HEINZ NIXDORF INSTITUT
UNIVERSITÄT PADERBORN

Knowledge Graph Summarization (KGSUMM)

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DICE
Data Science Group
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Knowledge Graphs

Introduction

A Knowledge Graph (KG) represents entities as nodes and their relationships as edges.

- Knowledge Graphs Everywhere

- Many open knowledge graphs

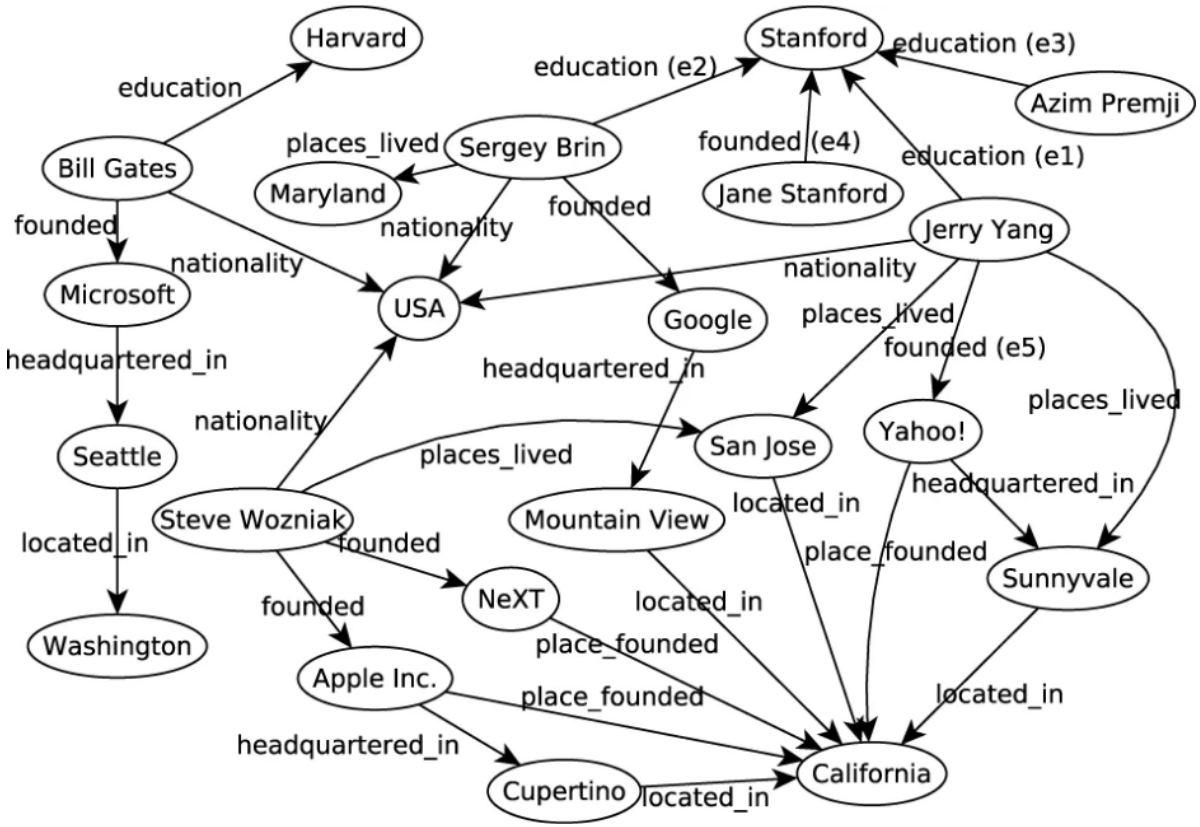
- Powering AI

- Applied across diverse domains

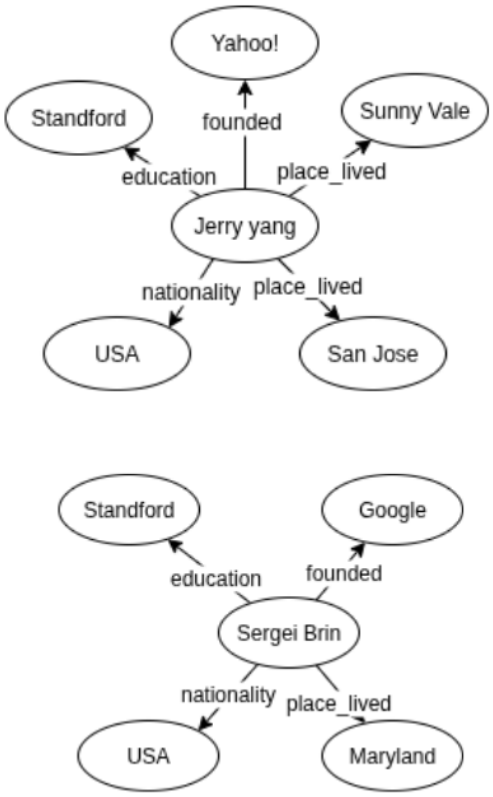
Knowledge Graphs

Structure and Representation

