

CMPT 485 – Assignment 2

Written Component

1)

Changing `m_shadowmapSize` from 32 to 2048 in differing increments of powers of 2 resulted in what looks like a loss in precision in how accurate the shadow is displayed.

As you moved the value lower it eventually resulted in the edges being highly aliased (big stair steps) when compared with higher values (512 for example).

I believe this is probably due to the fact that the texture, which is larger than 32x32 for example, cannot be represented in a 32x32 representation as the shadow map size would suggest resulting in lossiness. So it looks highly pixelated.

2)

Changing the min and mag filter for the cube map to `GL_LINEAR` from `GL_NEAREST` and repeating step one resulted in an interesting observation.

When the value was very high, 2048 for example or default 512, I could tell no difference between them. However as we moved down to lower values such as 64 or the really low 32 it is pixelated just as was observed in part 1). Now the real interesting observation unique to the situation here is with `GL_LINEAR` when the value is low, normally with `GL_NEAREST` we would just see the highly aliased (as previously described) shadow but with `GL_LINEAR` we see the same thing BUT it seems to be slightly anti-aliased (near the edges they have a slight gradient to them which is a blend between the hard edges and the wall).

Further analysis into this suggests that with `GL_NEAREST`, there is a 1-to-1 mapping of the texture value to the pixel so it just picks what's there but with `GL_LINEAR` it samples pixels nearby a given coordinate to determine an average colour which would explain why it has a gradient near the edge of the shadow.

3)

Changing the value of the “bias” constant in the fragment shader source of the Depth shader to -0.05, 0.0 and 0.05 with respect to part 1) and 2) didn't change much.

With values 0.0 and 0.05 I could not tell much of a difference to my eye with any configuration, however with -0.05 there was clearly an outstanding difference. It was as if the shape was inverted for lighting, from what I could tell this would suggest that the light source was on the interior which would explain why the shape was shadowed on its exterior with a pac-man like shape on it (which is probably the interior unrolled). As far as I could tell the background shadow remained relatively unchanged though.

4)

The reason for this is that Gouraud shaders offer very little detail when compared with

Jordan Johns
11067280
jbj486

Fragment shaders. Since Fragment shaders work per fragment, there is a linear representation (all values between hit) of the texture (and the shadow likewise), so it appears nice and smooth.

With Gouraud shaders they work per vertex, so there is not a linear representation of the texture that will appear, and neither with the shadow, so it will not look as good (because values between vertices will not be hit, only the end points).