User Interface for TBSL Question Answering System

Konrad Höffner, Lorenz Bühmann, TBSL Algorithm by Christina Unger, Lorenz Bühmann, Jens Lehmann, Axel-Cyrille Ngonga Ngomo, Daniel Gerber, Phillip Cimiano

Universität Leipzig (Algorithm Universität Leipzig & Universität Bielefeld)

October 7, 2013

1 Algorithm

2 User Interface

RDF Search Approaches

Approach	Expressiveness	Ease of Use	Ease of Setup
SPARQL Endpoint	++	−−	++
Facetted Search	−	+	$-^{1}/+^{2}$
Question Answering	+	++	$--^{1}/-^{2}$

[1] new development

[2] existing approach, new domain

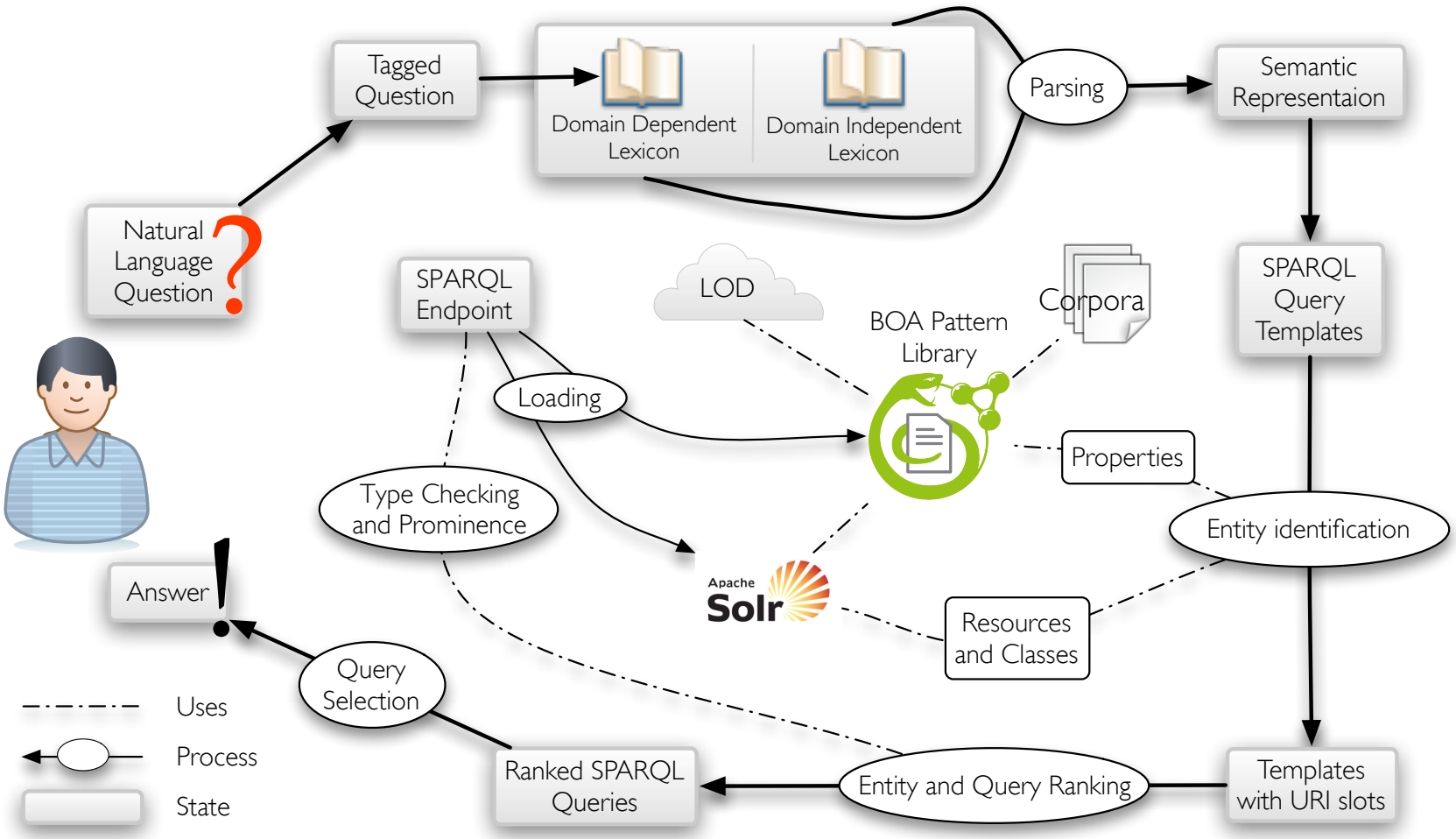
Definition of QA

- users ask questions in natural language (NL)
- using their own terminology
- receive concise answer