A knowledge Graph



Entity Description



KGSUMM

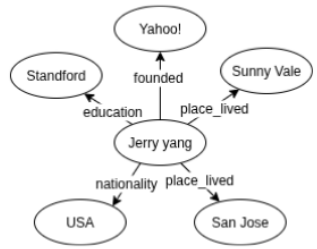
Why Summarize Knowledge Graphs?

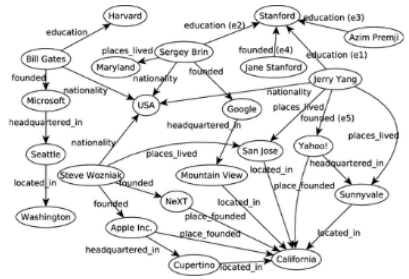
Knowledge Graphs grow large and noisy

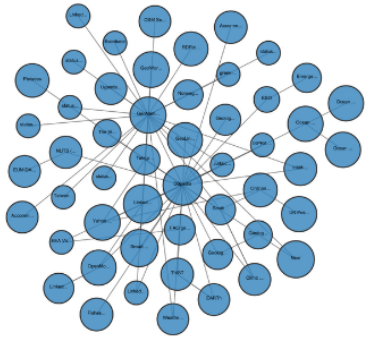
- Entities are connected by many facts
- Not all facts are relevant or important
- Verbose triples overwhelm users/systems

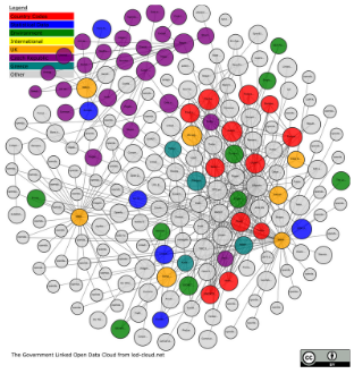
Key challenges

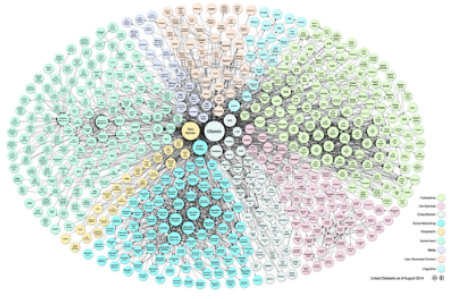
- Hard to extract the core meaning of an entity
- Inefficiency in search, reasoning, and downstream applications

