use more samples than the other techniques for fairness. All the other methods utilize the G-PT framework. We also show an input color image of G-PT, which does not utilize post-reconstruction. Finally, we visualize our feature that is passed into APR. As a numerical measure, the relative mean squared error (relMSE) [RKZ11] is used.

References


Input color, 81 spp (105.5 s), relMSE 0.0873

L1, 81 spp (106.0 s), relMSE 0.0100
Regularized L1, 26 spp (106.8 s), relMSE 0.0052

APR w/ G-buffers, 136 spp (104.6 s), relMSE 0.0030
Our feature

APR w/ ours, 69 spp (104.2 s), relMSE 0.0027
APR w/ ours and G-buffers, 56 spp (103.6 s), relMSE 0.0021

Reference, 256K spp
Input color, 150 spp (189.2 s), relMSE 0.1715

L1, 150 spp (190.5 s), relMSE 0.0181
Regularized L1, 88 spp (189.3 s), relMSE 0.0041

APR w/ G-buffers, 253 spp (188.4 s), relMSE 0.0036
Our feature

APR w/ ours, 129 spp (187.4 s), relMSE 0.0026
APR w/ ours and G-buffers, 111 spp (187.5 s), relMSE 0.0018

Reference, 512K spp
Input color, 372 spp (483.0 s), relMSE 0.1260

L1, 372 spp (484.7 s), relMSE 0.0069
Regularized L1, 291 spp (483.8 s), relMSE 0.0020

APR w/ G-buffers, 696 spp (483.1 s), relMSE 0.0017
Our feature

APR w/ ours, 344 spp (482.9 s), relMSE 0.0033
APR w/ ours and G-buffers, 308 spp (482.7 s), relMSE 0.0016

Reference, 512K spp
Input color, 512 spp (468.6 s), relMSE 0.4087

L1, 512 spp (469.8 s), relMSE 0.0284
Regularized L1, 397 spp (468.8 s), relMSE 0.0040

APR w/ G-buffers, 1130 spp (468.8 s), relMSE 0.0020
APR w/ ours and G-buffers, 408 spp (466.0 s), relMSE 0.0018

Reference, 1024K spp