Distributed Index for Multi-dimensional data in sensor networks

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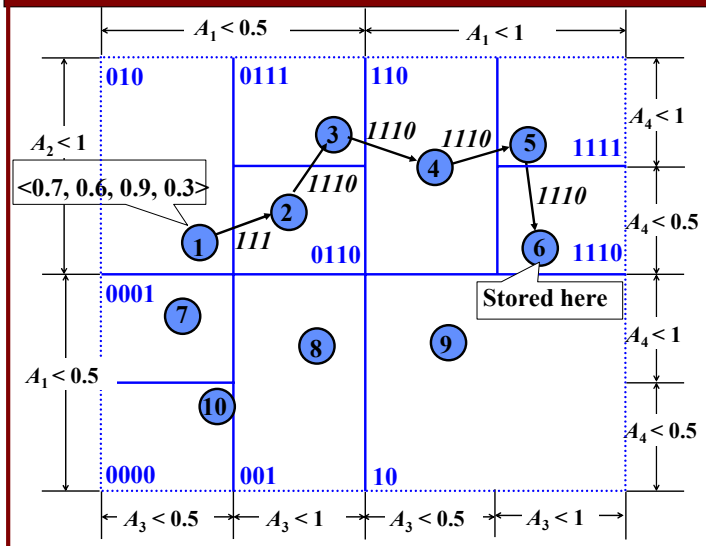
DIM's Motivation

- **Provides support for multi-dimensional range queries in sensor networks when in network storage is applied.**
  - e.g. List all events whose temperature lies between 70 and 80 and whose light levels are between 10 and 15.
- **Can be used for searching and correlating events of interests with multiple attributes.**
- **Classical approaches in traditional databases — Indices.**
- **But here we need a distributed index which works with bins that are scattered all over the network.**

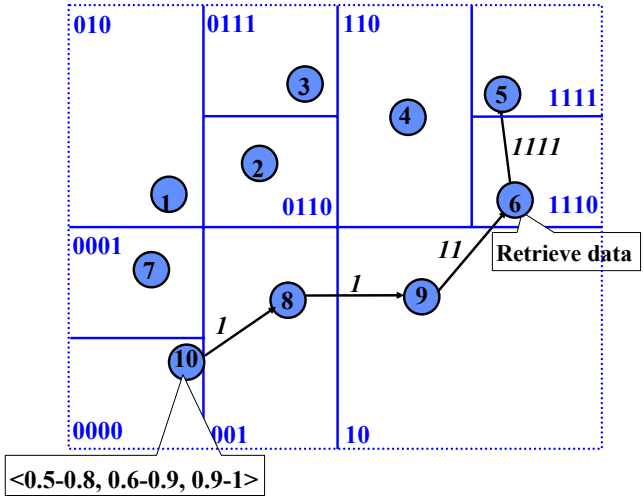
DIM's components

- **A virtual index tree that covers the entire network.**
- **A network partition jointly built by all nodes in a recursive and distributed way.**
  - **A allocation scheme that assigns each node to a bin.**
  - **DIM calls each bin a *zone*.**
- **A hash function that maps data and queries to bins.**
  - **DIM maps each data tuple to a single zone.**
  - **DIM maps each query to one or multiple zones depending on the ranges of the query.**
- **A geographic routing that delivers data and queries to bins.**

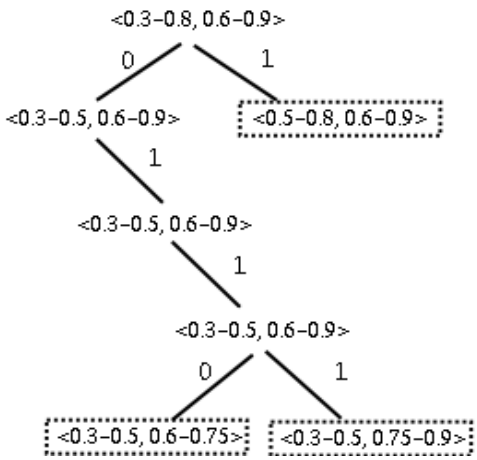
Data Insertion



Query Propagation



Query Splitting



DIM's Mote Architecture