information flow within relational multi-context systems

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ekaw 2014, linköping
november 26th, 2014

why combine systems?

- proliferation of expert systems for reasoning
- larger and larger bodies of knowledge available
- easy communication via the internet
- focus on connecting instead of combining
- easier to control decidability/complexity issues

multi-context systems

why very general framework for combining different reasoning systems

heterogeneous allow generic combinations of arbitrary types of systems with little or no restrictions

non-monotonic new facts can cause derived information to become false – important to express e.g. default reasoning

variety many different flavours

- "basic" mcs: propositional style, bridge rules add or remove facts
- managed mcs: bridge rules allow revision operators
- relational mcs: allow a first-order sublanguage
- dynamic mcs: allow contexts to change over time

methodology

goal propose systematic solutions to typical problems

tool general-purpose programming design patterns

- generic communication
- external definitions
- applications to ontologies

$\rightsquigarrow$ systematic way to express an ontology as a context within an mcs

adding default rules to an ontology

problem enrich an ontology with default rules

solution translate default rules into bridge rules (mcs primitive)

theorem one-to-one correspondence between models of the mcs and extensions of the default rule

$\rightsquigarrow$ generalizes to other kinds of context

ontology alignment

problem	reason within the merge of two ontologies, given an alignment
solution	express the ontologies and the alignment as contexts, communicating through bridge rules
theorem	semantics corresponding to the merge of the two ontologies
$\rightsquigarrow$	easier treatment of inconsistency

conclusions & future work

conclusions

- systematic constructions in mcs
- alternative solution to common problems in ontology reasoning
- general-purpose constructions

future work

- syntactic extensions of mcs
- treatment of integrity constraints