Categorization

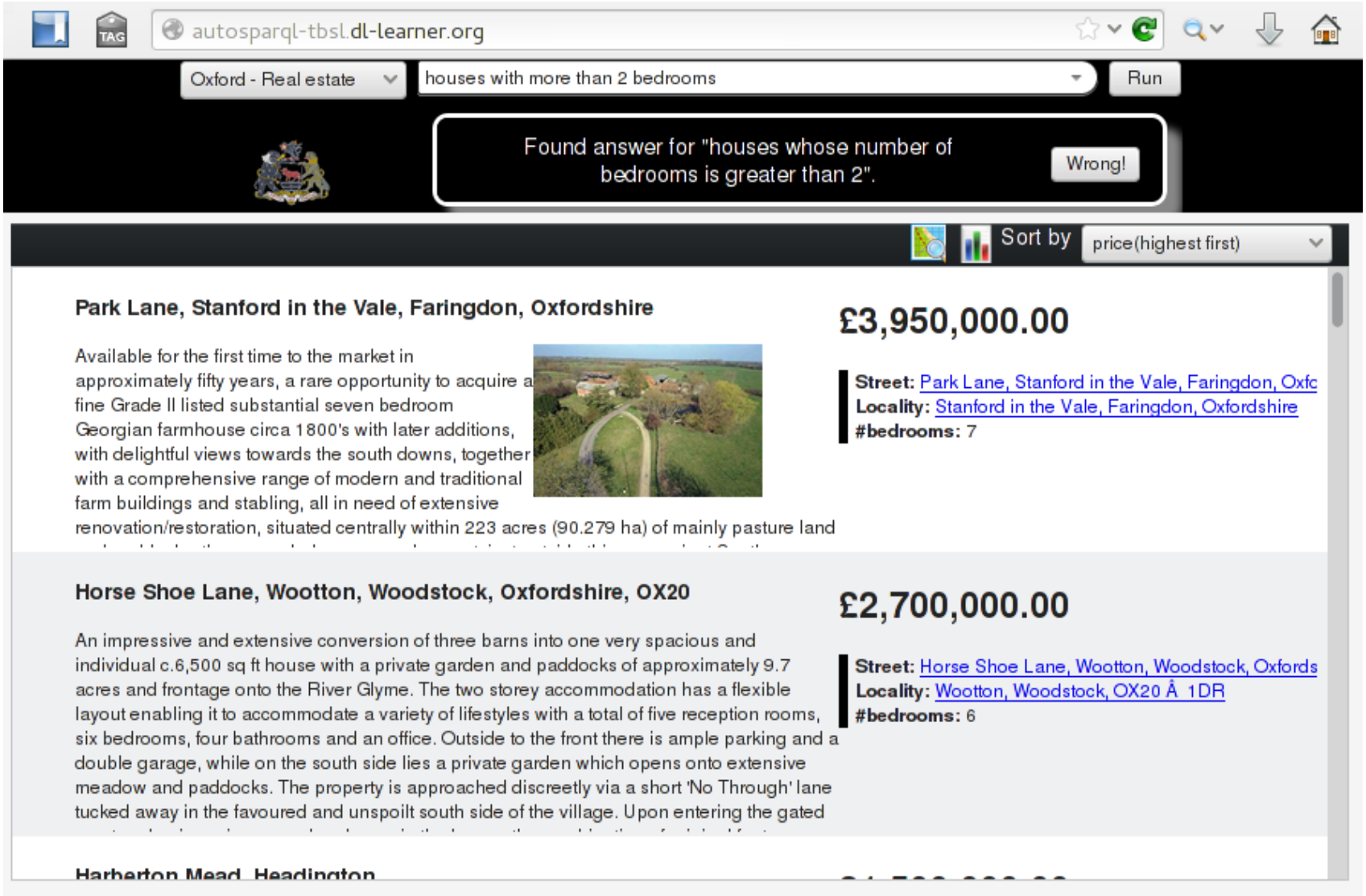
- Source Data: RDF
- Input Type: questions for lists of resources (e.g. Give me all houses)
- Scope: domain independent core, domain dependent additions
- Search Environment: fit for large scale, heterogeneity, only english for now (but adaptable)

Overview


Tagged Question
Domain Dependent Lexicon
Domain Independent Lexicon
Parsing
Semantic Representaion
Natural Language Question
SPARQL Endpoint
LOD
BOA Pattern Library
Corpora
SPARQL Query Templates
Loading
Properties
Type Checking and Prominence
Entity identification
Answer
Apache Solr
Resources and Classes
Query Selection
Uses
Process
State
Ranked SPARQL Queries
Entity and Query Ranking
Templates with URI slots

