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POINT-IN-CONVEX POLYHEDRA WITH $O(1)$ COMPLEXITY

The above presented algorithm can be easily modified for the E^3 case, i.e. for the case of Point-in-Convex Polyhedron test. The convex polyhedron is bounded by a virtual three dimensional bounding box. A rectangular space subdivision is "spherically" applied on each face of the bounding box resulting to orthogonal planar cells. For each cell a list of associated faces of the convex polyhedron is kept. The cell size is related to the smallest face of the convex polygon. In the vast majority the list contain only one face index, except of cases when a vertex or edge of the given convex polygon "fall" into the cell.

CONCLUSION

This paper presents a new approach for Point-in-Convex Polygon in E^2 and Point-in-Convex Polyhedron in E^3 tests based on polar and "spherical" space subdivisions using AABB. In the case of convex polygon, resp. convex polyhedron, the processing time is $O(1)$. The pre-processing time depends on geometrical properties of the given polygon, resp. polyhedron. In the case of a convex polygon, the preprocessing time is related to the minimal edge length. In the case of a convex polyhedron, preprocessing time is related to the smallest area of the polygon face.

The proposed algorithms are to be used if many points are to be processed and the given polygon, resp. polyhedron is constant. The proposed algorithms were experimentally verified and experimental results proved expected preprocessing and run-time complexity. It should be noted that actual timing is sensitive to hardware used and data caching due to extreme simplicity of the run-time part.

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