TexSR: Image Super-Resolution for High-Quality Texture Mapping
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Problem
HD texture pack distribution
- (+) delivers high-quality textures to end users
- (-) requires designers’ efforts
- (-) increases storage & memory overheads

State-of-the-art deep-learning-based single-image super-resolution (SISR) techniques [1, 2, 3]
- (+) show impressive results with noisy images in the real world
- (+) can also be used for automatically increasing texture resolution [4]
- (-) may not be suitable for noise-free textures due to a detail lost and/or color distortion

Related Work
Base SISR algorithm
Real-ESRGAN [1]

Texture compression format
ASTC [5] with variable block sizes

References
[9] Sascha Willems, Vulkan Sponza. github.com/SaschaWillems/VulkanSponza

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This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2021R1G1A1093404).

Our Method

1. Modification of Real-ESRGAN’s training parameters
a) Remove the additive Gaussian and Poisson noise
b) Do not consider the perceptual loss for training the network

2. Post-color correction
Selectively blend four pixels in the upscaled SR image and a pixel in its original image according to the HSV difference between them

3. ASTC compression
Instead of applying the same block size to all textures, we determine the block size of each texture using a PSNR target [6]

Results
TexSR successfully enhances texture details compared to Real-ESRGAN, with higher PSNR and lower mean LIP [7] values

TexSR can reduce the size of super-resolution textures
- DXT3 textures in Vulkan Sponza [9] → 82 MB
- ASTC textures generated from TexSR 2x (37 dB PSNR target) → 164 MB i.e., a half size compared to traditional 2x upscaling