

Report for Computer GraphicII, HW1

3D convex hull algorithm and collision detection

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Acknowledgements: Deadline: 2022-10-5 23:59:59

You can choose C++ or Python, and no restrictions on programming framework. You can freely use frameworks such as OpenGL.

The **report** submits as a PDF file to gradscope, the programming part should package all the files include code, input files, executable file, readme.txt, and report. The **package** name is **your_student_name+student_id.zip**.

You will get Zero if the code not passing the plagiarism check.

1 Part 1 (20 points)

1. (5 points) Prove the intersection of two convex set is still a convex set.
2. (15 points) If a plane is divided into polygons by line segments, please design a data structure to store the division information so that for the given line passing two points p_1 and p_2 on the plane, it is efficient to find all the polygons intersected with the line. Please provide the main idea and pseudocode of the algorithm and give the complexity analysis.

2 Part 2 (80 points)

2.1 3D convex hull algorithm(55 points)

(note: you need to show the convex hull visualization result; remember to state the data structure you use; analysis the runtime with incremental number of points; don't make the example too simple(like the simple box or tetrahedron))

2.2 Collision detection(25 points)

(note: need collision visualization and algorithm description)