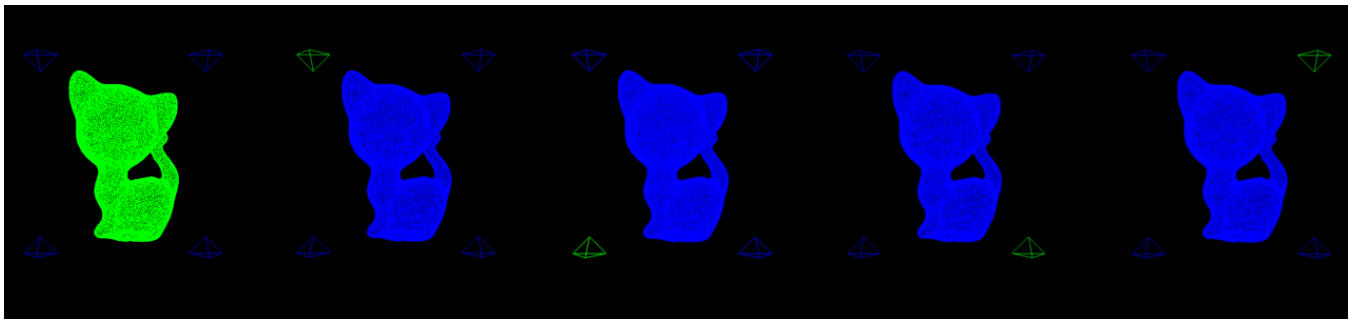
Breaking a Mesh into Submeshes

Using a mesh data structure that stores connectivity information (through edges), a mesh can be broken up into submeshes as follows:

1. Pick a vertex in the mesh and add the edges stemming from it to a stack. Mark the edges as seen.
2. Pop the top edge off the stack, pick the second vertex of the edge and add the edges stemming from that vertex that have not yet been seen to the stack. Mark the added edges as seen.
3. Repeat 2. till no more edges are left in the stack. On termination, the edges (and vertices and faces) marked as seen form a submesh. Remove them from the main mesh.
4. Repeat 1., 2. and 3.

If either the winged edge or half edge data structures are used, this edge based approach does not work for non manifold meshes. To break up a non manifold mesh into submeshes, a face based approach can be used as follows:

1. For each face in the mesh, determine the list of adjacent faces to that face.
2. Pick a face from the mesh that has not yet been seen and add it to a stack. Mark the face as seen.
3. Pop the top face off the stack and add all its adjacent faces that have not yet seen seen to the stack. Mark the added faces as seen.
4. Repeat 3. till no more faces are left in the stack. On termination, the faces (and vertices) marked as seen form a submesh. Remove them from the main mesh.
5. Repeat 2., 3. and 4.



The kitten and the four pyramids in the above figure are read in as a single mesh. The algorithm breaks the mesh into sub-meshes. The green highlight represents a currently selected submesh.

Implementation: https://github.com/rohan-sawhney/submesh