Assignment 4

Advanced Graphics, Augmented Reality, and Virtual Reality

September 2020

1 Problem Statement

In this assignment, we will work on mesh processing, and aim to implement various concepts to build an interactive mesh processing/editing software. We give credit to the instructors of COS426 course at Princeton for releasing their boilerplate code and question statements. Our assignment will be a derivation of the same. You can find the original assignment linked here, and the boilerplate of the application here. Do go through the instructions on setting up the development environment from the original assignment.

2 Working on the Assignment

To implement the mesh processing features listed below, you only need to edit the files `js/mesh.js` and `js/filters.js`. The former file is where you will add your mesh traversal utilities and transformation, and the latter file is where you will compose your filter solutions. Remember that the mesh traversal utilities will help you greatly in implementing the filter solutions. Before beginning your assignment, we recommend you take a quick look at the file `js/meshUtils.js`, which contains an implementation of a mesh data structure along with numerous functions for accessing and modifying a mesh's vertices, edges, and faces.

Please refer the original assignment for a detailed description on each of the following functions. You will be required to implement -

1. Transformation Operations
   (a) Translation This is already implemented for you.
   (b) Rotation
   (c) Scaling
2. Traversal Utilities
   All mentioned in the original assignment.
3. Analysis Operations
   All mentioned in the original assignment.
4. Warp Operations
   All mentioned in the original assignment.
5. Filter Operations
   (a) Noise
   (b) Uniform Laplacian Smoothing
   (c) Sharpening
   (d) Curvature-flow Laplacian Smoothing
   (e) Scale-Dependent Smoothing

6. Topology Operations
   All mentioned in the original assignment.
7. Subdivision Surfaces
   (a) Triangle Topology
   (b) Loop Subdivision

3 Marking Scheme

You may make a report to aid in documentation and evaluation, but you need not spend too much time on it.

1. Transformation Operations - 10
2. Traversal Utilities - 15
3. Analysis Operations - 10
4. Warp Operations - 10
5. Filter Operations - 25
6. Topology Operations - 20
7. Subdivision Surfaces - 10

4 Submission Guidelines

Please submit all your files in a roll numbered zip on Moodle on or before 11.55 PM October 16, 2020. Keep in mind the late day policy, and use them wisely. As this is a public assignment, please refrain from using any code you find online, so as to not deprive yourself of a wonderful learning opportunity. Plagiarism checks will be run.

This isn't a very hard assignment, but don't start too late, since we won't be giving extensions this time.

Best of luck!