# Mining interactions in bibliographical data with domain ontologies

**László Szathmáry**

Galois (or concept) lattices provide a natural and formal setting to discover and represent concept hierarchies. In this paper we investigate the application of formal concept lattices on different data sources (like bibliographical items, web documents) in order to extract knowledge units from data. These knowledge units are represented as formal concepts and they are organized within a lattice. The concept lattice can then be used for reasoning and problem solving, e.g. information retrieval. Concept lattices can be considered as classification tools for knowledge units in concept hierarchies. Furthermore, Galois lattices can be used with domain ontologies in parallel to build more precise and more concise concept ontologies, and for guiding the knowledge discovery process. In general, ontologies provide a shared and common understanding of a domain for communicating between people and heterogeneous application systems.

Iceberg concept lattices is a mathematical theory for building Galois lattices with respect to an ontology of properties, used in data analysis, information retrieval, and knowledge discovery. Iceberg concept lattices show only the top-most part of a concept lattice. They can be used as a visualization method (especially for very large databases), as a representation of frequent itemsets, or as a base of association rules.

We have connected iceberg concept lattices with ontologies. We have made experiments with iceberg concept lattices and ontologies over bibliographical items of our research team. Detecting correlations and interactions between members of the team provides a global view of the team functioning. It can help us to find interconnections between the members, to see which are the main/marginal works within the team, etc. We have also investigated what information is revealed by descending in the ontology and increasing its granularity, combined with the visualisation support of iceberg lattices.