Reference List

This project mainly focuses on the implementation of 2 functions to support freeform surface, namely:

(1) *Skinning Surface*; and

(2) *Digital Sculpting*.

To facilitate the performance in terms of computational speed and memory usage, 2 data structures are adopted, namely *Octree* and *Half-Edge*.

Skinning Surface

Given a set of lists of data points to be interpolated, do *Surface Global Interpolation* to generate a set of lists of control points of the skinning surface. [link]

Do *Curve Global Interpolation* to vertical sets of points so that the points generated control a clamped surface. [link]

Do *Uniform Cubic B-Spline Curves Interpolation* to horizontal sets of points so that the points generated control an open surface. [link]

Wrap around the generated horizontal control points so that the surface generated is a closed surface. [link]

Use *de Boor's Algorithm* with the generated control points to generate points on the surface. [link]

Triangulate these points to generate faces on the surface and display.

Reference: C. -K. Shene, "CS3621 Introduction to Computing with Geometry Notes," Michigan Technological University, May. 2011. [Online]. Available: [link]

Digital Sculpting

Intersection Test

J. Havel, A. Herout, "Yet Faster Ray-Triangle Intersection," IEEE Transactions on Visualization and Computer Graphics, vol. 16, pp. 434-438, July. 07, 2009. [link]

Subdivision

H.-R. Pakdel, F. F. Samavati, "Incremental Subdivision for Triangle Meshes," International Journal of Computational Science and Engineering, vol. 3, 2017. [link]

Sculpting Effect

The algorithms are developed mainly based on the project SculptGL by Stéphane Ginier [link].

Data Structure

Octree: for speeding up intersection test. [link]

Half-Edge: for speeding up subdivision. [link]