CSE 5500, T. J. Peters, UConn, Fall `19, HW2 (15 pts)

September 10, 2019

1. Convex hull in 3D, find an algorithm

input = all(?) points of cloud data

output = list of triangles that form boundary of convex hull

2. Adapt code (or implement, your choice) for 3D convex hull,

2.1 documenting choice &

2.2 explaining why chosen.

3. Points of cloud are necessarily within convex hull (boundary & interior), as no exterior points.

4. What about boundary of point cloud sets?

4.1 Suppose you could find all the boundary points of cloud?

4.2 Use heuristic of < 6 => boundary point

4.3 The two previous steps should produce decimated files. What is the average of the

ratio of the decimated file size to the original file size.

(2 points for correct outputs over given files)

5. Then test against convex hull. If any boundary point of cloud is not zero distance from CH, then not convex.

5.1 BUT, very strict

5.2 Requires dist(pt, triangle) Create this!

(1 pt for design of dist(pt, tri) (short written overview, pseudo-code OK),

1 pt for code,

1 for demo of it working (your synthesized data or my data)

6. Identify convex point clouds

6.1 Exactly

6.2 Within some reasonable approximation (state, explain rationale) (1pt)

7. Experiments

7.1 Run data exactly (3 pts)

7.2 Run data with approximation (3 pts)

7.3 Comment on acceptability of approximation approach (3 pts)

Grading: 15 points (to complement 5 points of first HW)