Special Purpose Trees I

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Special Purpose Trees

We examine examples that are often used to handle geometric data:
Here's some examples:

1. R Trees
2. Quad Trees
3. kd-Trees

Motivations

1. Most of the geometric data are more than one dimensions
2. How are we going to arrange these data ?
3. Sorting: What is meant by sorting in higher dimensions?
4. Searching: Are there any good search strategies (analogous to binary search)?

Hierarchical Subdivisions

1. Use Tree structures to support search
2. Needs to *partition* the space effectively
3. Support usual operations: insert, delete and search
4. Support other operations of interest
   - Nearest Neighbor
   - Range Search
   - Ray Shooting

Example: R-Trees

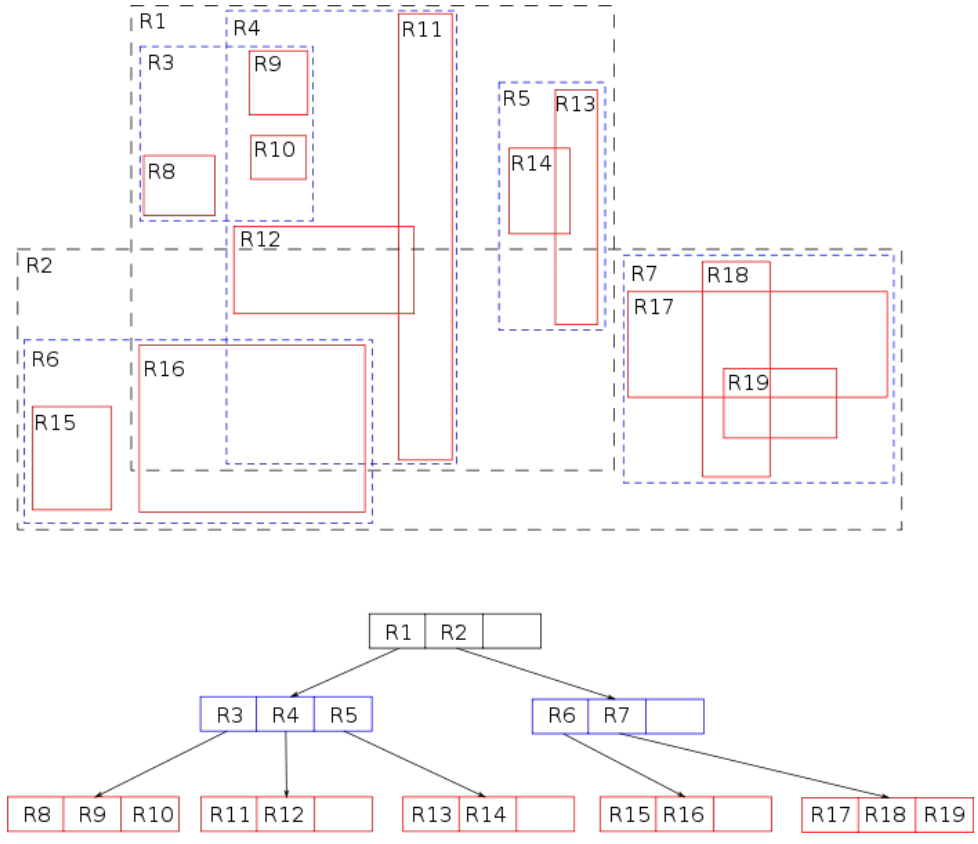

Figure : R Trees: Ideas

Example: Quad Trees

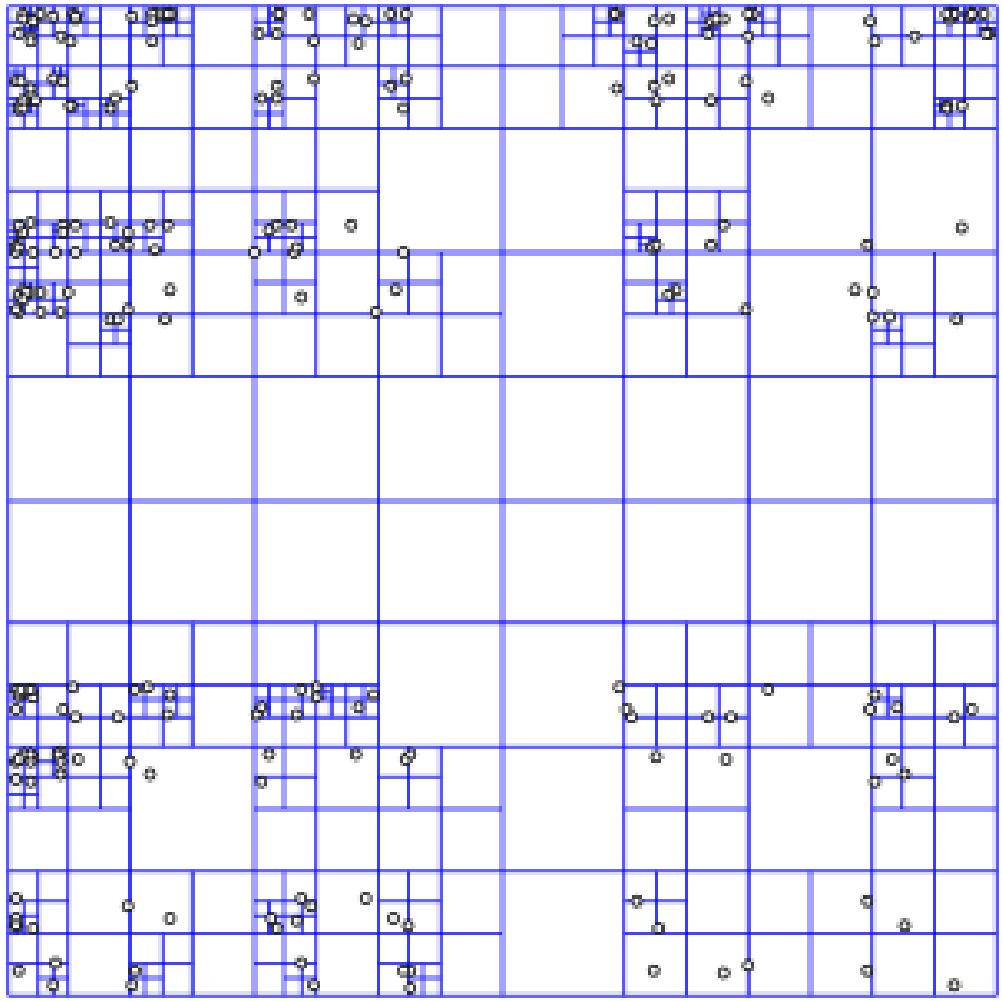

Figure : QuadTrees: Ideas

Note There many other types of quad trees

Example: kd-trees 1

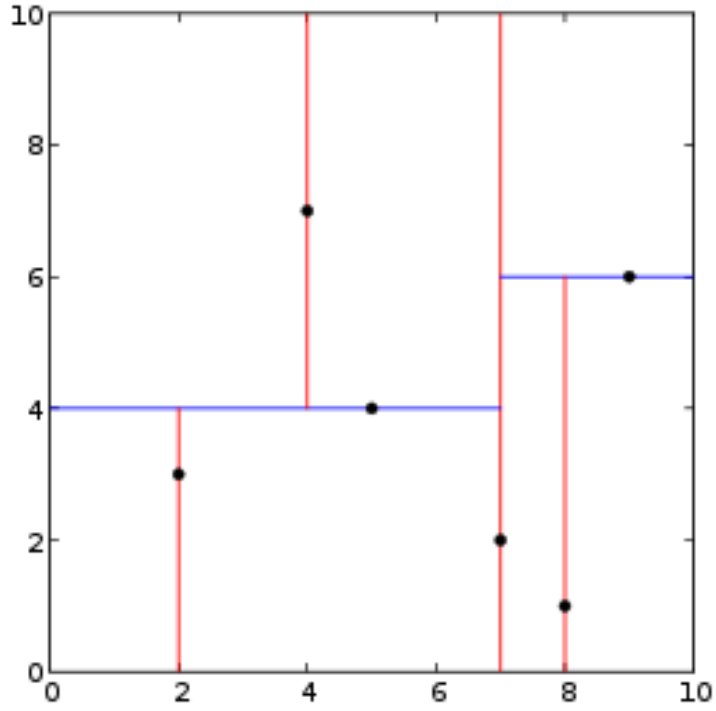

Figure : KD-Trees: Ideas

Example: kd-trees 2

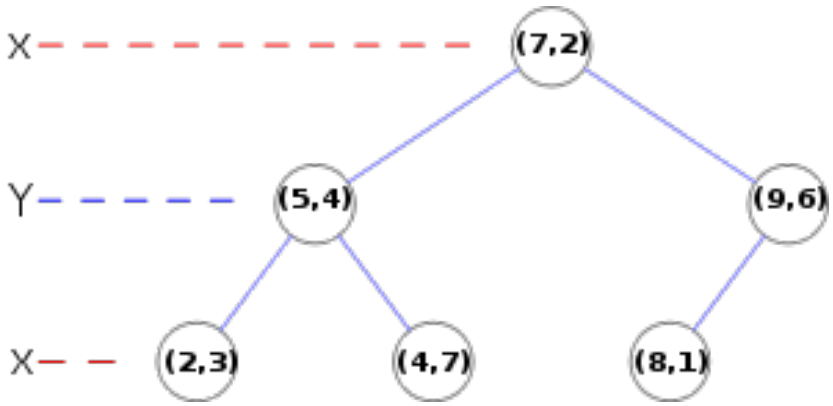

Figure : KD-Trees: Ideas

Example: kd-trees 3

1. How to implement insert, delete and search ?
2. How to implement operation to find nearest neighbors ?