Computer Graphics

Assignment 4 - Bounding Box Collision Detection with Hierarchical Bounding Volume (BVH)

Due date: April 3rd 2025 (Thursday) 11:59 PM

1 Background

Bounding boxes are commonly used for collision detection in graphics and physics simulations. A hierarchical bounding volume (BVH) helps speed up collision detection by grouping objects into a tree-like structure, reducing the number of comparisons.

2 Objective

In this assignment, you will implement a Bounding Box detection using BVH for multiple 3D meshes. You will:

- Write a class for the Bounding Volume Hierarchy (BVH) Tree;
- Recursively build a BVH tree.
- Detect collisions using BVH by comparing all leaf nodes.

3 Expected Outcome

Upon completing the missing functions, you should see a figure displaying a user-defined number of randomly generated bounding boxes. Pairs of overlapping boxes will be high-

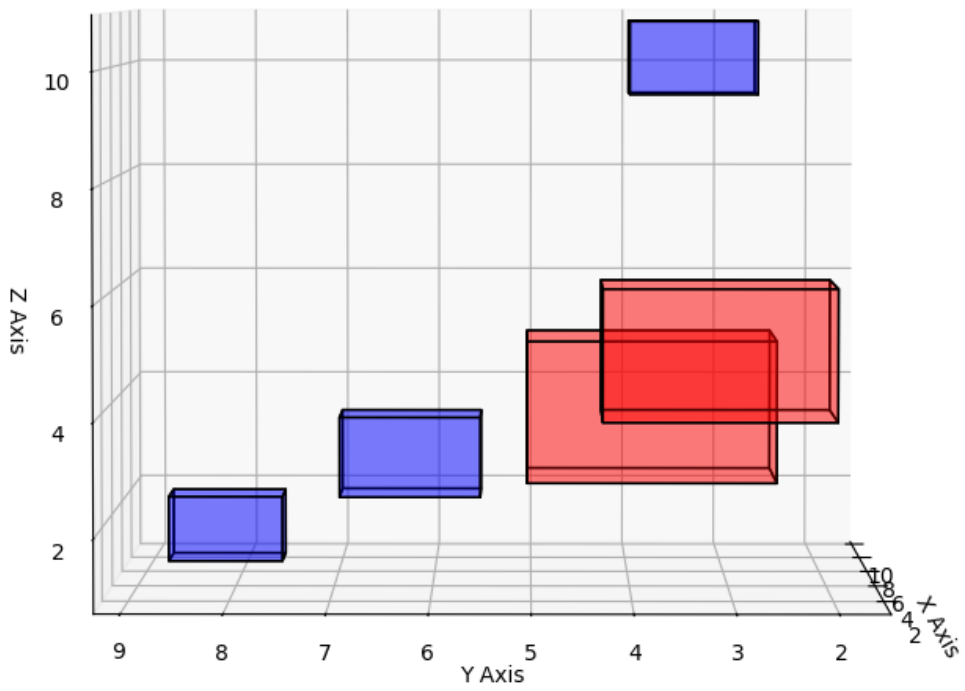

Figure 1: Example Result

lighted in red, while non-overlapping boxes will be shown in blue.

Examples are shown in Figure 1.

4 Items to submit

A zip file that contains your Python code (.py or .ipynb) and a PDF report showing the output figures from your code.