# Improving the Progressive Denoising of MC Rendered Images in low SPPs

(From "Progressive Denoising of MC Rendered Images", A. Firmino et al, EG 2022)

Mid-term Project Presentation

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# Background: Noises in MC-Rendering @ low SPP



Samples Per Pixel

Samples Per Pixel

# Background: Denoising in MC-Rendering

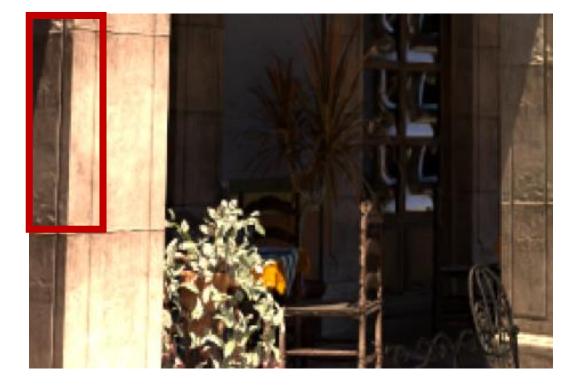


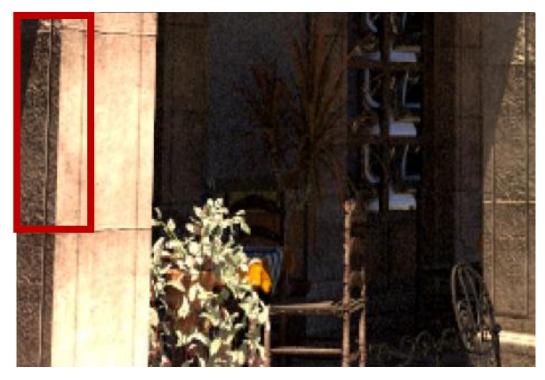


**16** Samples Per Pixel

**16** Samples Per Pixel Denoised (By Intel OIDN)

### Background: Denoisers are not flawless!

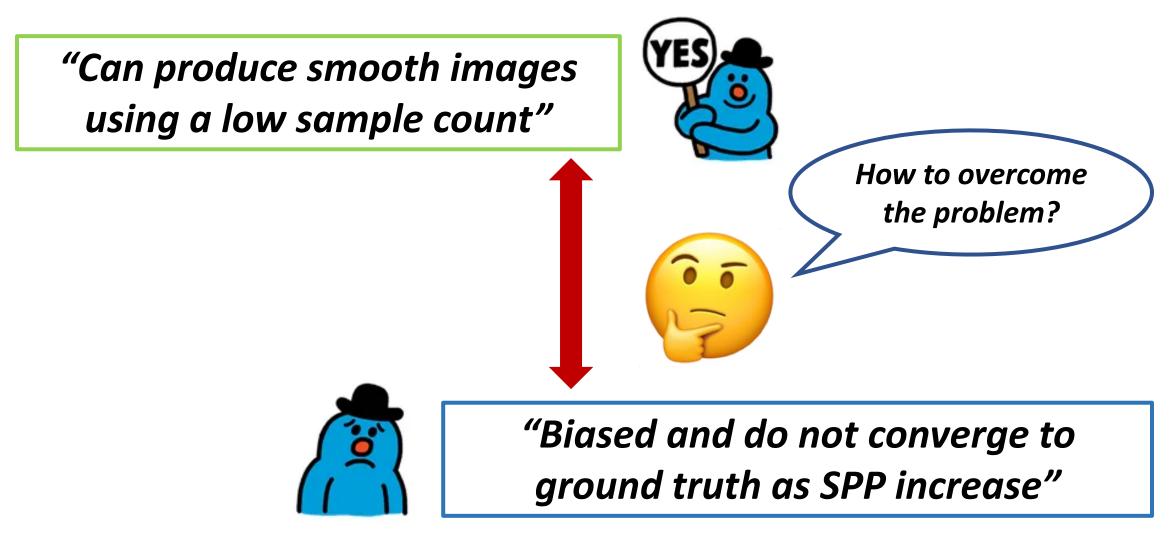




Samples Per Pixel Denoised

Samples Per Pixel

# Problem: Existing deep-learning based denoisers for MCR



# Recap: Progressive Denoising

- Blend denoised & original images based on variance of non-denoised pixels
- Produce optimal per-pixel mix parameter (which takes the best pixels of each image)



Input 1: Rendered



Input 2: Denoised



Per-pixel mixing param

# Limitations

• **Progressive denoising** shows limitations at very low sample counts



Figure 13: Limitation of our method at very low sample counts, 2spp in this example, arising from insufficiently accurate sample variance estimates.

# Motivation

# "Improving progressive denoising at low SPPs"

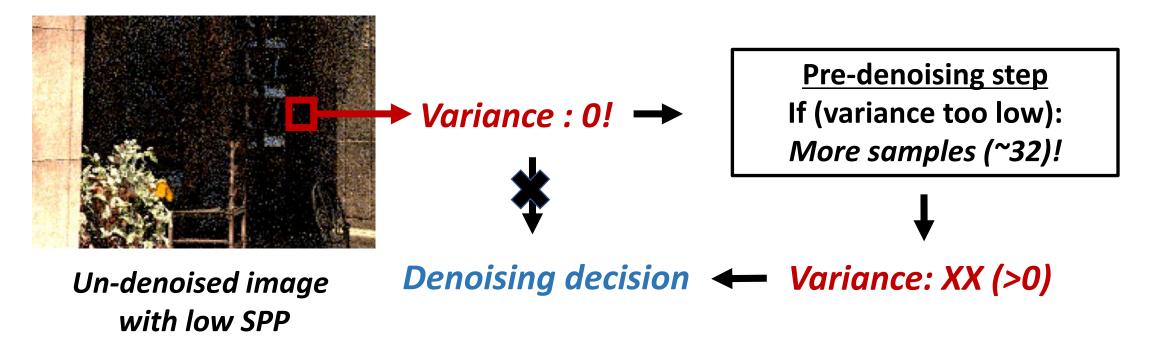


#### "Consistent, versatile denoiser in all SPP ranges"

# Approaches (1) : Mounting of Adaptive sampling

 <u>Adaptive Sampling</u>: Optimizing technique in MC rendering which allocates more samples to the areas of the suspicious part of the image

How to apply?



# Approaches (2) : Estimate from widen neighbourhood

- Original paper uses **<u>11-by-11</u>** size neighbourhood to estimate the variance of pixel
- Check if different options (larger kernels) can give better results while it does not give performance degradance

# Approaches

#### **Adaptive Sampling based approach:**

- Can expect better quality in low SPPs
- Good literatures to refer (Deep Adaptive Sampling for Low Sample Count

Rendering, A.Kuznetsov et al, EG 2018)

• Cannot guarantee if the implementation will be feasible

#### **Widening kernel based approach**

- Easy to implement
- Weak impact & cannot guarantee the quality

#### Jaehyun Ha

- Coordinates the entire project
- Check if widening kernel-based approach works
- Check whether adaptive sampling methods can be applied on top of progressive denoising
- Making slides
- Review the literatures
- ...

# Thank You

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