

Accepted Manuscript

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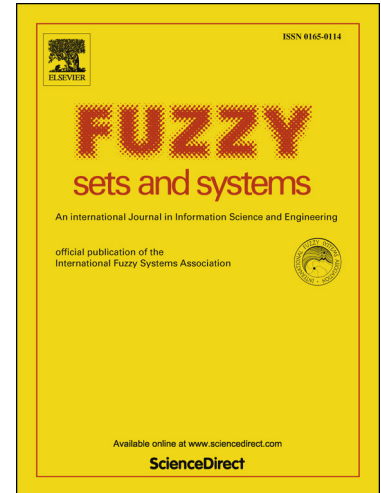
PII: S0165-0114(17)30202-6
DOI: <http://dx.doi.org/10.1016/j.fss.2017.05.002>
Reference: FSS 7218

To appear in: *Fuzzy Sets and Systems*

Received date: 1 November 2015
Revised date: 10 April 2017
Accepted date: 2 May 2017

Please cite this article in press as: Z. Zhang, Constructing L-fuzzy Concept Lattices without Fuzzy Galois Closure Operation, *Fuzzy Sets Syst.* (2017), <http://dx.doi.org/10.1016/j.fss.2017.05.002>

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Constructing L-fuzzy Concept Lattices without Fuzzy Galois Closure Operation

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Abstract

Improving construction efficiency of fuzzy concept lattices remains one of the important issues in the field of fuzzy formal concept analysis. Building L-fuzzy concept lattice is usually based on the closure operation of the fuzzy Galois connection, and each closure operation needs to scan the fuzzy concept context twice. This becomes a significant computing overhead, especially when the fuzzy formal context is large. We propose a batch-mode algorithm for directly constructing fuzzy concept lattices based on union and intersection operations of the fuzzy set that scans the fuzzy formal context once only. Experimental results show that it improves the construction efficiency of the complete fuzzy concept lattice, especially for large fuzzy formal contexts with small truth sets.

Keywords: Algorithm; L-fuzzy concept lattice; Fuzzy set; Set operation; Equivalence class

1. Introduction

Formal concept analysis (FCA) was proposed by Wille (1982) [23], and has been applied in various fields of computer science as a tool for conceptual analysis. Most applications based on FCA need to derive formal concepts or its lattice from the formal context, such as microarray data analysis in bioinformatics [21], exploratory data analysis in athlete information [1], and fuzzy ontology construction [33]. Although these applications utilized differently defined fuzzy formal concepts, the first step of the procedure of each appli-

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