HalVA – Rule Analysis Framework for XTT2 Rules

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RuleML

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http://geist.agh.edu.pl
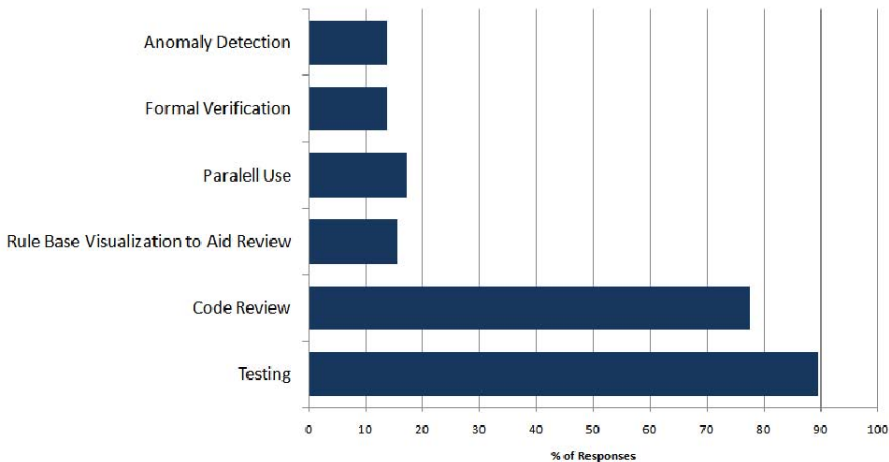
Outline

State of the art

Figure: What can be verified (*Development and Verification of Rule Based Systems — A Survey of Developers*[6])

HalVA

Motivation

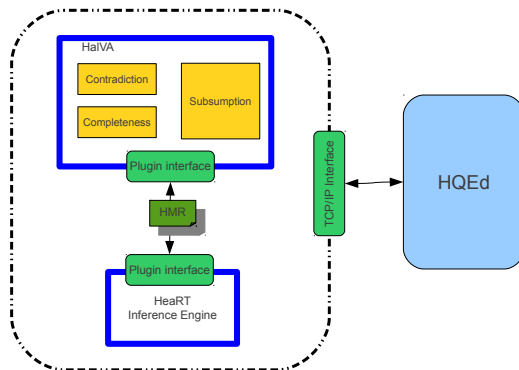Provide tools fot formalized knowledge base verification

Figure: HeKatE Tools

What can be verified

- Inconsistency in a single rule
- Inconsistency between a pair of rules
- Subsumption within a single rule
- Subsumption between a pair of rules
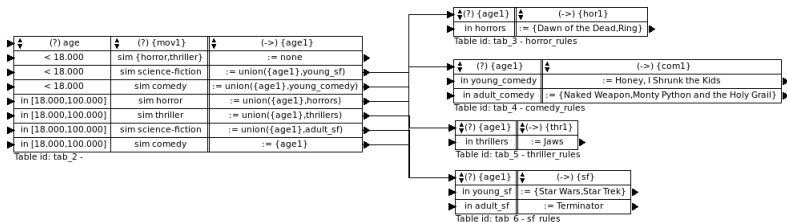- Completeness of a group of rules

XTT

Figure: XTT Table

Rule in ALSV(FD) logic

$$\text{IF} \qquad age < 18 \wedge movie\_types \cap \{horror, thriller\} \neq \emptyset$$
$$\text{THEN} \quad age\_filter := \emptyset$$

Rule in HMR

```
[age lt 18, movie_types sim [horror, thriller]]
==> [age_filter set [none]].
```

