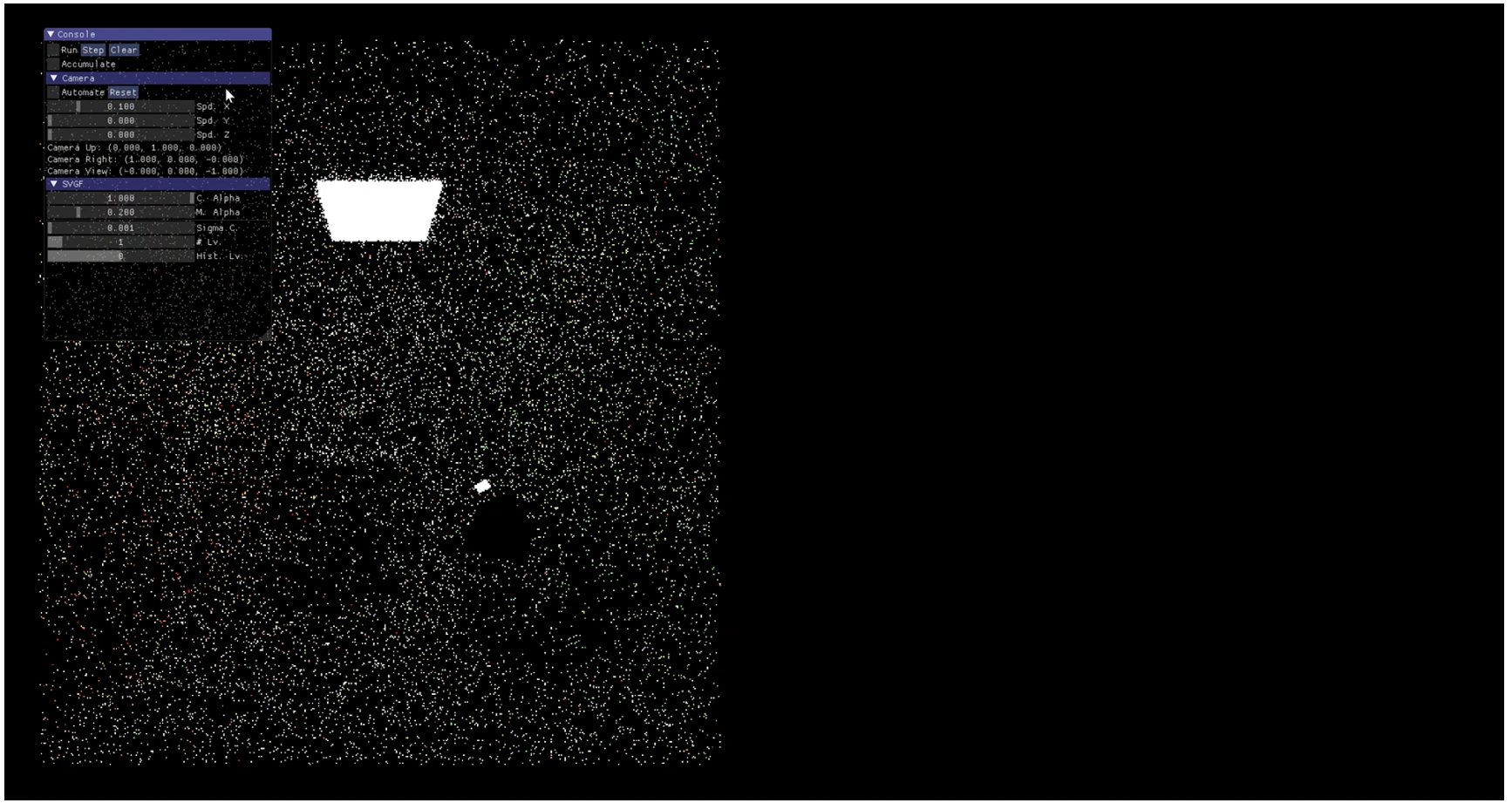
# Path Tracer Denoising MS3

W. Chen, Y. Dong, Z. Xie

# MS3 Outline

1. SVGF Progress
2. Path Tracer Progress
3. Machine Learning Progress
4. Project Timeline

# SVGF - Progress




**MS1:**

- A-Trous Wavelet Filter

**MS2:**

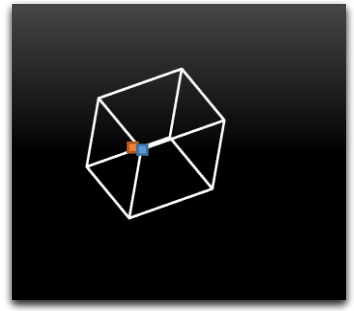
- Temporal Accumulation
- Variance Estimation

