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A Distributional Structured Semantic Space for Querying EAV Databases

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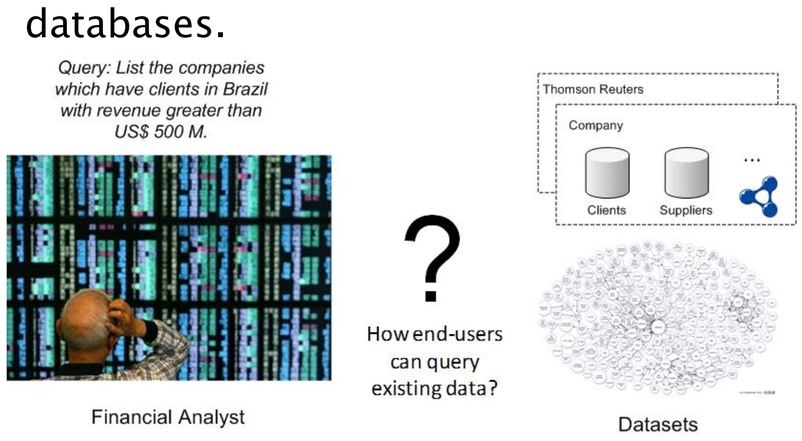
Motivation

- Currently users need to be aware of the structure of datasets in order to query them.
- Natural language queries as an intuitive way to query Entity-Attribute-Value databases.

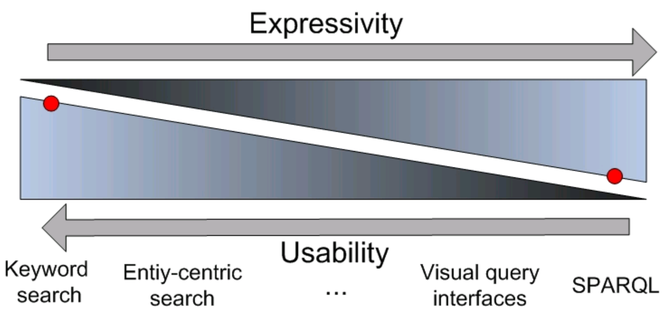


Objective

- A vocabulary independent natural language query mechanism.

Challenges

- How to allow users query data without prior knowledge of its representation?
- How to address the expressivity-usability trade-off of existing approaches?



Proposed Approach

- Combines of 3 elements:
  - **Entity search.**
  - **Distributional semantics: semantic relatedness**
  - **Principled compositional semantics: spreading activation search.**
- Formalized as a *distributional structured vector space model* (T-Space).

Results

Evaluated using the QALD Workshop query set containing 100 natural language queries over DBpedia.

- **The approach was capable of answering 83% of the queries.**
- **Avg. precision = 0.61, avg. recall = 0.86, mean reciprocal rank = 0.49.**
- The distributional-compositional model:
  - Showed high discrimination for node selection.
  - Deliveries a precise and flexible semantic matching between query and vocabulary terms.

