5.1 Computing With Geospatial Data

Definition of algorithm

Discussion of complexity

Introduction to Computational Geometry
5.2 The Discrete Euclidean Plane

Geometric Domains

Discretization methods:
- Green-Yao algorithm
- Douglas-Peucker algorithm
5.3 The Spatial Object Domain

Data structures:
- Spaghetti
- Doubly-Connected Edge List (DCEL)
- Object DCEL
5.4 Representation of Field Based Models

Regular Tesselated Representations vs Irregular Tesselated Representations

Delaunay Triangulations

Voronoi Diagrams
5.5 Fundamental Geometric Algorithms

Metric/Euclidean:
- Distance
- Area of a simple polygon
- Centroid of a polygon

Topological:
- Point-in-polygon
  - semi-line algorithm
  - winding number algorithm
5.5 Fundamental Geometric Algorithms (continued)

Set-Based:
- Collinearity
- Point on segment
- Segment intersection

Triangulation
- Greedy triangulation algorithm
- Delaunay triangulation algorithms
5.6 Vectorization and Rasterization

Vectorization
1. Thresholding
2. Smoothing
3. Thinning
4. Chain Coding
5. Transformation into a series of vectors

Zhang-Suen algorithm
Network Representation and Algorithms

Network Representation
  - Adjacency List vs Adjacency Matrix

Traversals
  - Depth-first vs Breadth-first

Shortest Path
  - Dijkstra's Algorithm
1. Plane Sweep Algorithm.
2. Voronoi Diagram for Query Processing
3. Fastest Path Computation
4. Correlation in Spatial Time Series Queries
Thank you!