R+ tree

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An **R+ tree** is a method for looking up data using a location, often (x, y) coordinates, and often for locations on the surface of the earth. Searching on one number is a solved problem; searching on two or more, and asking for locations that are nearby in both x and y directions, requires craftier algorithms.

Fundamentally, an R+ tree is a tree data structure, a variant of the R tree, used for indexing spatial information.

Difference between R+ trees and R trees [edit]

R+ trees are a compromise between R-trees and kd-trees: they avoid overlapping of internal nodes by inserting an object into multiple leaves if necessary. **Coverage** is the entire area to cover all related rectangles. **Overlap** is the entire area which is contained in two or more nodes.[1] Minimal coverage reduces the amount of "dead space" (empty area) which is covered by the nodes of the R-tree. Minimal overlap reduces the set of search paths to the leaves (even more critical for the access time than minimal coverage). Efficient search requires minimal coverage and overlap.

R+ trees differ from R trees in that:

- Nodes are not guaranteed to be at least half filled
- The entries of any internal node do not overlap
- An object ID may be stored in more than one leaf node

Advantages [edit]

- Because nodes are not overlapped with each other, point query performance benefits since all spatial regions are covered by at most one node.
- A single path is followed and fewer nodes are visited than with the R-tree

Disadvantages [edit]

- Since rectangles are duplicated, an R+ tree can be larger than an R tree built on same data set.
- Construction and maintenance of R+ trees is more complex than the construction and maintenance of R trees and other variants of the R tree.

Notes [edit]

1. ^ Härder, Rahm, Theo, Erhard (2007). *Datenbanksysteme.* (2., überarb. Aufl. ed.). Berlin [etc.]: Gardners Books. pp. 285, 286. ISBN 3-540-42133-5.

References [edit]

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