Annual Conference of ITA

ACITA 2009

Rule Modeling Using Semantic MediaWiki

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Background

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

"
```
[[Category:Person]]
[[attend::ACITA2009]]
```
"

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"

```
{{#if:
    {{#ask:[[:{{PAGENAME}}]]|?{{{1}}}=
        |mainlabel=- |link=none
    }}
    |[[Category:{{{2}}}]]
}}
```

antecedent

consequent

Usage example: `{{Domain|hasAuthor|Document}}`

Concrete Modeling Scenarios

OWL Entailment

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

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

```
{{#vardefine:same
    |{{#ask: [[owl:sameAs::{{{1}}}]]
            |format=list|link=none}}
}}

{{#if: {{#var:same}}
    |{{#arraymap:{{#var:same}}|,|__x|
    [[owl:sameAs::__x]]
}}
```

Logic Programs

Rules in logic programs:

$$H :- B_1,\ldots B_n$$

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

RightHanded(x):-Person(x),
not LeftHanded(x).

```
{{LP Rule
  |body= 1::Person; 1:not:LeftHanded
  |head= RightHanded
}}
```

See details at: http://tw.rpi.edu/proj/cnl/Template:LP_Rule

Integrity Constraints

Integrity constraints describes errors in a dataset

Example:

notOK :- Person(x), not HasGender (x,y)

See details at: http://tw.rpi.edu/dev/cnl/Integrity_Constraint

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