

Thoughts on Rules for the FIBO Effort

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Rules – Technical Requirements: Attributes

- **Expressive power:** NAF (and aggregates), functions, higher-order (incl. reification, rule ids), defeasible, omniform, restraint
 - function-free Horn is vanilla
- **Scalability computationally**
- **Evolvability:** handle K change and integration
- **Semantics clean and well-lighted**
- **Cost-efficient authoring (KA) methods known**
- **Computationally efficient reasoning methods known**
- **Ease of K interchange translation methods**
- **Ease of other integration with rest of software/data environment**
- **Implementation availability, scope, quality**
- **Open-source**

Req. Analysis for Financial: Contracts, Reporting

- Need defeasible higher-order logical formulas for: ...
- Cost-effective knowledge acquisition
- Policy-centric: contracts, regulation, law, trust, pricing, notice
 - E.g., Regulation W about what's an affiliate co. of a bank for conflict-of-interest
- Info integration with ontology mapping: reporting analysis
 - E.g., *pro-forma* treat acquisition of a co. for its IP: as *operating* expense
- The logic must handle exceptions and change, gracefully
 - Must be defeasible
 - = K can have exceptions, i.e., be “defeated”, e.g., by higher-priority K
 - For empirical character of K
 - For evolution and combination of KB's. I.e., for social scalability.
 - For causal processes, and “what-if's” (hypotheticals, e.g., counterfactual)

Survey

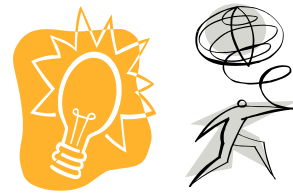
- **Rulelog is the logic that best meets the requirements**
 - Early in process of commercialization
 - RIF-Rulelog in draft as standard
 - Important open source: Flora-2 (provides large subset)
- **Others not close to meeting the requirements**
- **Legacy systems are expressively ~ limited subset: logic programs (LP)**
 - Production rules dominant in business rules sector are often crufty semantically
 - Standards: RIF –BLD, -Core, -PRD; OWL-RL; SPARQL, SQL; ISO Prolog
 - Important open source: JBoss production rules, XSB Prolog
 - **Issue: how to translate from/to Rulelog:** more work needed, incl. applied research
- **FOL beyond this never much been practical, except bits of OWL-DL**
 - Standards: Common Logic, SBVR, OWL-DL
 - Important open source: Vampire (see TPTP for more)
- **Probabilistic only loosely integrated as yet, effectively**
 - Basic research still needed/ongoing
 - Severe issues in computational scalability, knowledge acquisition
- **Collaborative environment: RuleML, XBRL, W3C, Oasis, OMG, ...**

Rulelog

- **Rulelog is the logic that best meets the requirements**
 - Extension of LP. Transforms into LP. Rules, ontologies, databases.
 - 1st to meet challenge: defeasible + tractable + classical formulas
 - RIF-Rulelog in draft as standard
 - Open source: Flora-2 provides large subset. 1st implem.: Vulcan SILK.
 - Supports strong, very broad semantic knowledge interchange
 - “Big tent”: supersumes almost all used expressiveness in previous sem web
- **Complementary approach: Textual Logic**
 - Map text to logic, logic to text. Map using logic.
 - Textual terminology: English phrase \leftrightarrow logical term. Interactive disambiguation.
 - Enables cost-effective knowledge acquisition etc. UI to be text-based
 - Leverages the power of Rulelog

Past Difficulties with Rich Logical K

- **KRR not defeasible & tractable**
- ... even when not target of text-based KA
- **E.g.**
 1. FOL-based – OWL, SBVR, CL: infer garbage
 - Perfectly brittle in face of conflict from errors, confusions, tacit context
 2. E.g., FOL and previous logic programs: run away
 - Recursion thru logical functions



Thank You

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