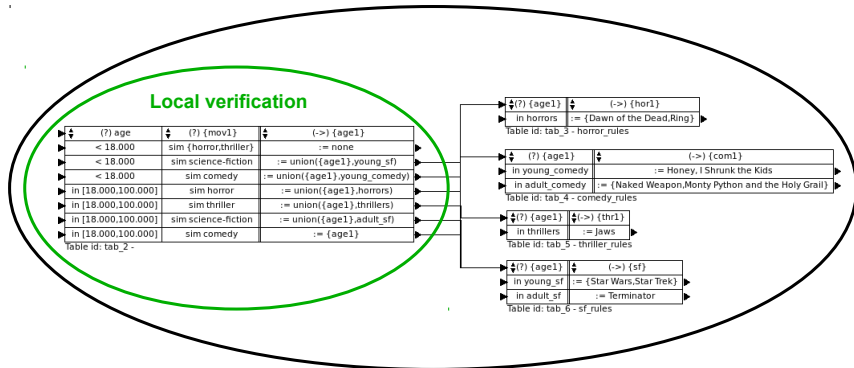# Local and Global Verification

Global Verification

Figure: Local vs. Global verification

Related Work

DERIS2009: *Proposal of a graph-oriented approach to verification of XTT2 rule base* (XTT2 as a hyper graph)

How to verify?

Cartesian product of values of attributes

Combinatorial explosion - inefficient.

Combination of domain partitions

More efficient, but still domain dependant. Requires finite domains.

Future work

The new approach is based on analyzing logical dependencies between condition parts of rules, rather than on algebra of sets.
$(A = V_1 \mapsto A = V_2) \Leftrightarrow V_1 = V_2$
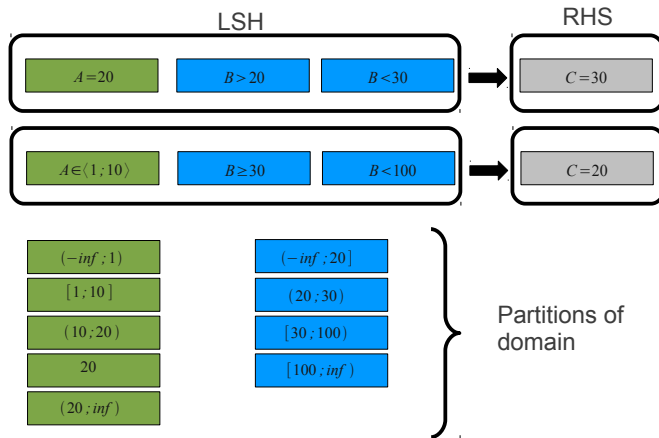
Partitioning domains

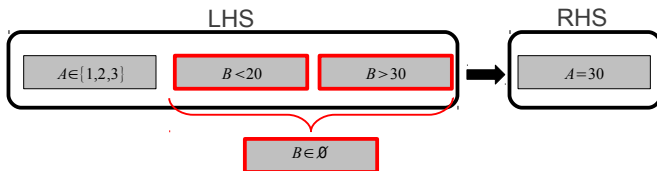Figure: Partitioning domains

Inconsistency

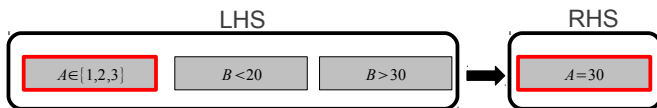**Figure**: Inconsistency within a single rule

Figure: Inconsistency between LHS and RHS
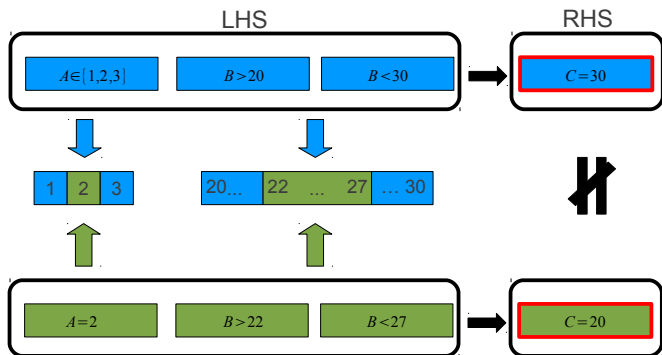
Inconsistency

Figure: Inconsistency between a pair of rules
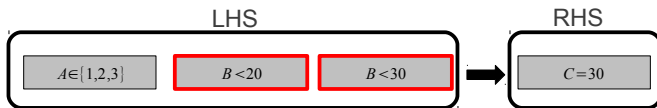
Subsumption

