Electronic Transactions on Artificial Intelligence
Vol. 4 (2000), Section C: pp. *35-49*
http://www.ep.liu.se/ej/etai/2000/006/

Refereed Article

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Incremental Encoding of Multiple Inheritance Hierarchies Supporting Lattice Operations

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Abstract: *Incremental updates to multiple inheritance hierarchies 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 is becoming more and more important. General techniques for the 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 encoding methods which have their relative merits.*

Publication and review history

1. *Received* by the research area "Concept Based Knowledge Representation" of the Electronic Transactions on Artificial Intelligence, posted on its web site, and advertised in its Newsletter on 10.3.2000.
2. Available for *discussion* in the ETAI area of Concept Based Knowledge Representation until March–June, 2000. The discussion protocol is available and will be retained in the Article Interaction Page at
   http://www.etaij.org/ra/cbkr/002/
3. First version conditionally *accepted* after due refereeing and according to scientific journal standards by the Electronic Transactions on Artificial Intelligence (ETAI) on 30.11.2000.
4. Revised version *accepted* on 28.12.2000.
5. Revised version appears in Electronic Transactions on Artificial Intelligence, Volume 4 (2000), pages 35–49. The section and the annual volume are made permanently available at
   http://www.ep.liu.se/ej/etai/2000/
6. Paper editions of the ETAI issue and the ETAI volume containing this artice *republished* by the Royal Swedish Academy of Sciences.
7. First and final versions are also *published* as individual articles by Linköping University Electronic Press in December 2000 and January 2001, and are permanently available at
   http://www.ep.liu.se/ea/cis/2000/001/

The review policy and the quality requirements for acceptance are documented at http://www.etaij.org/info/

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