

Discovering Emerging Patterns in Spatial Databases: a Multi-Relational Approach

Michelangelo Ceci, Annalisa Appice, Donato Malerba

{ceci, appice, malerba}@di.uniba.it



Department of Computer Science, LACAM lab

University of Bari, Italy



What is an Emerging Pattern?

... An itemset P that distinguishes a **target** class C_i from a **background** class C_j

1. $support_{C_i}(P) \geq minSupport$ (frequent pattern on C_i) (1)

2. $growthRate^{C_j \rightarrow C_i}(P) \geq minGrowthRate$ (2)

(Dong and Li, 1999)

where:

➤ $support_{C_i}(P) = prob(P|C_i)$

➤ $growthRate^{C_j \rightarrow C_i}(P) = support_{C_i}(P) / support_{C_j}(P)$



Mining EPs on Spatial Data?

- 1) Spatial objects have a locational property which implicitly defines **spatial relationships** between objects.
- 2) **Spatial autocorrelation** justifies the consideration of these spatial relationships.
- 3) Spatial objects of different types are represented in **different relational tables** (layers)



Relational Data Mining approach to mining EPs



Mr-EP: A Relational Data Mining approach

Tight-coupling with database. Knowledge on data structure available free of charge to guide the search in relational pattern space.

Discovery based on the Levelwise method (Mannila & Toivonen, 1997) and additional pruning criteria particularly suited for EPs.

Multi-relational emerging pattern discovery to discover relational EPs and provide a characterization of classes.

Human interpretable discovered emerging patterns.