Figure: Subsumption within a single rule
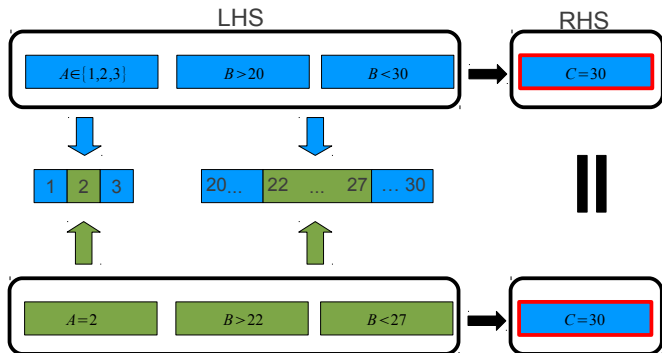
Subsumption

Figure: Subsumption of a pair of rules
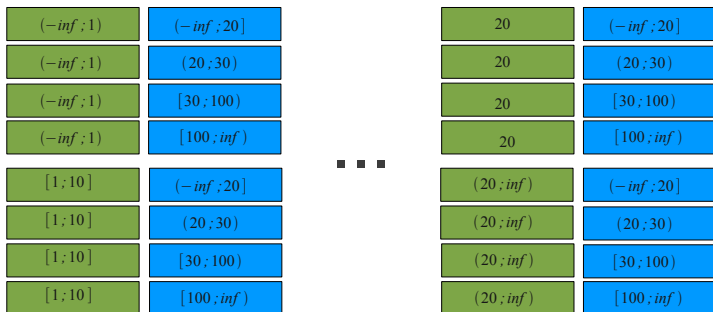
Completeness of a group of rules

Figure: Cartesian product of partitions of domains
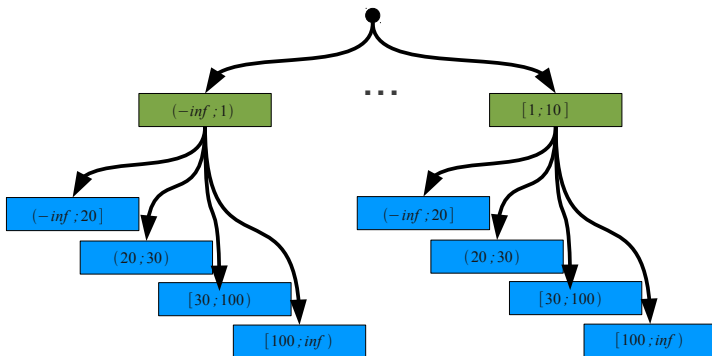
Completeness of a group of rules

Figure: Tree of states
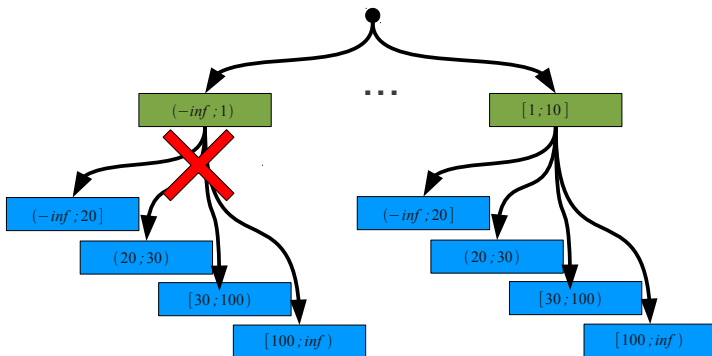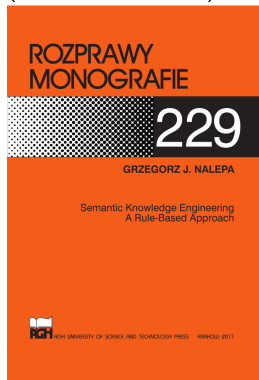
Completeness of a group of rules

Figure: Tree of states

Conculsion

Take a copy of the book (outside the room):

- Formalised knowledge base
- Custom rule representation
- Verification tools
  - Inconsistency
  - Subsumption
  - Completeness of a group of rules

Current Focus

BIMLOQ

Integrating BPMN with formalism provided by XTT.
http://bimloq.ia.agh.edu.pl

More information

KESE2011 *Proposal of a hierarchical approach to formal verification of BPMN models using Alvis and XTT2 methods*

¡Thank you for your attention!

¿Any questions?

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