1 Algorithm

2 User Interface


autosparql-tbsl.dl-learner.org
Oxford - Real estate
houses with more than 2 bedrooms
Run
Found answer for "houses whose number of bedrooms is greater than 2".
Wrong!
Sort by
price(highest first)
Park Lane, Stanford in the Vale, Faringdon, Oxfordshire
£3,950,000.00
Available for the first time to the market in approximately fifty years, a rare opportunity to acquire a fine Grade II listed substantial seven bedroom Georgian farmhouse circa 1800's with later additions, with delightful views towards the south downs, together with a comprehensive range of modern and traditional farm buildings and stabling, all in need of extensive renovation/restoration, situated centrally within 223 acres (90.279 ha) of mainly pasture land
Street: Park Lane, Stanford in the Vale, Faringdon, Oxfc
Locality: Stanford in the Vale, Faringdon, Oxfordshire
#bedrooms: 7
Horse Shoe Lane, Wootton, Woodstock, Oxfordshire, OX20
£2,700,000.00
An impressive and extensive conversion of three barns into one very spacious and individual c.6,500 sq ft house with a private garden and paddocks of approximately 9.7 acres and frontage onto the River Glyme. The two storey accommodation has a flexible layout enabling it to accommodate a variety of lifestyles with a total of five reception rooms, six bedrooms, four bathrooms and an office. Outside to the front there is ample parking and a double garage, while on the south side lies a private garden which opens onto extensive meadow and paddocks. The property is approached discreetly via a short 'No Through' lane tucked away in the favoured and unspoilt south side of the village. Upon entering the gated
Street: Horse Shoe Lane, Wootton, Woodstock, Oxfords
Locality: Wootton, Woodstock, OX20 Â 1DR
#bedrooms: 6
Harberton Mead, Headington

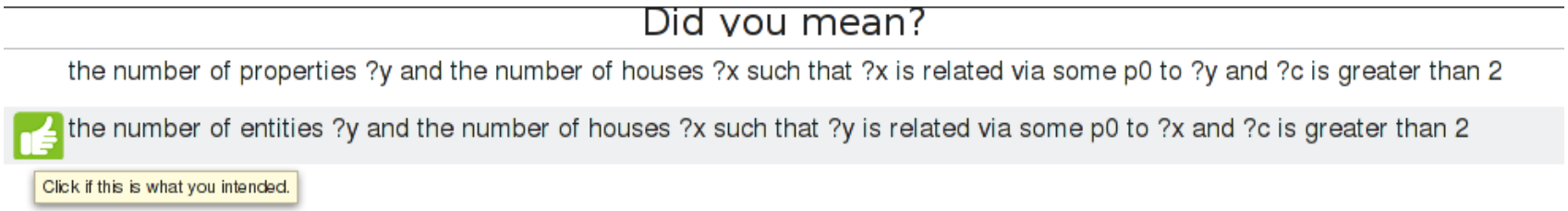


Figure : Expert users can choose among different interpretations for difficult questions.

