

Assignment no. 3

due: June 12th, 2017

You may work on and submit this assignment **in pairs**.

Additional technical information about the exercises will appear in the course's website.

Exercise 3.1: The Hausdorff distances between triangular meshes, theory

Design an efficient algorithm to compute the exact (squared) Hausdorff distance between two input triangular meshes. Describe your algorithm in detail. Analyze the running time and storage requirement of your algorithm.

Exercise 3.2: The quality of a mesh decimator, experiments

The Hausdorff distance between the original mesh and its decimated version is a good measure of the quality of the simplification. We will apply it in this exercise to assess the quality of decimation.

In order to carry out the experiments below you need two tools:

- A triangular mesh decimator.
- A procedure that measures the (typically approximate) Hausdorff distance between two meshes.

Take five 2-manifold meshes that differ in shape and size. (The additional-information page for this assignment will include several meshes.) Use a mesh decimator to simplify each of the five meshes, possibly simplifying each mesh several times (each time starting with the original mesh) with different simplification parameters. Measure the Hausdorff distance between the original mesh and the simplified mesh in each test. Report on your findings in numerical tables as well as in qualitative conclusions.

Remarks

(1) By Hausdorff distance here we mean the bi-directional distance.

(2) By now CGAL has both tools, and they will be described in class. The mesh decimator in CGAL can be controlled by various user-supplied routines. Using such could make the experiments more interesting and educating.