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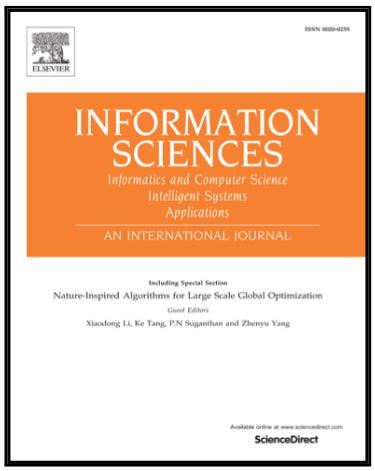

On attribute reduction in concept lattices: Experimental evaluation shows discernibility matrix based methods inefficient

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On attribute reduction in concept lattices: Experimental evaluation shows discernibility matrix based methods inefficient

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Abstract

In recent years, discernibility matrix based methods of attribute reduction in concept lattices (DM-methods) enjoyed an increase in attention and were applied in many extensions of Formal Concept Analysis. In our previous paper, we pointed out that there exists an older method (CR-method) with theoretically lesser time complexity and we proposed a wrapping procedure to use the CR-method in any extension where the DM-methods are used. Now we evaluate the methods experimentally. Results of the evaluation assert our previous theoretical findings that the CR-method is strictly superior as it outperforms the DM-methods by several order of magnitude. To emphasize the poor performance of the DM-methods we introduce a new naïve and deliberately slow algorithm called SIMPEL. Subsequently, we show that even its performance is not so bad in comparison with the DM-methods. Our conclusions are that it is inefficient to use the DM-methods for attribute reduction in concept lattices and that the CR-method should be used instead in practice.

Keywords: Experimental evaluation; formal concept analysis; reduction in concept lattice; discernibility matrix.

1. Introduction

Formal concept analysis (FCA) [4, 1] is a method of relational data analysis based on a formalization of a certain philosophical view of conceptual

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