



# Knowledge Graph Summarization (KGS)

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**Project Group - WiSe 2025**

July 21, 2025

# 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



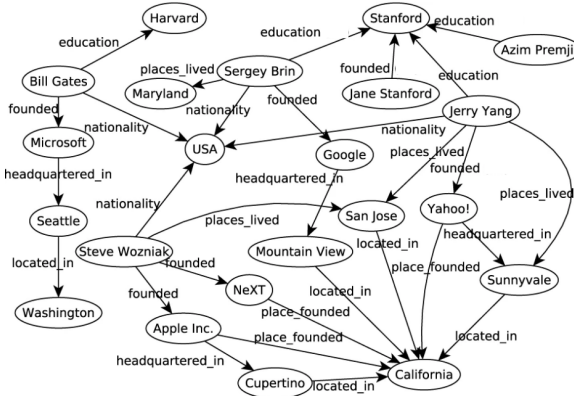
### ► Applied across diverse domains



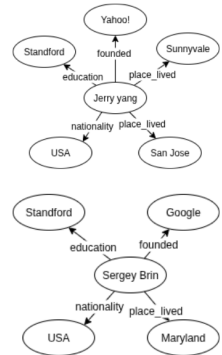
# Knowledge Graphs

## Structure and Representation

### A knowledge Graph



### Entity Description



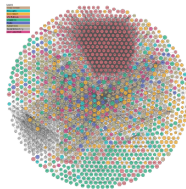
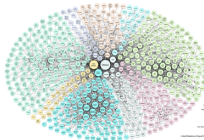
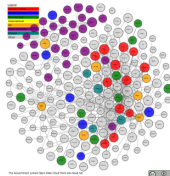
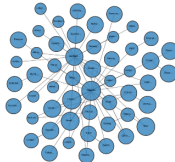
## Why Summarize Knowledge Graphs?

## 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

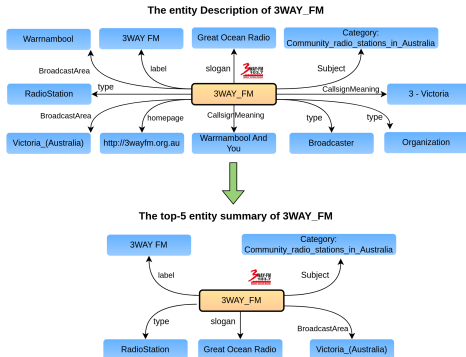
- ▶ Hard to extract the core meaning of an entity
- ▶ Inefficiency in search, reasoning, and downstream applications



## 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.



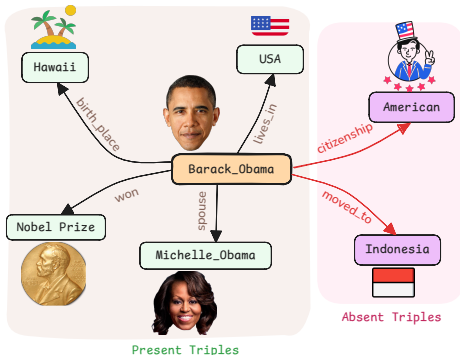
Firmansyah, A.F., Moussallem, D., Ngomo, A.C.N. (2021). GATES: Using Graph Attention Networks for Entity Summarization. In *Proceedings of the 11th Knowledge Capture Conference (K-CAP '21)*, ACM, New York, NY, USA, pp. 73–80.

Firmansyah, A.F., Moussallem, D., Ngomo, A.C.N. (2024). ESLM: Improving Entity Summarization by Leveraging Language Models. In *The Semantic Web – ESWC 2024*, LNCS, vol. 14664, Springer, Cham.

## 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, A.C.N. (2025). ANTS: Abstractive Entity Summarization in Knowledge Graphs. *The Semantic Web – ESWC 2025. LNCS*, vol. 15718, Springer, Cham.

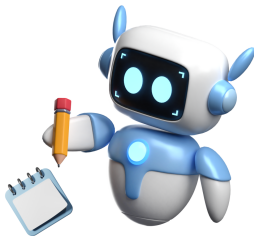
Improving the entity summarizer performance in generating an entity summary and address the challenges in entity summarization tasks

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



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

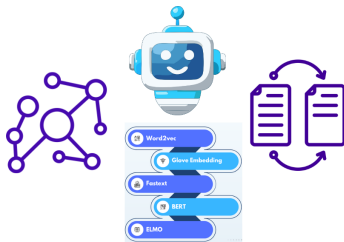




- ▶ Training Computer Resources
- ▶ Follow-up Thesis Opportunities
- ▶ Publication Support



# That's all Folks!



Thank you!

[dice-research.org/teaching/KGSUMM-2025](https://dice-research.org/teaching/KGSUMM-2025)

## Have questions?

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