CMPM 163 Notes

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Winter 2019 — April 23, 2019

Miscellaneous

- Quiz next week: Tuesday, April 30th - mix of theoretical and code questions (Terminology and GLSL commands)
- Careful when using Unity's default lighting system, it may be doing multiple lighting passes without telling you - to resolve this issue, activate blending in your shader; alternately, pass point light positions directly and use these positions to calculate lighting

Using Images for Vertex Displacement

- A common use-case is the generation of **Height Maps**. By detecting vertex height in a shader, it's trivially simple to map different textures to a mesh depending on y-displacement.
- One technique is to pass a height texture to the shader.
- Unity provides facility to directly edit meshes in script.
- Unity offers the `RecalculateNormals()` method on `Mesh` objects to automatically set normals on that mesh.
- In certain circumstances, the `tex2D()` lookup is not available in the vertex shader. However, `tex2Dlod()` may be available. This is because `tex2D()` attempts to automatically set the mip level, which isn't necessarily available before rasterization.

Noise and Procedural Generation in Shaders

- There are different types of noise, which are different in terms of aggregate structure (such as periodicity)
- In certain types of noise, individual pixels may have some relationship to their neighboring pixels.

- **Perlin Noise** was originally developed by Ken Perlin as he was working on the original Tron movie. His task was to create a new kind of naturalistic visual effect computationally.
- The general idea behind **Perlin Noise** is to create "bins" for which numbers are generated randomly; these "bins" are then subdivided, and the values are interpolated between.
- In noise generation, the term **Octave** refers to the practice of combining multiple noise waveforms to create a more sophisticated waveform.