ENEXA

Efficient Explainable Learning on Knowledge Graphs

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Paderborn University

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Motivation

Knowledge Graphs in the Wild

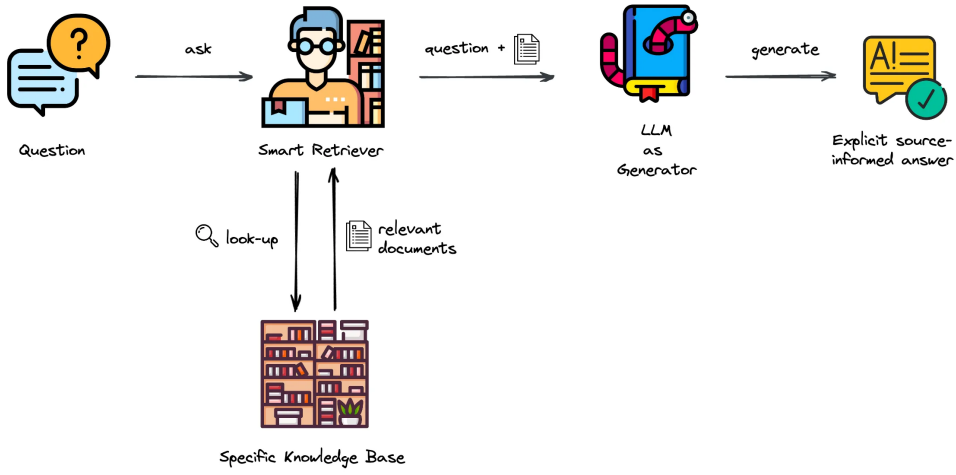


Figure from https://blog.ml6.eu/leveraging-llms-on-your-domain-specific-knowledge-base-4441c8837b47

Motivation

Challenges

Real datasets are large

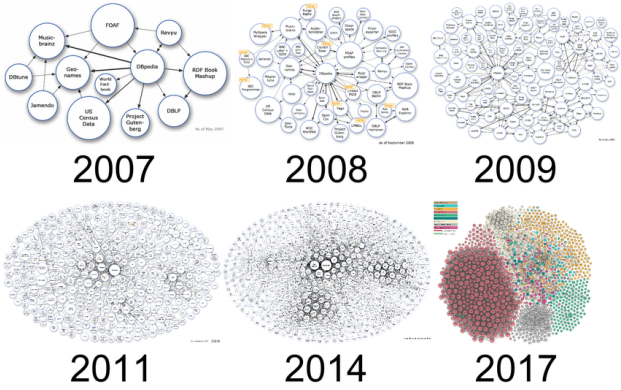


Figure 1 from `https://lod-cloud.net/`, 2 from Benny Kimelfield: "Probabilistic Database Repairing"

Motivation

Challenges

Real datasets are large, inconsistent

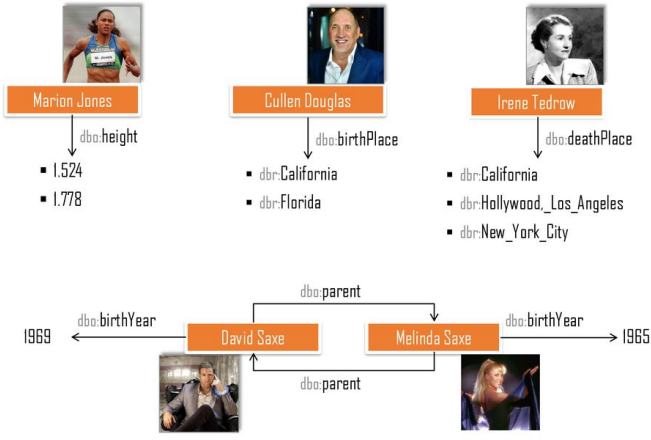
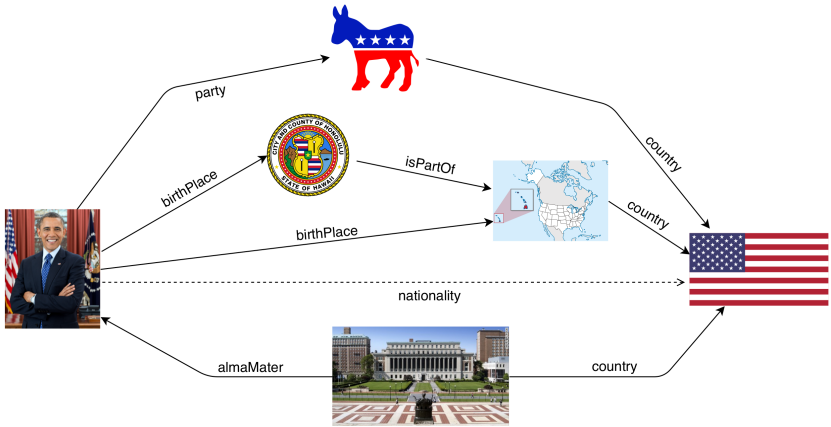


