Assignment 1: Rendering 2D objects

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I. Introduction

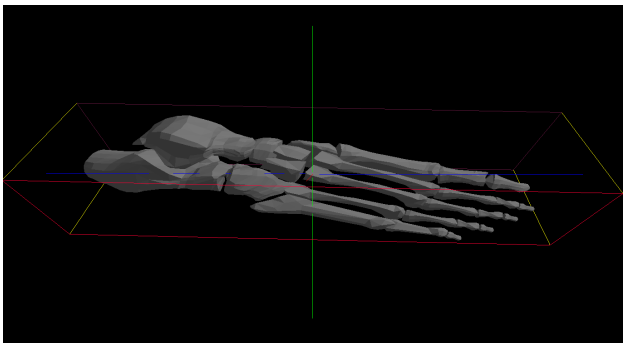
The aim of this experiment is to render 3D objects which are read from a ply file and perform rotations using quaternions. We also experiment with light source.

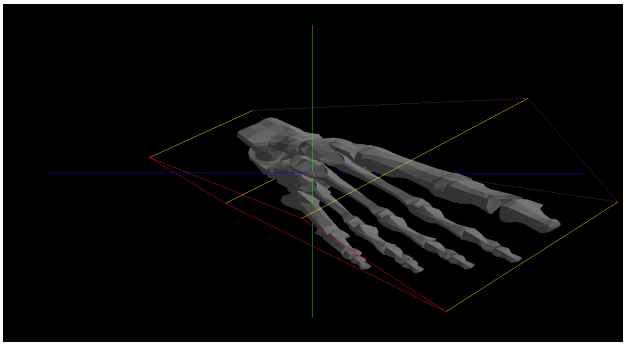
II. Quaternions and 3D model

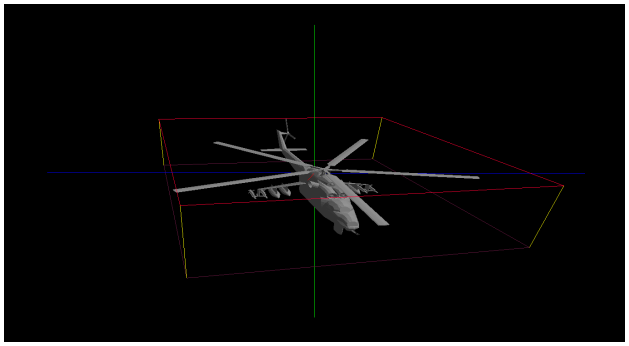
1) We used a trackball code which implemented quaternions for rotation. This routine takes previous (x, y) values and new (x, y) values. It then maps it to a point on a sphere, i.e, (x, y, z). These two points on the sphere are sent to the quaternions which sets the rotation matrix. We multiply this to the concatenated matrix, which is then multiplied to every point.
2) We read the object from a ply file which gives all the points and polygons which form the object. We compute normals per polygon using cross product between two vectors which forms two sides and then compute normals per vertex by taking average over all the normals of polygons it is part of.
3) Zoom and translate are carried over from assignment 1.
4) One light source is used which is located at (5, 5, 5).

III. Results

The rendering of different models from different perspective is as follows:







IV. Conclusion

1) Quaternions provides a more smoother rotation of the object about its center.
2) We can enable upto 8 lights. Lighting provides a more realistic and a gives that 3D and depth effect.