HDRP Shaders

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Sommaire

1 Implemented features

1.1 Edge detection algorithm

The objective was to get the edges of a texture based on camera depth and projection parameters, camera color and screen space normals. The algorithm that is used is the traditional Canny Edge Detector with 5x5 Sobel filter kernel. It is divided in 5 main steps:

- Grayscale: Texture is converted to grayscale texture.
- Gaussian Smooth: Texture is blurred with a 5x5 Gaussian filter kernel.
- Gradient magnitude and angle computation: 5x5 Sobel filter kernel is used to compute gradient values and angles.
- Non maximum suppression: If current pixel's gradient magnitude is lower than the magnitude of the pixel pointed by gradient direction or the one pointed by negative gradient direction, it is suppressed.
- Hysteresis: Double threshold is used to determine strong pixels ($\geq highThreshold$), weak pixels ($highThreshold \geq val \geq lowThreshold$) and delete others. Eventually, the weak pixels that have no strong pixels as neighbour are set to 0 and the others are set to highThreshold.

1.2 Custom effects

1.2.1 Post-processing

Since the output generated by the canny edge detector has really thin edges, a 3x3 Gaussian filter kernel is used to apply a soft blur effect and have a better result.

1.2.2 Recoloration

The colors from output texture of EdgeDetectionCustom are set to edges with a lightning effect based on time.

1.2.3 Bloom

The texture generated by the edge detector is combined with its blurred version to create a little bloom effect on the edges.

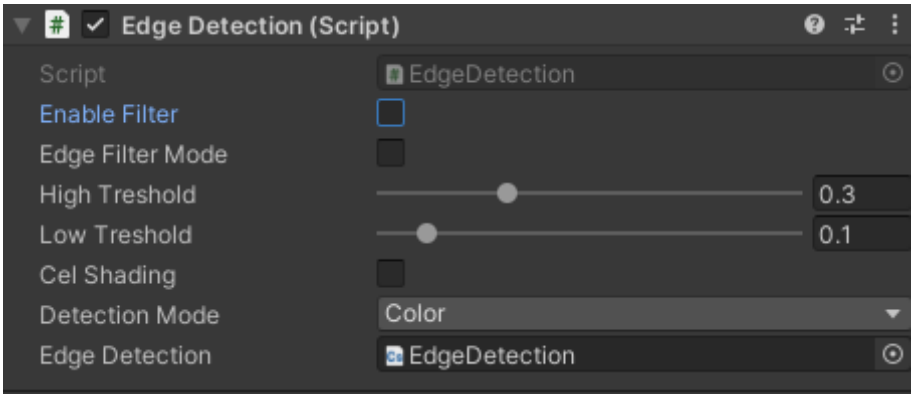
1.2.4 Cel Shading

The texture generated by the edge detector is blurred then combined with the original source texture to create cel shading effect.

2 How to test

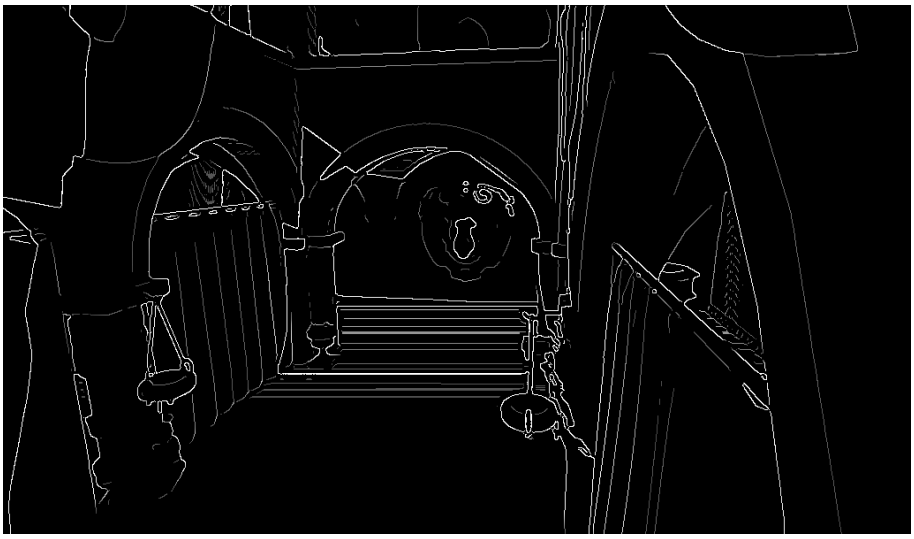
Modifying any of these parameters should produce real-time modifications to image.