Figure 1 from https://lod-cloud.net/, 2 from Benny Kimelfield: "Probabilistic Database Repairing"

Motivation

Challenges

Real datasets are large, inconsistent and incomplete



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Core Idea

enexa

Goal

Devise ante-hoc explainable ML approaches that can deal with the scale, inconsistency and incompleteness of real-world knowledge graphs.

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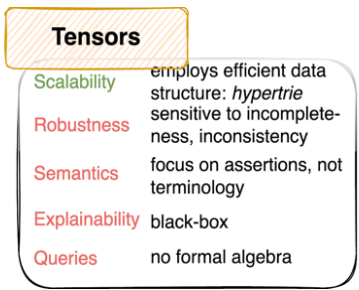

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Devise ante-hoc explainable ML approaches that can deal with the scale, inconsistency and incompleteness of real-world knowledge graphs.

Tensors

Scalability	employs efficient data structure: *hypertrie*
Robustness	sensitive to incompleteness, inconsistency
Semantics	focus on assertions, not terminology
Explainability	black-box
Queries	no formal algebra

Embeddings

Scalability	long training time
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Formal Logics

Scalability	very large search space
Robustness	sensitive to incomplete-ness, inconsistency
Semantics	exploitation of assertions and terminology
Explainability	models can be verbalized
Queries	formal algebra

Representation of Knowledge Graphs

Tensors

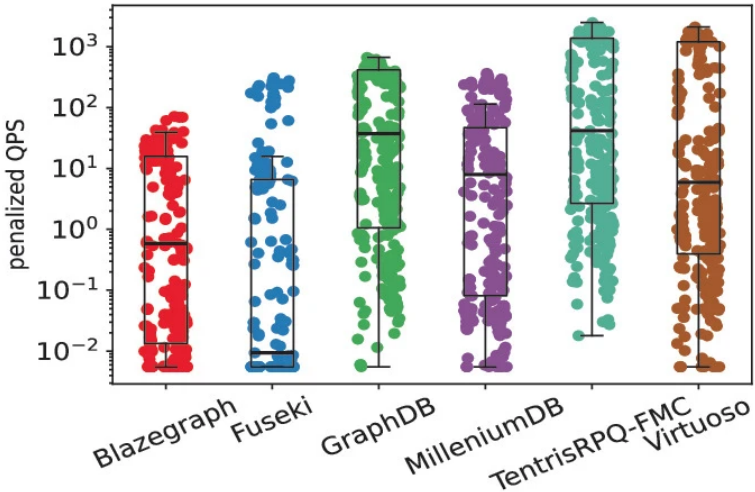

Figure from Karalis et al.: "Efficient Evaluation of Conjunctive Regular Path Queries Using Multi-way Joins"

Explainable Machine Learning

Neural Class Expression Synthesis

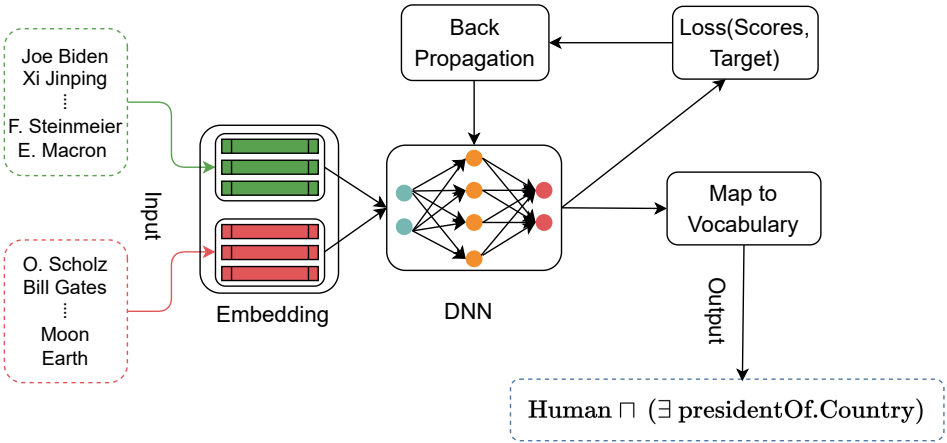

Figure from Kouagou et al.: "Neural Class Expression Synthesis"