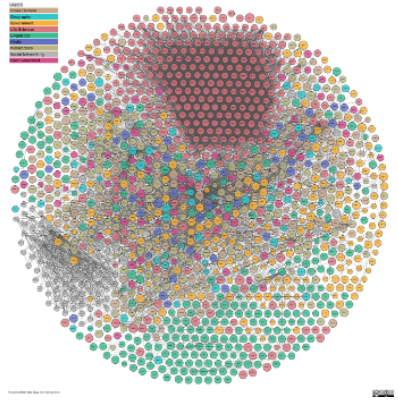










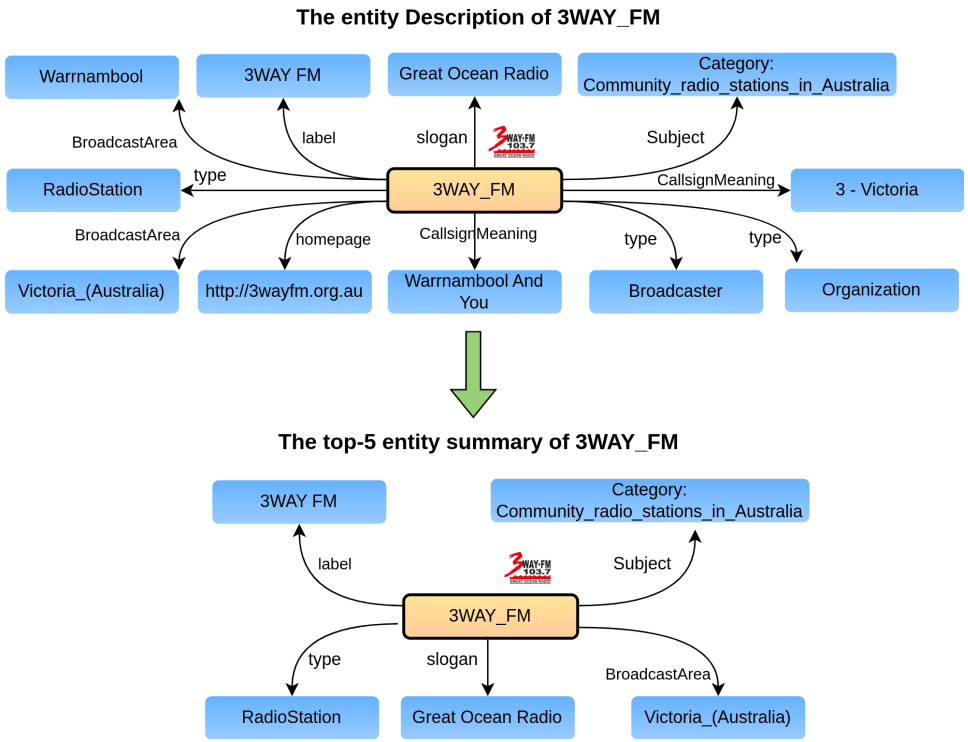


KGSUMM: Topics

Extractive Entity Summarization in Knowledge Graphs

Motivation

- **Problem**: Entities are often described with excessive and redundant information in KGs.
- **Solution**: Apply entity summarization to produce concise, informative views.
- **Goal**: Select a representative subset of triples by optimizing relatedness, informativeness, and diversity.



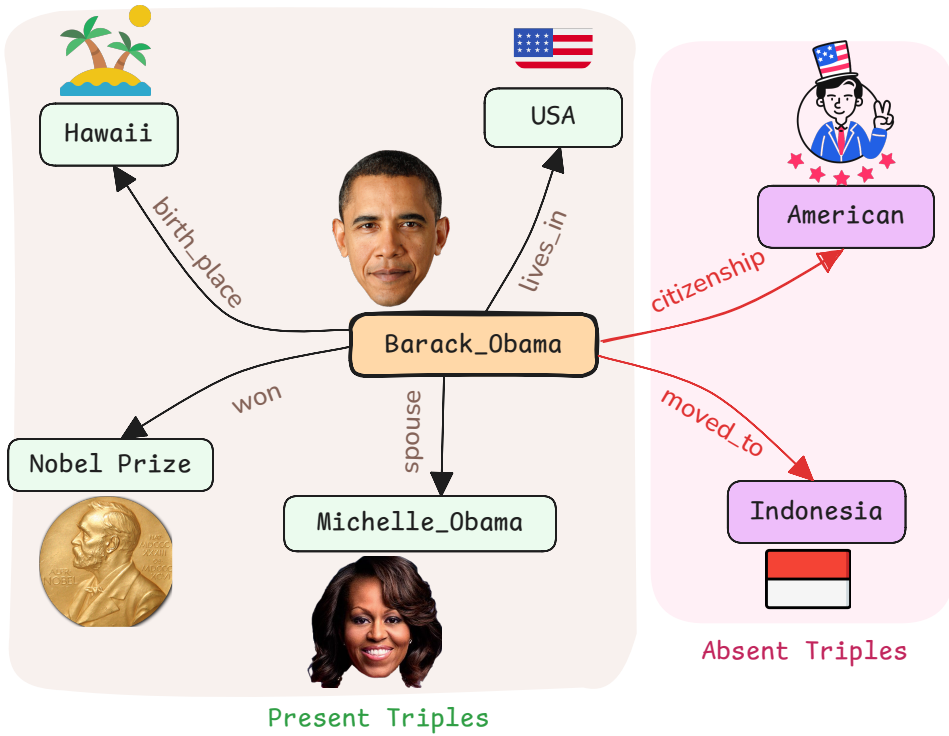
Firmansyah, A.F., Moussallem, D., Ngomo, AC.N. (2021). GATES: Using Graph Attention Networks for Entity Summarization. In *Proceedings of the 11th Knowledge Capture Conference (K-CAP '21)*, ACM, New York, NY, USA, pp. 73–80.
Firmansyah, A.F., Moussallem, D., Ngomo, AC.N. (2024). ESLM: Improving Entity Summarization by Leveraging Language Models. In *The Semantic Web – ESWC 2024*, LNCS, vol. 14664, Springer, Cham.

