

TPA 1: Comparison of Continuous Collision detection (CCD) Algorithms

Use of API's for implementation of collision detection algorithms is allowed.

The computational cost of a collision detection algorithm depends not only on the complexity of the basic interference test used, but also on the number of times this test is applied. Therefore, it is crucial to apply this test only at those instants and places where a collision can truly occur.

Several strategies have been developed to this end: (1) to "Find a lower time bound for the First collision", (2) to reduce the pairs of primitives within objects susceptible of interfering, and (3) to cut down the number of object pairs to be considered for interference. These strategies rely on distance computation algorithms, hierarchical object representations, orientation-based pruning criteria, and space partitioning schemes.

Input :

The number of objects, layout, motion pattern etc.

Output :

You are required to come up with a detailed visual (demo) comparison of the following CCD algorithms :

1. OBB - Oriented bounding box
2. k-dop - Discrete Orientation Polytope
3. KDtree - BSP-tree
4. Oct-tree

Use as many metrics that you can find in literature to compare these.

References

1. Jimenez, Pablo, Federico Thomas, and Carme Torras. "3D collision detection: a survey." Computers & Graphics 25.2 (2001): 269-285.
2. Kockara, S., "Collision detection: A survey." Systems, Man and Cybernetics, 2007. ISIC. IEEE International Conference on. IEEE, 2007.
3. Min Tang, Dinesh Manocha, Sung-Eui Yoon, Peng Du, Jae-Pil Heo, and Ruofeng Tong, VolCCD: Fast Continuous Collision Culling between Deforming Volume Meshes, ACM Transaction on Graphics, 30, 5, Article 111 (October 2011), 15 pages.



