A Fuzzy Extension of SPARQL for Querying Gradual RDF Data

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Motivations
Retrieving artists such that almost all albums he/she recommends are low-rated and created by a close friend.

Previous extensions of SPARQL:
- with Boolean navigational capabilities,
- with fuzzy querying capabilities (on node attribute values only),
- but not both.

The RDF Data Model
RDF supports Boolean relationships (True (1) or False (0)).

Example: Beyonce is a friend of Shakira

Fuzzy RDF Data Model supports gradual relationships:
- friend (close, best, normal, ...),
- recommends (strongly, weakly, ...).

The SPARQL Query Language
A SPARQL query contains Boolean conditions.

Example:
```
SELECT ?art1 WHERE {
  ?alb rating ?r.
  FILTER (?r < 4) .
}
```

Contributions: More Flexible SPARQL
Querying using fuzzy preferences:
- on the values of the nodes (using fuzzy conditions (e.g. low rating))
- on the structure of the graph (using fuzzy regular expressions (e.g. F s.math/h.math/o.math/r.math/t.math /d.math/i.math/s.math/t.math/a.math/n.math/c.math/e.math))

Example: Retrieve artists (?art1) such that almost all albums (?alb) he/she recommends are low-rated and created by a close friend (?art2).
```
SELECT ?art1 WHERE {
  (?art1 ?friend+) distance is short1 ?art2.
  ?art2 creator ?alb.
  ?alb rating ?r.
  FILTER (?r is low).
}
```

Implementation
Adding a software (called FURQL) layer over a standard and possibly distant classical SPARQL engine (endpoint).

Storage of Fuzzy RDF graphs
Using the reification mechanism
Idea: attach fuzzy degrees to triples.

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