

VizO – Vizualizing and Verbalizing Class Expressions

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Data Science

Knowledge Graphs (KG)

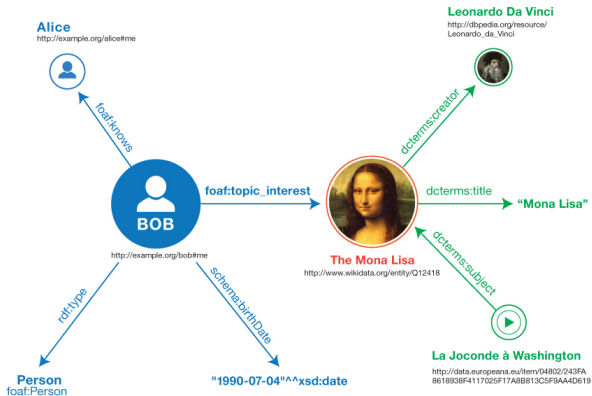


Figure: <https://www.w3.org/TR/rdf11-primer/>

Data Science

Linked Open Data (2007)

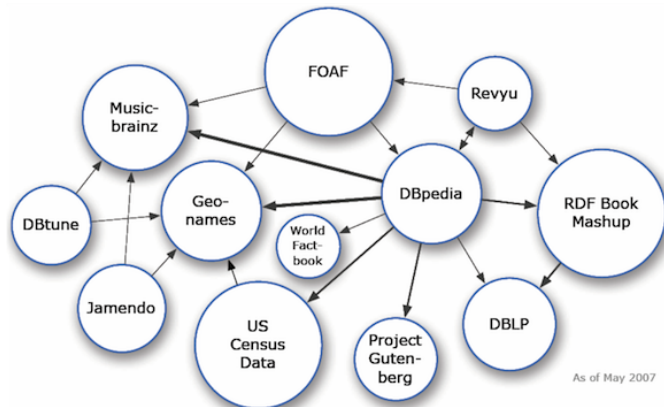
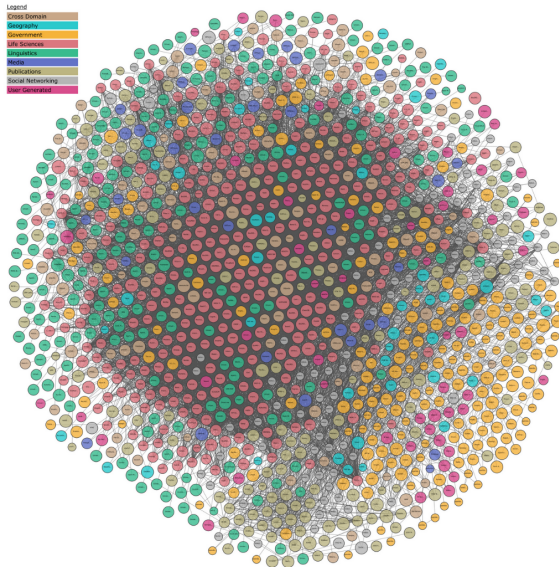


Figure: <http://lod-cloud.net>

Linked Open Data (2023, <http://lod-cloud.net>)



The Linked Open Data Cloud from lod-cloud.net



Data Science

Why we need KGs?

1. Knowledge reasoning
2. Explainable AI
3. Never ending learning
4. Natural language processing
5. Data integration
6. Intelligent Question answering
7. Fact checking
8. Digital assistants
9. ...



Web Ontology Language (OWL) ...

- ▶ ... is a formal Ontology language
- ▶ ... is an instance of Description logics
- ▶ ... can be translated to natural language.



Why?

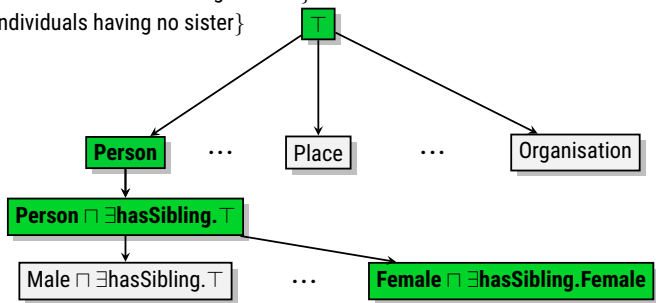
- ▶ Represent complex ontological knowledge
- ▶ Standardized format and semantics
- ▶ Basis for explainable AI



Background

OWL Class Expression Learning

$$E^+ = \{\text{Female individuals having a sister}\}$$

$$E^- = \{\text{Individuals having no sister}\}$$


Project Goal

- ▶ **Problem:** OWL Class expressions are hard to read
- ▶ **Solution:** Verbalize and visualize class expressions

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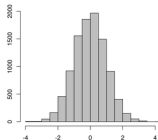
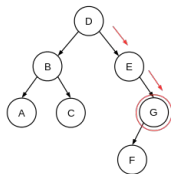
Web Server



OWL Class
Expressions



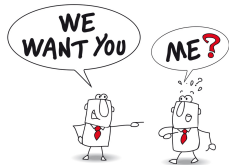
GUI



Roadmap

1. Read into OWL semantics
2. Read into OWL Class expression learning
(<https://github.com/dice-group/Ontolearn>)
3. Read into verbalization tools
(<https://github.com/dice-group/LD2NL>)
4. Build a basic web application for visualization
5. Iteratively extend the web application with additional visualizations





- ▶ Python, Flask
- ▶ JavaScript
- ▶ Prior knowledge of RDF, OWL or description logics is beneficial
- ▶ Worked with git, GitHub before
- ▶ Motivation to learn...

- ▶ **SOTA:** State-of-the-art Data Science technologies as basis for explainable AI
- ▶ **Open design:** Different designs possible to present the data
- ▶ **Master theses:** Topics can be extended accordingly
- ▶ **Publications:** at top conferences (ISWC, ESWC, WWW)





Thank you!

More information at

[https://dice-research.org/
teaching/VizOPG23/](https://dice-research.org/teaching/VizOPG23/)