KGSUMM: Topics

Abstractive Entity Summarization in Knowledge Graphs

Motivation

- **Problem**: The incompleteness of knowledge graphs leads to incomplete summaries
- **Solution**: Apply abstractive entity summarization, to make more complete summary.
- **Goal**: To go beyond extractive summarization by generating more complete and coherent summaries



Firmansyah, A.F., Zahera, H.M., Sherif, M.A., Moussallem, D., Ngomo, AC.N. (2025). ANTS: Abstractive Entity Summarization in Knowledge Graphs. The Semantic Web – ESWC 2025. LNCS, vol. 15718, Springer, Cham.

Project Objectives

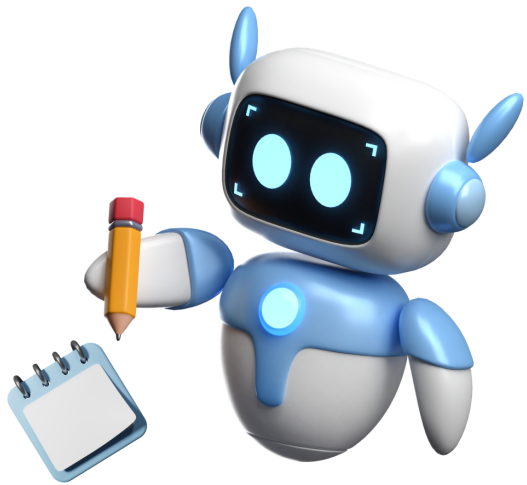
Improving the entity summarizer performance in generating an entity summary and address the challenges in entity summarization tasks

- Improve summary quality depends on relatedness, informativeness, and diversity.
- Explore the advanced techniques of NLP/ML
- Ensure Computational Efficiency
- Discover novel approaches

Project Tasks

What types of tasks will the project group be responsible for?

- Study state-of-the-arts (SOTA) Models
- Reproduce SOTA models on New Benchmark Datasets
- Analyze the Limitation of SOTA Models
- Develop a New Entity Summarizer
- Evaluate the Models
- Create a Visualization



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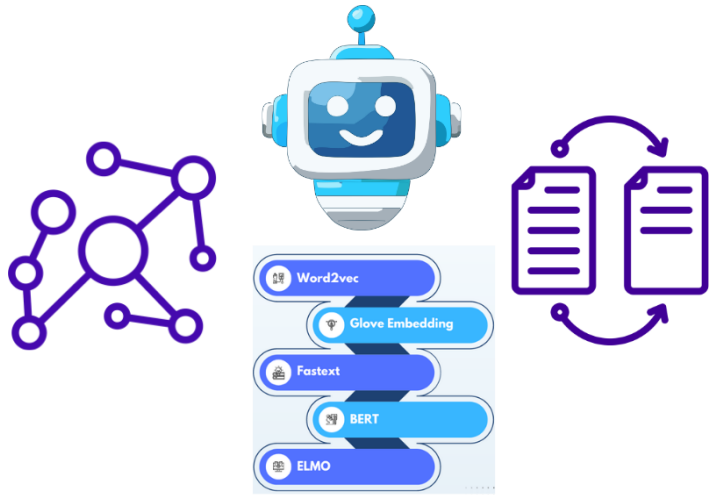

Thank you!

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Have questions?

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