Use Cases

Business Processes

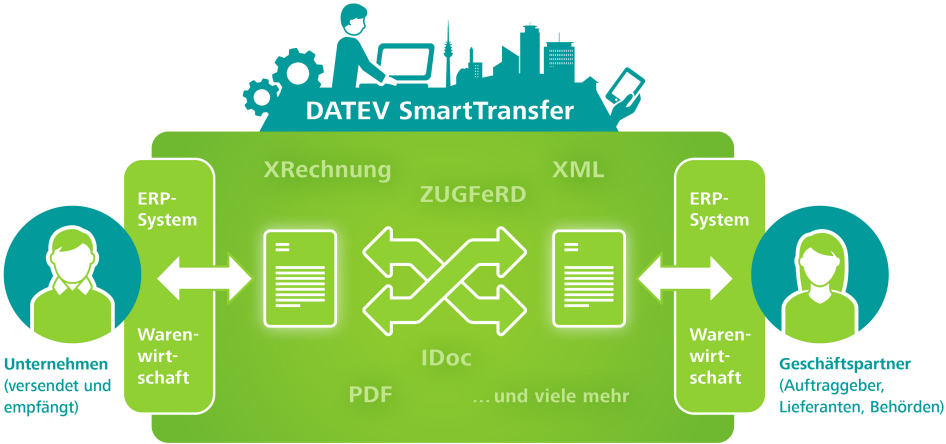

Figure from DATEV

Use Cases

Geospatial Intelligence

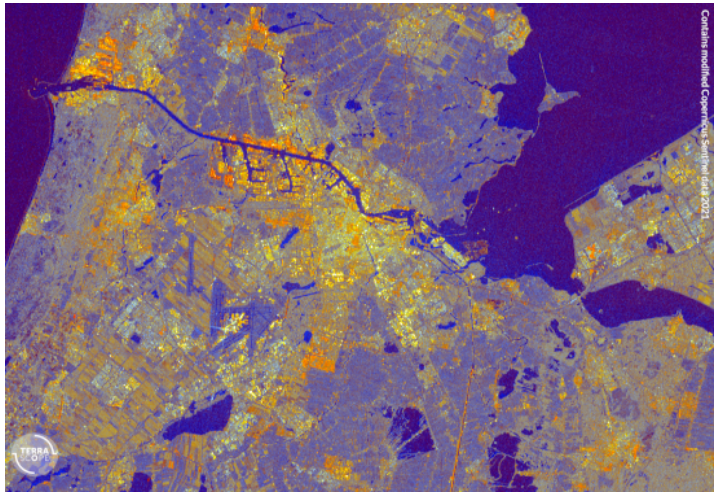

Figure from European Union Satellite Centre

Use Cases

Brand communication

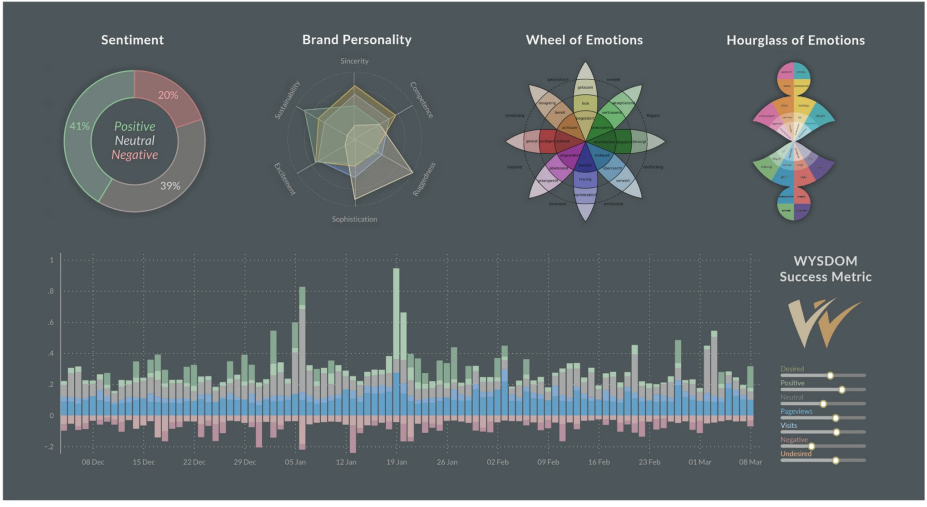

Figure from webLyzard

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Thank You!

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http://enexa.eu
https://github.com/EnexaProject

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