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Linear R-Tree Revisited

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Abstract: The problem of finding an optimal splitting of overflowed nodes has a major influence on query performance of the R-tree spatial index structure. Most of the previous split heuristics of R-tree-based index structures have quadratic time and face the problem of increasing overlap of the resulting minimum bounding rectangles (MBRs). In this paper, we propose an efficient heuristic method for handling R-tree node splits. The proposed method is an enhancement of the Linear R-tree method proposed in C. Ang & T. Tan, New linear node splitting algorithm for R-trees, Proc. 5th Int. Symposium on Advances in Spatial Databases, 1997, 339-349. However, it provides a solution to resolve the distance tie problem to prevent the splitting algorithm from halting. From a practical point of view, the new splitting method is very attractive because it has linear time complexity, acceptable space utilization, as well as better query performance. Results from several experiments conducted using real-life as well as synthetic datasets show that the proposed splitting method outperforms the quadratic version of the original R-tree in terms of query performance and construction time.