

# Project Groups

## Knowledge Graphs

Group: Data Science  
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**UNIVERSITÄT PADERBORN**  
*Die Universität der Informationsgesellschaft*

DICE – Data Science Group, University Paderborn, Germany

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# Motivation

One Minute on the Web



## 2020 *This Is What Happens In An Internet Minute*



# Motivation

One Minute on the Web



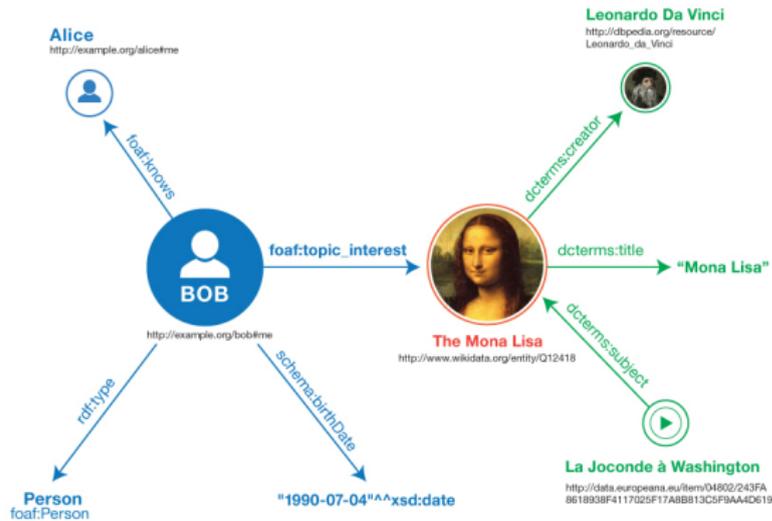
## 2020 *This Is What Happens In An* Internet Minute



VS



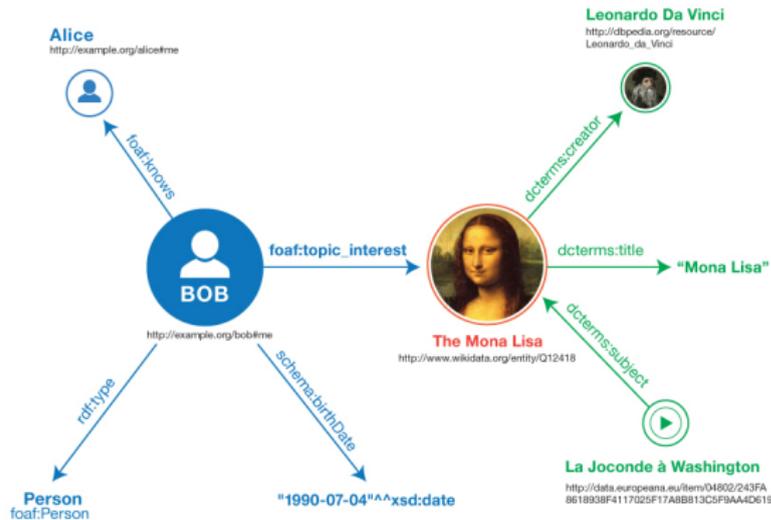
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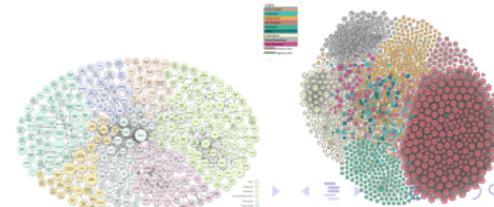
<https://www.w3.org/TR/rdf11-primer/>

# Motivation

## Knowledge Graphs



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



# Motivation

Knowledge graph-based systems



amazon alexa



DIESEL



Question Answering  
wiKiframework-based  
System



Qanary

QAMEL

Question Answering  
on Mobile Devices



Treo WDAQUA



- 1 Digital assistants
- 2 Explainable AI
- 3 Summarize or Explain KBs to non-experts
- 4 Create news automatically (automated journalism)
- 5 Summarize medical records
- 6 Generate technical manuals
- 7 Support the training of other NLP tasks
- 8 Generate product descriptions (Ebay)
- 9 ...