Acknowledgements

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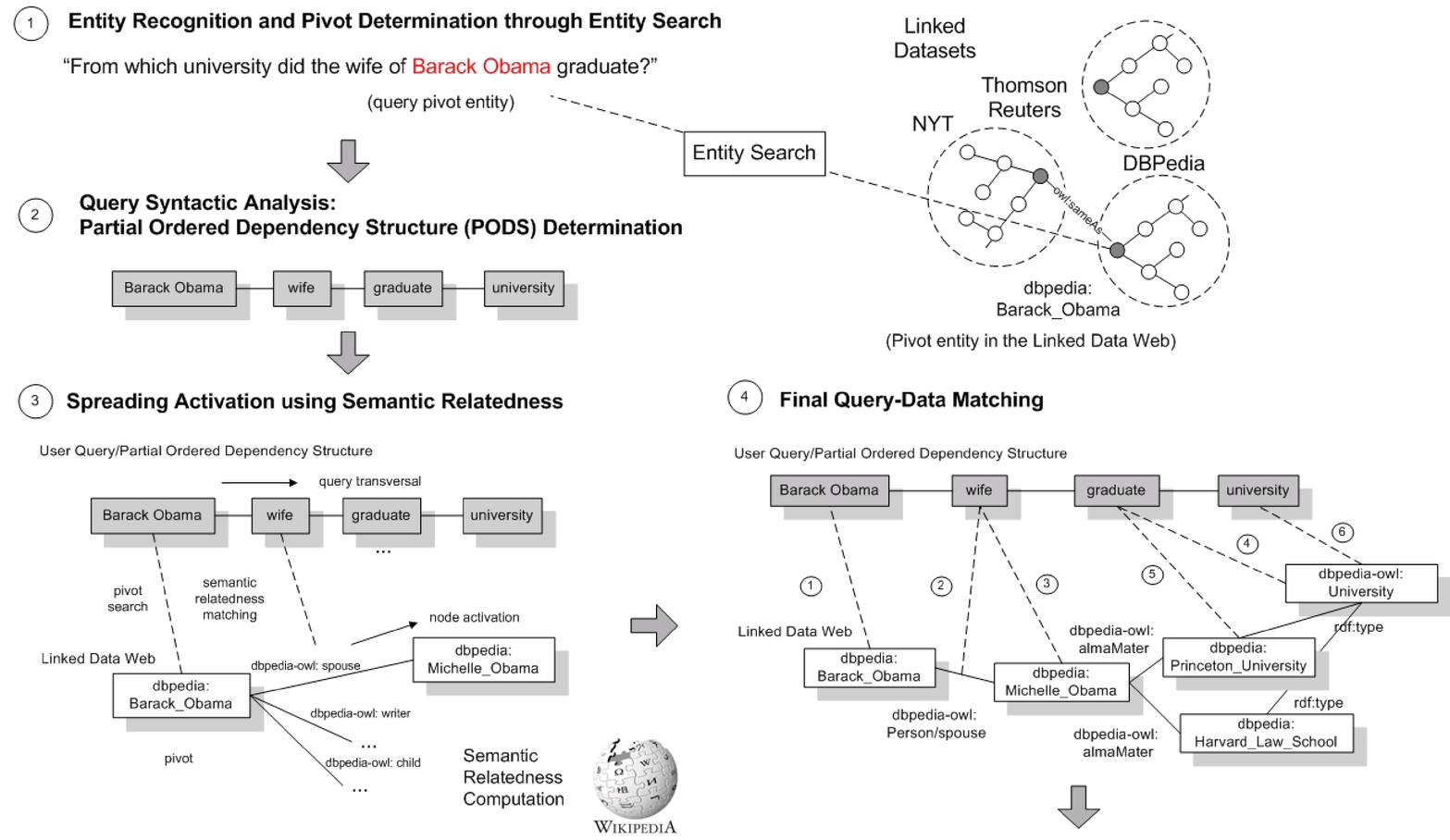
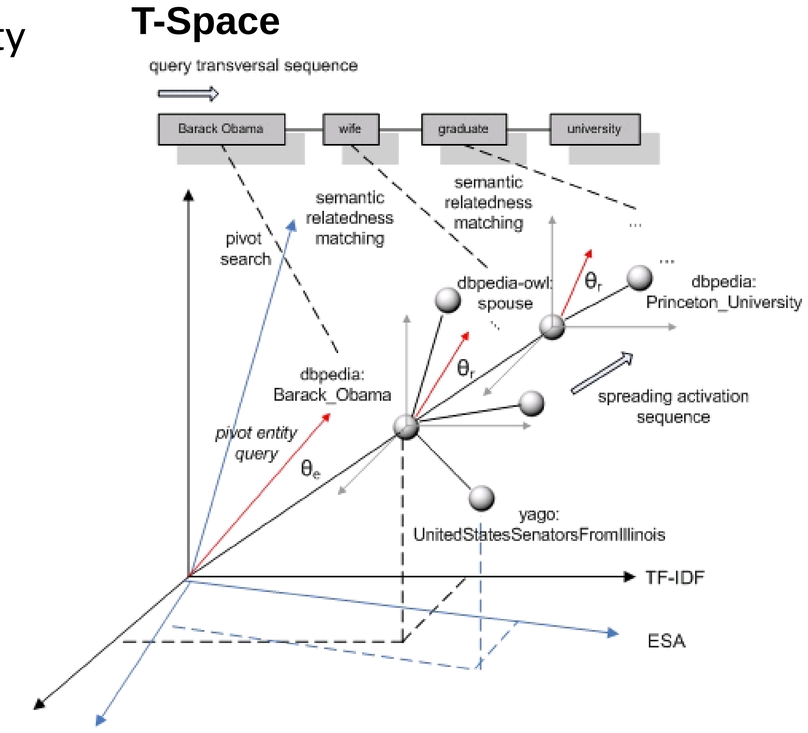
Querying the Linked Data Web