**MS3:**

- Reprojection
- GUI Control Panel

*dear imgui*

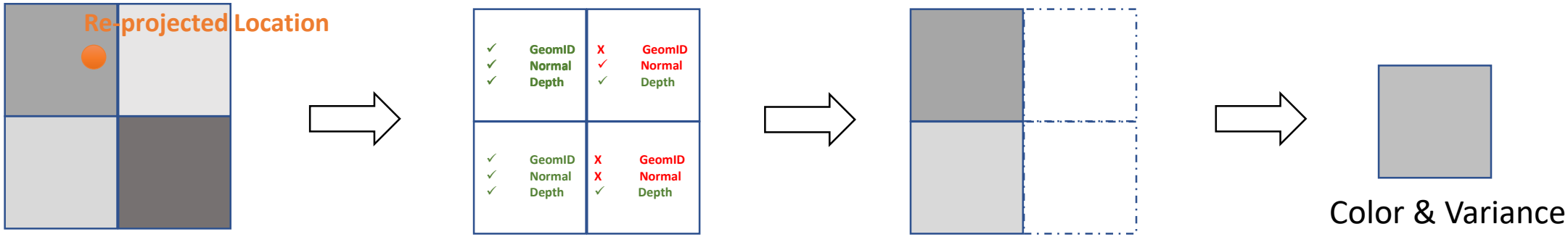
# SVGF - Reprojection



- Determine the pixel coordinate in the previous frame for temporal accumulation

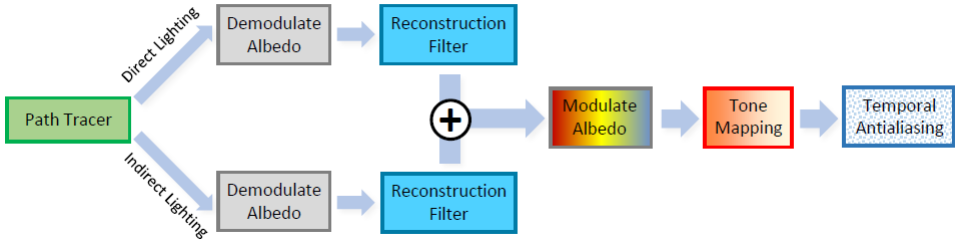
**Current Pixel Coordinate** → G-Buffer Position → **Current World Space Position** → Rigid Body Motion → **Previous World Space Position** → Previous View Matrix → **Previous Camera Space Position** → Perspective Projection → **Previous Pixel Coordinate**

- Use 2x2 tap bilinear filter to improve quality.

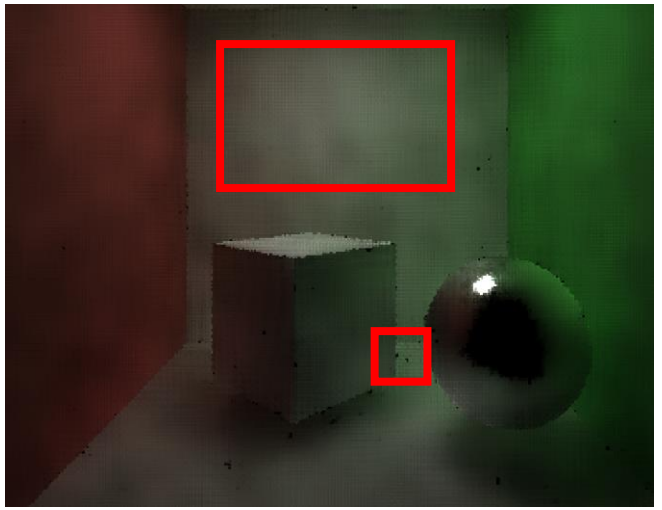


# SVGF - Next

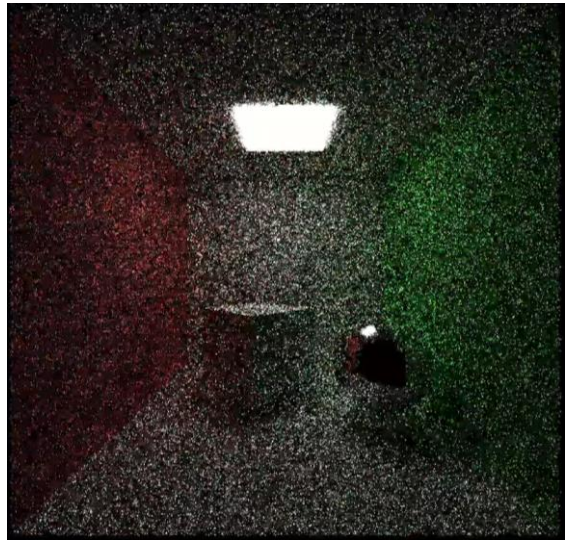
- Re-projection under camera rotation
- Low discrepancy sampling
- Separately filtering direct & indirect light
- More optimization




