

The background features a complex network of thin, light-colored lines forming a triangular mesh. Scattered throughout are small, semi-transparent dots in shades of green, blue, and orange. A horizontal band of semi-transparent white and light gray geometric shapes, including triangles and rectangles, runs across the middle of the image. On the left side, there is a vertical strip containing a grid of small gray plus signs and a rectangular area with a pixelated, orange-to-yellow gradient.

Mining Spatial Associations

Spatial Frequent Patterns and Associations

- Spatial frequent patterns and association rule: $A \Rightarrow B [s\%, c\%]$
 - A and B are sets of spatial or non-spatial predicates, e.g.,
 - Topological relations: *intersects, overlaps, disjoint*, etc.
 - Spatial orientations: *left_of, west_of, under*, etc.
 - Distance information: *close_to, within_distance*, etc.
 - Measures: $s\%$: support, and $c\%$: confidence of the rule
- Example: Rules likely to be found
 - $is_a(x, large_town) \wedge intersect(x, highway) \rightarrow adjacent_to(x, water) [7\%, 85\%]$
- Explore *spatial autocorrelation*: Spatial data tends to be highly self-correlated (*nearby things are more related than distant ones*)
 - E.g., neighborhood, temperature

Mining Spatial Associations: Progressive Refinement

- Hierarchy of spatial relationship:
 - *close_to* is a generation of *near_by*, *touch*, *intersect*, *contain*, ...
 - **Progressive refinement:** First search for rough relationship and then refine it
- Two-step mining of spatial association:
 - Step 1: Rough spatial computation (as a filter)
 - Using MBR (Minimum Bounding Rectangle) or R-tree for rough estimation
 - Step2: Detailed spatial algorithm (as refinement)
 - Apply only to those objects which have passed the rough spatial association test (no less than *min_support*)