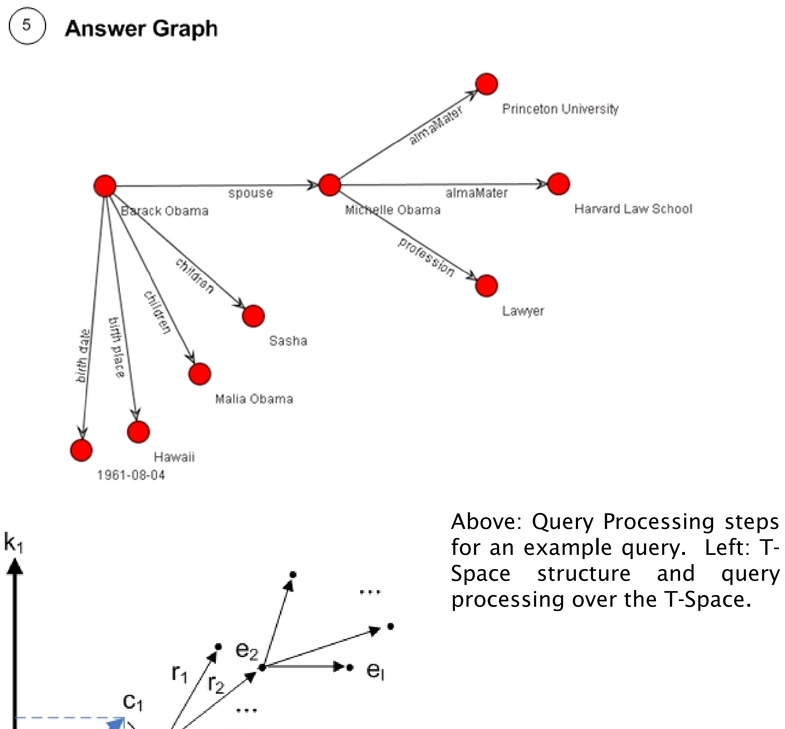
Example query: "From which university did the wife of Barack Obama graduate?"

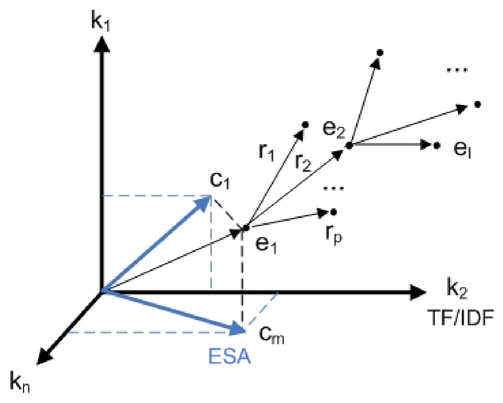
Treo



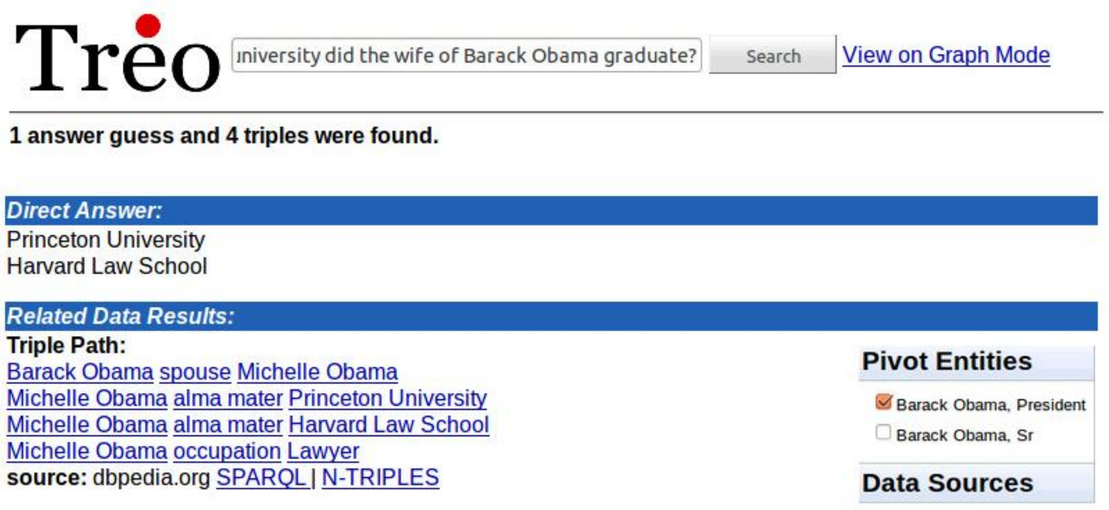
T-Space







Above: Query Processing steps for an example query. Left: T-Space structure and query processing over the T-Space.



References

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A. Freitas, J. G. Oliveira, S. O'Riain, E. Curry, J. C. Pereira da Silva, Querying Linked Data using Semantic Relatedness: A Vocabulary Independent Approach. In Proceedings of the 16th International Conference on Applications of Natural Language to Information Systems (NLDB), 2011.

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