Metric and Topological Aspects in Distributed Systems
Thesis summary

First of all, we described in the **"Introduction"** the general framework of our work. In the second chapter, **"Formal Concept Analysis"**, we briefly overview the basic notions which will be used throughout the rest of the thesis.

In the third chapter, **"Threshold Concept Lattices"**, we propose a new metric model for extracting the relevant information from large collections of documents and for refining the information retrieval. We first define two new concept forming operators and prove that they form a Galois connection. We use this adjunction to introduce a new type of concept lattices, namely threshold (t)-concept lattices, that allows us to work with specific thresholds for searching words in Web documents. We show that many of the properties of classical concept lattices, including the basic theorem of Formal Concept Analysis, still hold in this new setting.

One important issue for the model we proposed is whether or not this approach is scalable to large and dense data sets. Since for dense formal contexts, the size of the corresponding concept lattices can be very large, the problem of generating the set of concepts is not an easy one. Thus, in the next chapter, **"Similarity in $L-$Oriented Concept Lattices"**, we develop a model of similarity for an $L-$attribute-oriented concept lattice, which we use to reduce the complexity of the t-conceptual structures we have built. We introduce two similarities between $L-$attribute oriented concepts, induced by their extents or intents, study their properties, and prove that they are equal. Next, we define a tolerance relation on the set of $L-$attribute oriented concepts, based on the new types of similarity introduced between $L-$attribute oriented concepts. This relation can be used to factorize the $L-$attribute oriented concept lattice, and thus to reduce its complexity. We also develop an efficient algorithm to compute the blocks of the resulted factor lattice.

In the last chapter, **"Lower and Upper Concept Lattices"**, using the Hoare and Smyth preorders, a Galois connection and and notions from domain theory, we define two new types of formal concepts, namely the lower and the upper formal concepts and study the structure of the corresponding sets of concepts. We prove the basic theorem of the FCA, which states that the set of lower (upper) concepts is a complete lattice, in this new setting, as well as other properties of lower and upper concept lattices.