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Incremental Encoding of Multiple Inheritance Hierarchies Supporting Lattice Operations

M.F. van Bommel and T.J. Beck

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Abstract

Incremental updates to multiple inheritance hierachies are becoming more prevalent with the increasing number of persistent applications supporting complex objects. Efficient computation of lattice operations such as greatest lower bound (GLB), least upper bound (LUB), and subsumption subsequently is becoming more and more important. General techniques for compact encoding of a hierarchy are presented that support the operations, and are flexible enough to allow incremental updates to the hierarchy. One such method is to plunge the given ordering into a boolean lattice of binary words, leading to an almost constant time complexity of the lattice operations. The method is based on an inverted version of the encoding of Ait-Kaci et al. to allow incremental update. Simple grouping is used to reduce the code space while keeping the lattice operations efficient. Comparisons are made to an incremental version of the range compression scheme of Agrawal et al., where each class is assigned an interval, and relationships are based on containment in the interval. The result is two incoding methods which have their relative merits.

Authors' address

Department of Mathematics, Statistics, and Computer Science
St. Francis Xavier University
Antigonish, Nova Scotia B2G 2W5
Canada

Email: {`mvanbomm,x93gtd`}`@stfx.ca`

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