# Section 1

Project group: Knowledge Graph Summarization –  
KGSUM



## Summary

- **Problem:** Enormous amounts of data provided as graphs
- **Solution:** Graph Summarization - Noise elimination
- **Goal:** Reduction of Graph size - Definition of interestingness

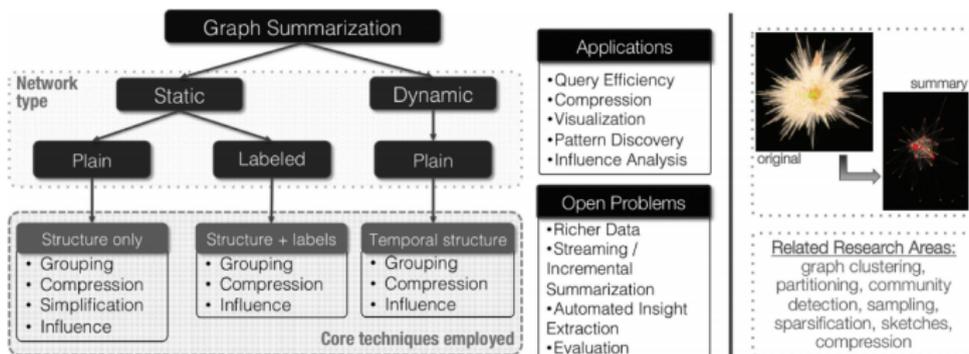


Fig. 1. Overview of our survey. Taxonomy of graph summarization algorithms based on the input type and the core employed technique; alternative approaches; applications; and open problems.

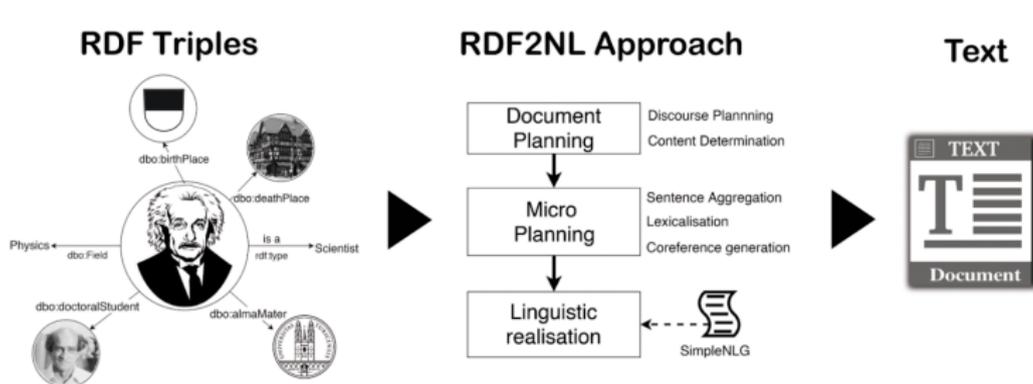
## Section 2

Project group: Knowledge Graph Verbalization –  
KG2NL



## Summary

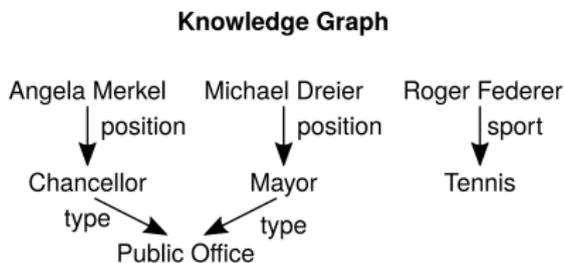
- **Problem:** Lack of quality in generated entity text summaries
- **Solution:** Extend rules and templates or apply machine learning
- **Goal:** Improve the fluency of generated texts





## Summary

- **Problem:** Black-box ML models not explainable
- **Solution:** Generate explanation from DL in natural language
- **Goal:** Improve the adequacy and fluency of generated texts



## Training Examples

Angela Merkel: Politician

Roger Federer: **not** Politician

**Is Michael Dreier a politician?**

Neural network: 0.95, **no explanation**

Rules: yes

**∃ position.public office ⊆ Politician**

## Natural Language

Everything that has a position as public office is a politician



## Paper:

- Ngomo, et al. "A Holistic Natural Language Generation Framework for the Semantic Web." – RANLP 2019

## Github project:

- <https://github.com/dice-group/LD2NL>

## Technologies:

- Java / Maven and Python
- SPARQL
- Machine Learning and Deep Learning



## Thank you! Questions?

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