**Direct & Indirect Light Reconstruction**



**2-Level A-Trous**



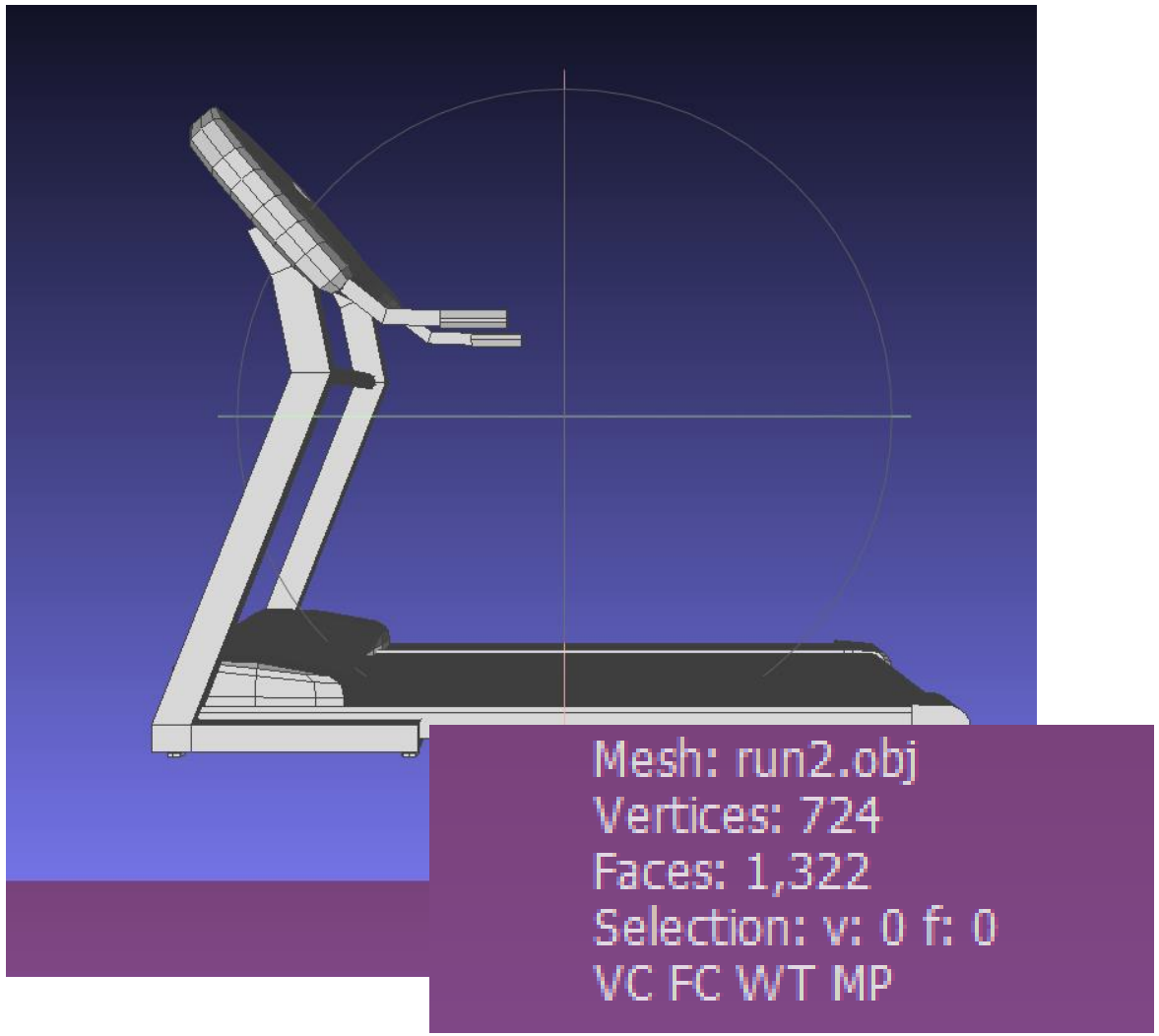
**Camera Rotation**

# Path Tracer – Complex Scene

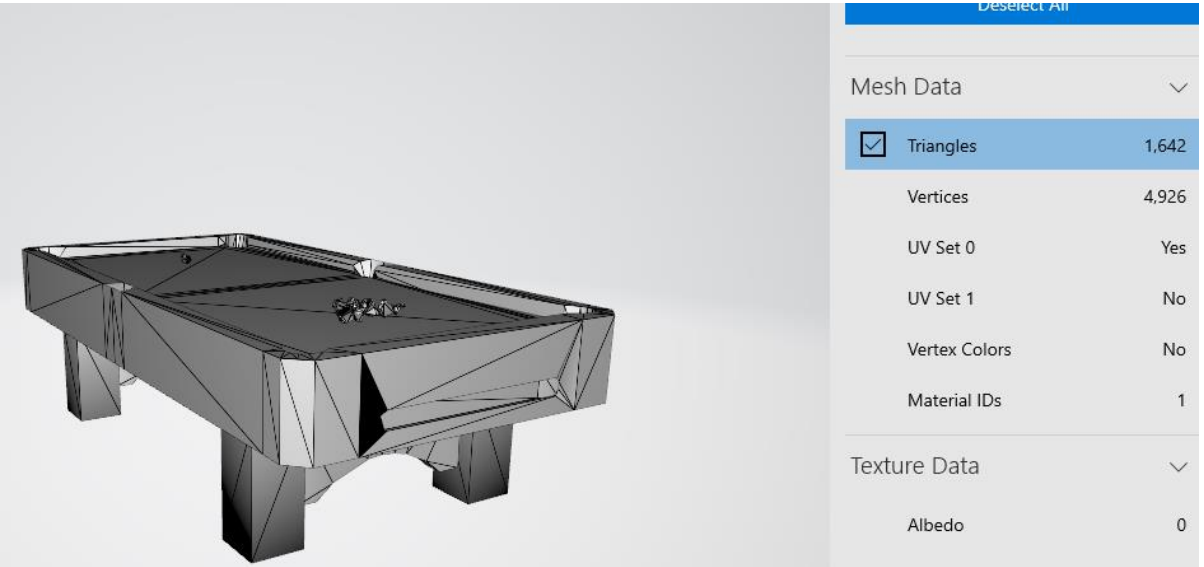
30k Triangles

# Path Tracer – Complex Scene

**MeshLab**

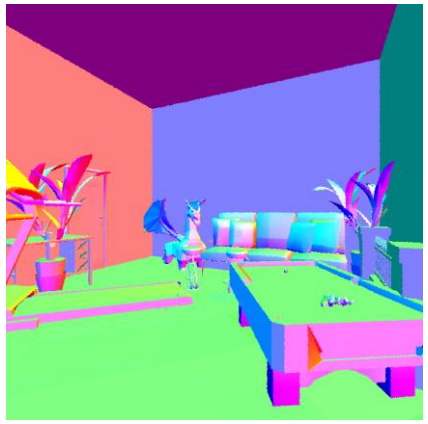



# Path Tracer – Complex Scene




# Path Tracer – Training Set Generation

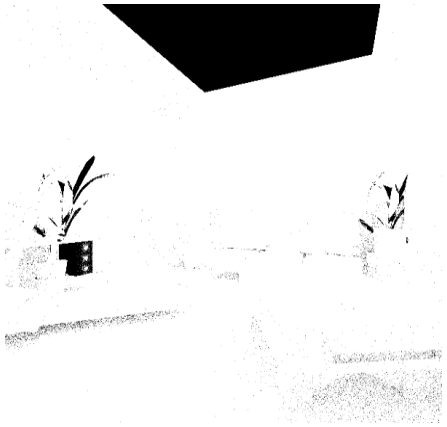
Ground Truth



Normal

Depth

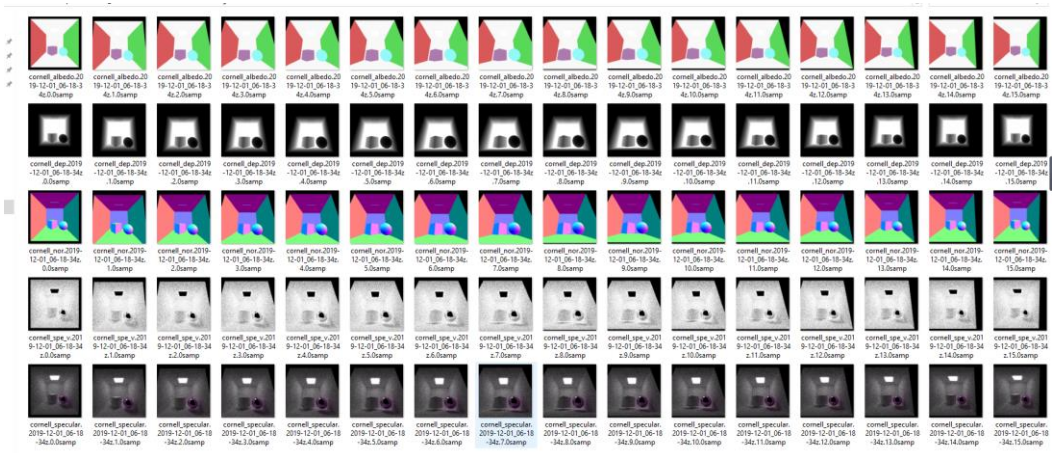
Luminance