- Enable Filter: Enables/Disables Depth/Color/Normal/Custom default filters.
- Edge Filter Mode: Turns edge detection ON/OFF (needs Enable Filter to be ON).
- High Threshold: Sets high threshold for edge detection.
- Low Threshold: Sets low threshold for edge detection.
- Cel Shading: Turns cel shading ON/OFF (needs Enable Filter and Edge Filter Mode to be ON).
- Detection Mode: Sets detection mode.

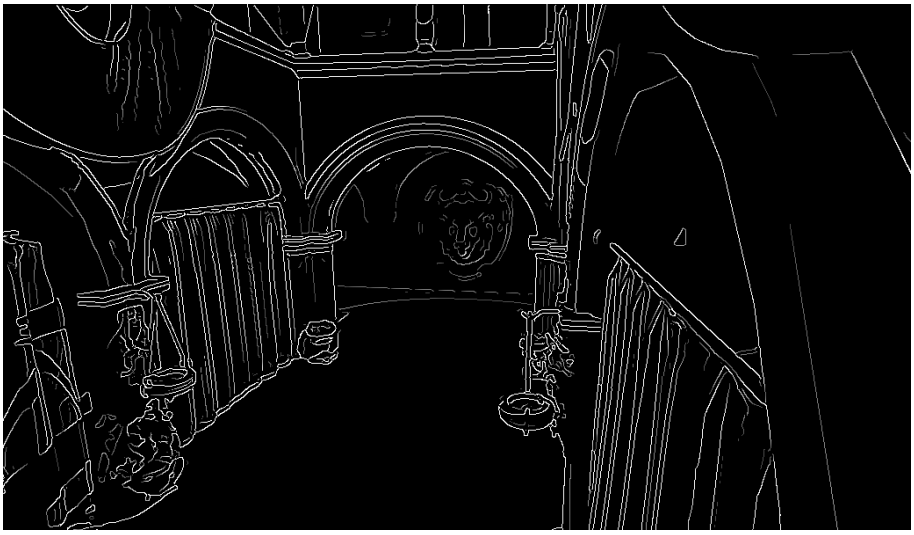


3 Results

3.1 Edge detection - Depth

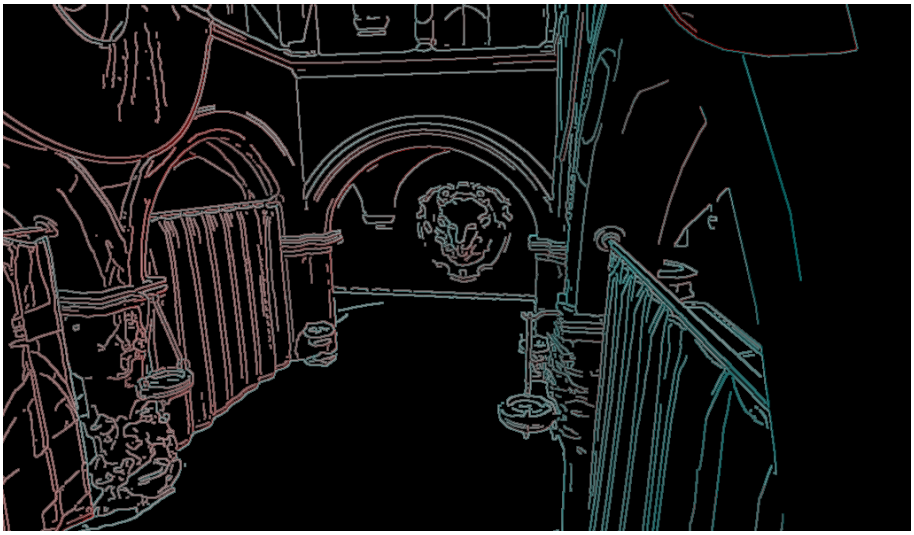


3.2 Edge detection - Color

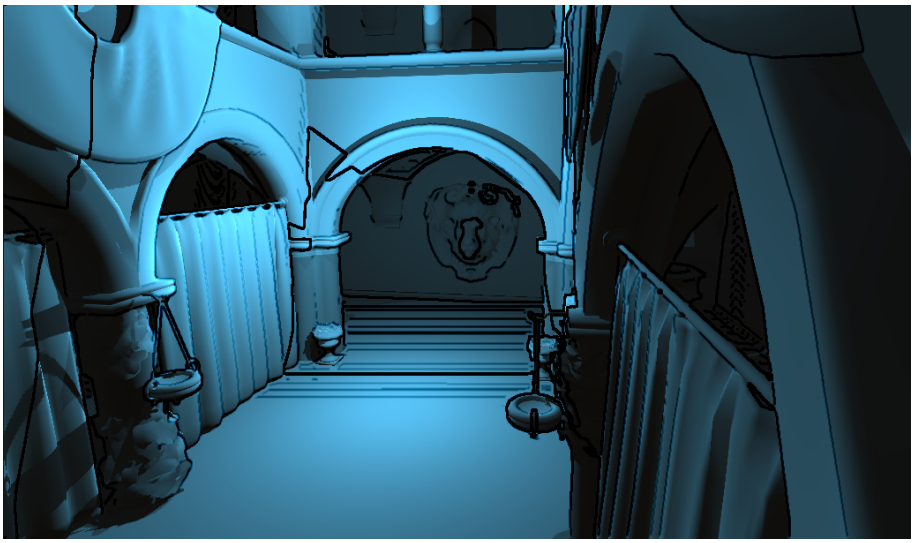


3.3 Edge detection - Normal

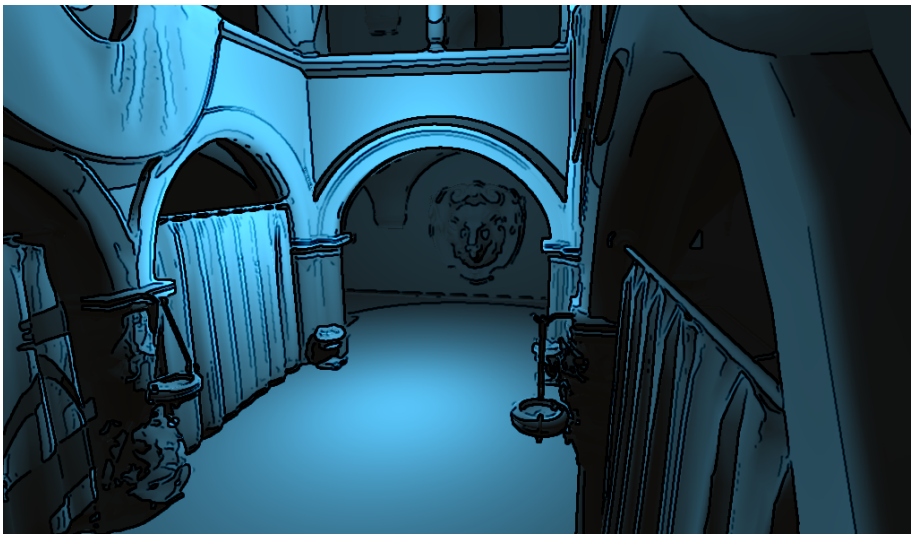
3.4 Custom Effect (animation screenshot)



3.5 Cel Shading - Depth



3.6 Cel Shading - Color



3.7 Cel Shading - Normal

3.8 Cel Shading - Custom