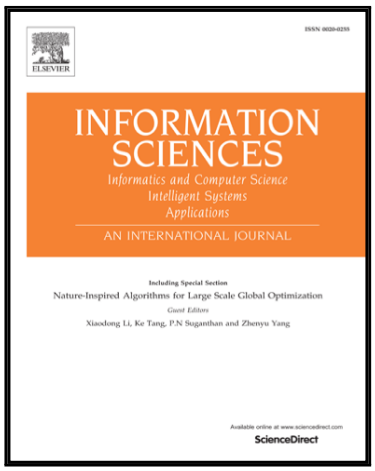

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Abstract

In recent years, the increasing complexity of real problems has directed the attention of many types of research, especially those handling large datasets. Formal concept analysis (FCA), for instance, is an increasingly growing research field. It is considered an important theory to formalize the representation of knowledge. FCA uses concept lattice theory to hierarchically organize concepts from a formal context consisting of objects, attributes, and their incidences. However, formal contexts with high dimensionality, considering the number of objects, attributes or both, demand powerful computational resources. Several algorithms have been proposed to extract formal concepts. These algorithms have an exponential complexity in the worst case. So, for high dimensionality contexts, the computational cost becomes prohibitive. This problem motivated several studies seeking alternatives to deal with this type of scenery. Unlike other works, that propose novel algorithms to extract formal concepts, we aimed to improve the performance of FCA algorithms by using an alternative structure, Binary Decision Diagrams (BDD), to represent formal contexts, objects and attributes. The work uses BDD to represent information in a canonical and simplified way to reduce the resources needed to manipulate large datasets, typical scenery for big data problems. Our results show that this approach enables the manipulation of higher dimensional contexts in object quantities, which were unfeasible to original algorithms.

Keywords: Formal concept analysis, Binary decision diagrams, High dimensionality, *NextClosure*, *In-Close2*