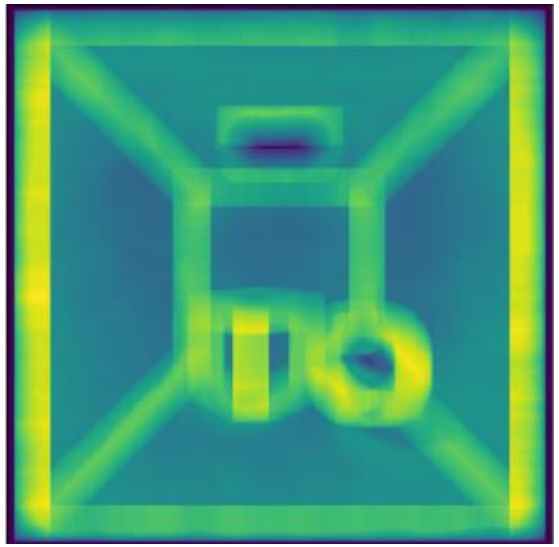
Variance

Moving Camera to generate more data

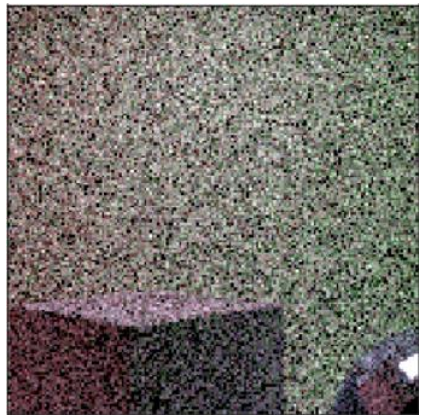
# Machine Learning -Progress



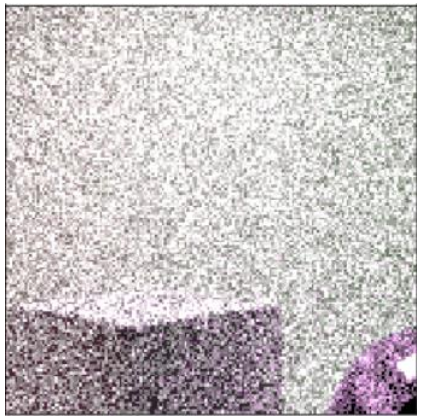
Training Set



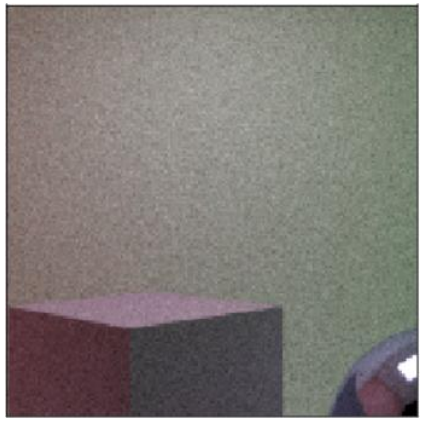
Importance Map



Noisy Input



Denoised



Ground Truth

# Timeline

- Milestone 1
  - Revised codes from hw3 to generate data for next milestone
  - Wrote framework code
  - Built a basic spatial filter
- Milestone 2
  - Added texture to the path tracer and generate image data from path tracer
  - Built and trained denoising neural network on PyTorch first for proof of concept
  - Completed temporal accumulation and variance estimation in SVGF
- Milestone 3
  - Finished all major components in SVGF
  - Achieved real-time denoising for static scenes
  - Generated complicated scenes and more training images
- Final Presentation
  - Finalize SVGF for demo
  - Optimize denoising network for better quality.
  - Performance analysis and comparison