

MODULE – IV

SPATIAL DATABASE

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Sources:

Pearson Education, Inc. 2011, Elmasri/Navathe, Fundamentals of Database Systems, seventh Edition

Spatial Databases

Spatial Database Concepts

- Keep track of objects in a multi-dimensional space
 - ▣ Maps
 - ▣ Geographical Information Systems (**GIS**)
 - ▣ Weather
- In general spatial databases are n-dimensional
 - ▣ This discussion is limited to 2-dimensional spatial databases

Common types of analysis in spatial data`

3

Analysis Type	Type of Operations and Measurements
Measurements	Distance, perimeter, shape, adjacency, and direction
Spatial analysis/statistics	Pattern, autocorrelation, and indexes of similarity and topology using spatial and nonspatial data
Flow analysis	Connectivity and shortest path
Location analysis	Analysis of points and lines within a polygon
Terrain analysis	Slope/aspect, catchment area, drainage network
Search	Thematic search, search by region

Spatial Data Types and Models

- Map Data
 - ▣ Basic Features: points, lines, and polygons
- Attribute Data
- Image Data

Spatial Operators

□ Static Operators

- ▣ Topological: Disjoint, Meet, Overlap, Contains, Inside, Covers, Covered by, Equal
- ▣ Projective
- ▣ Metric: area, relative size of an object's parts, Compactness, and symmetry

□ Dynamic Operators: alter the objects upon which the operations act

- ▣ create, destroy, and update
- ▣ Update: translate (shift position), rotate (change orientation), scale up or down, reflect (produce a mirror image), and shear (deform)

Spatial Queries

- **Range** query: Finds objects of a particular type within a particular distance from a given location
- **Nearest Neighbor** query: Finds objects of a particular type that is nearest to a given location
- **Spatial joins** or overlays: Joins objects of two types based on some spatial condition (intersecting, overlapping, within certain distance, etc.)