

Timothy Hoang
Prof. Johnson
CMPT446

Project: Backface Culling

This application is about 3D hidden surface removal, more specifically, back-face culling. Back-face culling is the removal of primitives facing away from the camera. Closed polygonal models typically have outward facing normal vectors and polygons that face away from the camera will be overwritten by those that do face the camera. To improve performance, you can discard those polygons facing away before the pipeline starts. You can test for this condition the same as silhouette drawing. The test goes like this: draw silhouette if $(e \cdot n_0)(e \cdot n_1) \leq 0$ where n_0 and n_1 are two normals and e is the vector from the edge to the eye/camera.

With this application, the user can manipulate a 3D object using their mouse's click and drag ability to change the rotation. Instead of actually culling the object primitives, markers present in the middle of the triangles highlight when they are being culled. For this to be visible, the object is made as a wire frame. Above the model representation will be instructions for manipulation as well as a key for the indicators on whether or not the surface is being culled depending on the markers.

By using this application, the user is able to see which surfaces are being culled and see how impactful back-face culling can be for closed polygonal models when it comes to performance optimization. The more complex an object, the greater the possibility of increased performance due to the massive culling of more and more surfaces.

Resources Used in Creating this Project

WebGL Cube tutorial from vertices and indices: https://developer.mozilla.org/en-US/docs/Web/API/WebGL_API/Tutorial/Creating_3D_objects_using WebGL

Clip space to screen space tutorial: <https://www.youtube.com/watch?v=pThw0S8MR7w>

Rotation tutorial from click and drag: <https://www.youtube.com/watch?v=rd9HbHS1H6I>