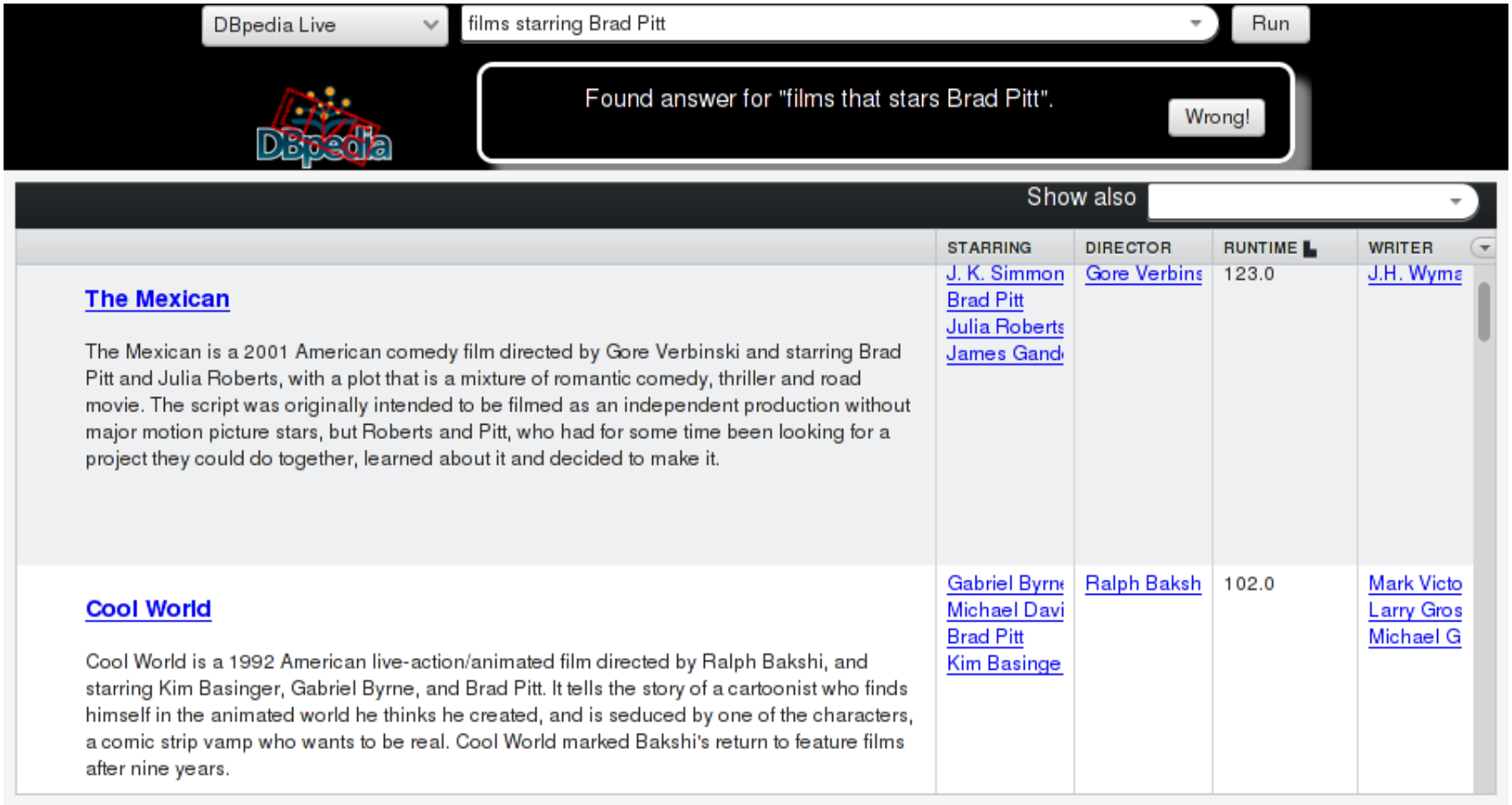


Figure : question “films starring Brad Pitt” on DBpedia knowledge base, answered by list of movies.

Implementation

- implemented in Java (good semantic web library support, rapid development)
- libraries: Apache Jena, Stanford JavaNLP API
- Apache Solr Index for resource lookup
- web application done in Vaadin (extension of GWT)
- demo prototype at `http://autosparql-tbsl.dl-learner.org/` (may not always be online)

Displaying of Resources

- one slot for label, comment, image (+ custom ones depending on KB) with manually defined priority lists
- Oxford: all properties manually defined
- DBpedia: rest of properties sorted by frequency
- manually created blacklist
- user can add properties
- chart view of prices

Future Work

- increased feedback about estimated time, better explanation for failed queries
- use of different algorithms
- usability evaluation
- increased stability
- additional domains

Thank You! Questions?

H. Cunningham D. Damljanovic, M. Agatonovic.
Natural language interfaces to ontologies: Combining syntactic analysis and ontology-based lookup through the user interaction.

In *Proceedings of the 7th Extended Semantic Web Conference (ESWC 2010), Heraklion, Greece, May 31-June 3, 2010*. Springer, 2010.

L. Fischer E. Kaufmann, A. Bernstein.
NLP-Reduce: A "naive" but domain-independent natural language interface for querying ontologies.
In *Proceedings of the 4th European Semantic Web Conference (ESWC 2007), Innsbruck, Austria*, 2007.

J. Lehmann, C. Bizer, G. Kobilarov, S. Auer, C. Becker, R. Cyganiak, and S. Hellmann.
DBpedia – A crystallization point for the Web of Data.
Journal of Web Semantics, 7(3):154–165, 2009.

Jens Lehmann, Tim Furche, Giovanni Grasso, Axel-Cyrille Ngonga Ngomo, Christian Schallhart, Andrew Sellers, Christina Unger, Lorenz Bühmann, Daniel Gerber, Konrad Höffner, David Liu, and Sören Auer.
Deqa: Deep web extraction for question answering.
In *Proceedings of ISWC*, 2012.

V. Lopez and E. Motta.
Ontology driven question answering in AquaLog.
In *Proceedings of the 9th International Conference on Applications of Natural Language to Information Systems (NLDB 2004), Manchester, England*, 2004.

Christina Unger, Lorenz Bühmann, Jens Lehmann, Axel-Cyrille Ngonga Ngomo, Daniel Gerber, and Philipp Cimiano.
Sparql template-based question answering.
In *Proceedings of WWW*, 2012.

E. Motta V. Lopez, V. Uren and M. Pasin.
AquaLog: An ontology-driven question answering system for organizational semantic intranets.
Journal of Web Semantics, 5(2):72–105, 2007.

V. Uren V. Lopez, M. Sabou and E. Motta.
Cross-ontology question answering on the Semantic Web – an initial evaluation.
In *Proceedings of the Knowledge Capture Conference, 2009, California*, 2009.