Rule Modeling Using Semantic MediaWiki

Jie Bao (RPI), Li Ding (RPI), Paul R. Smart (U. Southampton), Dave Braines (IBM UK), Gareth Jones (IBM UK)

Background

Semantic Mediawiki (SMW) is a popular Semantic Web platform that supports semantic annotations and a simple query language.

However, SMW lacks native modeling of rules, therefore offers only limited support for inference.

Query-based Rule Modeling

- Use SMW queries to model rule antecedents
- Use conditional parser functions (“#if”) or loop functions (e.g., #arraymap) to model rule consequents
- Use templates to store rules

Example

rdfs:domain inference rule: “Template:Domain”

Use SMW queries to model rule antecedents
Use conditional parser functions ("#if") or loop functions (e.g., #arraymap) to model rule consequents
Use templates to store rules

Concrete Modeling Scenarios

OWL Entailment

Similar to rdfs:domain, many other OWL entailment rules can be modeled

Example: eq-sym (symmetry of owl:sameAs)

Logic Programs

Rules in logic programs:

\[ H : \neg H \]

Example: every person is by default right-handed, unless that person is known to be left-handed, i.e.,

\[ \text{RightHanded}(x) ; \text{Person}(x), \neg \text{LeftHanded}(x) \]

\[ \text{LeftHanded}(x) ; \text{Person}(x), \neg \text{RightHanded}(x) \]

\[ \text{Person}(x) ; \neg \text{HasGender}(x, y) \]

Integrity Constraints

Integrity constraints describes errors in a dataset

Example: notOK :- \text{Person}(x), \neg \text{HasGender}(x, y)

Pros and Cons

- No external reasoner required
- Supports expressive rules
- Easy to extend
- Pay as you go: local rule invocation by template embedding

- Not always complete
- Limited real-time updating

Future work

- Encoding OWL 2 RL entailment rules in SMW
- Supportive user interfaces for rule authoring