Shape comparison metrics - a short report

Martin Metodiev

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1 Introduction

Here we review some useful metrics. We will focus on shape analysis metrics that incorporate information from both the vertices and connectivity of a mesh dataset [1], [2]. Ideally, a shape metric will be independent of the relative spatial location of two objects, and also rotational and scaling variations. An intuitive approach is to use the Hausdorff distance as a measure of similarity between two sets A and B is defined as:

$$d_H(A, B) = \max\left(\sup_{a\in A}\inf_{b\in B}\|a-b\|, \sup_{b\in B}\inf_{a\in A}\|a-b\|\right)$$

Where:

- A and B are the two sets (meshes) represented as sets of points,
- a and b are points in meshes A and B, respectively,
- $\|a-b\|$ is the Euclidean distance between points a and b,
- The first term $\sup_{a\in A}\inf_{b\in B}\|a-b\|$ measures the greatest distance from any point in mesh A to the closest point in mesh B,
- The second term $\sup_{b\in B}\inf_{a\in A}\|a-b\|$ measures the greatest distance from any point in mesh B to the closest point in mesh A.

2 Section 1