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Facharbeit in Informatik (3KP)
Datenbanktechnologie

Topic: Quadtrees

Quadtrees are multi-dimensional tree data structures for the partitioning of objects in a multi-dimensional space. Depending on the shape of the objects to partition, several types such as point quadtrees or region quadtrees have been introduced, where this work will focus on region quadtrees only.

To improve the efficiency of the partitioning performed by a quadtree, different decomposition methods, such as coverage-based splitting, that restrict the number of quadtree blocks that contain an object; or density-based splitting that restrict the number of objects that are contained by a quadtree block, up to new quadtree variants, such as cover fieldtree or loose quadtree have been defined.

The tasks of the work are as follows:

1. Literature research on quadtrees [3, p.211-220, p.255-264, p.466-480] [1] [4, 2]

2. Elaboration of advantages and disadvantages of the different decomposition methods, with illustration by examples

3. Elaboration of advantages and disadvantages of the loose quadtree compared to the regular quadtree

4. Writing report of approx. 10 pages on the results

References

[1] Cover fieldtree and loose quadtree (demo). http://donar.umiacs.umd.edu/quadtree/rectangles/loosequad.html, 2012.

[2] S. Raschdorf and M. Kolonko. Loose octree: a data structure for the simulation of polydisperse particle packings. http://www.iasor.tu-clausthal.de/stochopt/files/papers/LooseOctreePaper.pdf, 2009.

[3] H. Samet. *Foundations of Multidimensional and Metric Data Structures (The Morgan Kaufmann Series in Computer Graphics and Geometric Modeling)*. Morgan Kaufmann Publishers Inc., San Francisco, CA, USA, 2005.

[4] T. Ulrich. Loose octrees. In M. DeLoura, editor, *Game Programming Gems,*, pages 444–453. Charles River Media, 2000.

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