Doctoral Consortium – ADBIS 2019 – *Bled, Slovenia*

Textual Data Analysis from Data Lakes

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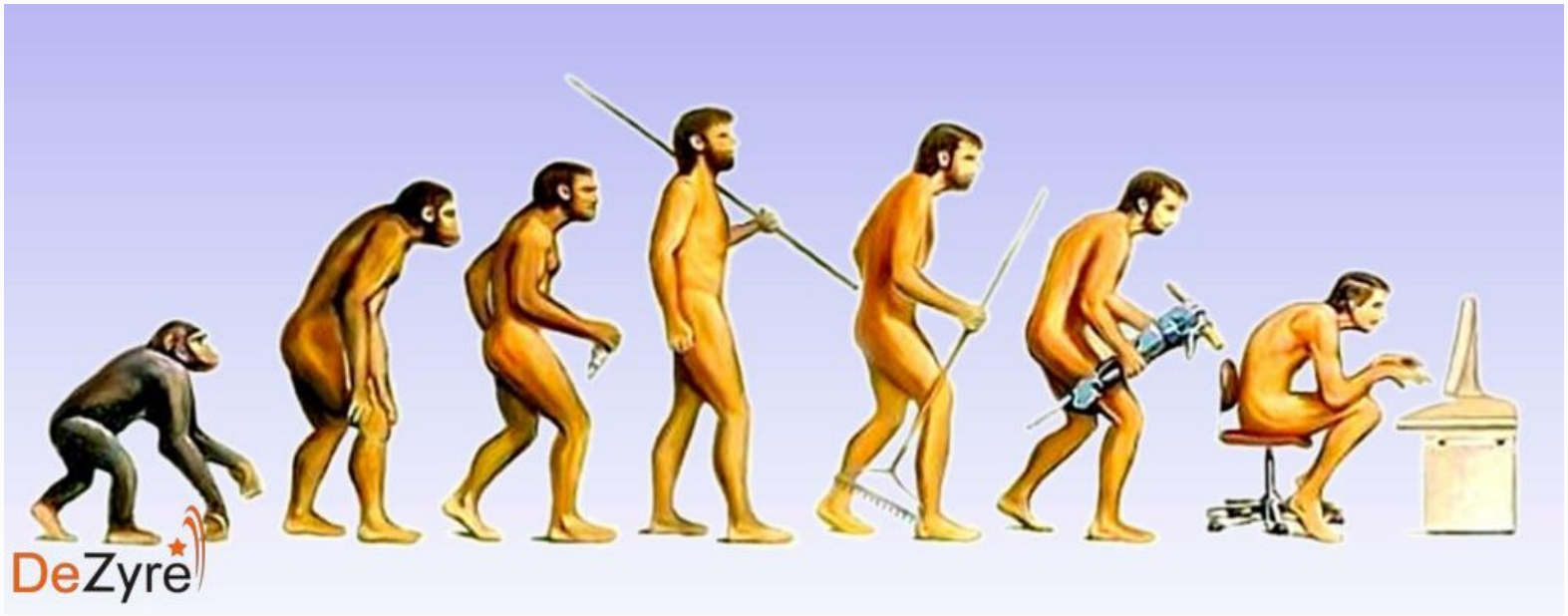
Supervised by Pr. Jérôme Darmont

September 8, 2019

Outline

1. Introduction
2. Thesis Objectives
3. Metadata Models
4. First Results
5. Conclusion

We are in big data era



innovations in IT until the 2000s

- RDBMSs
- World Wide Web
- Data Warehouses

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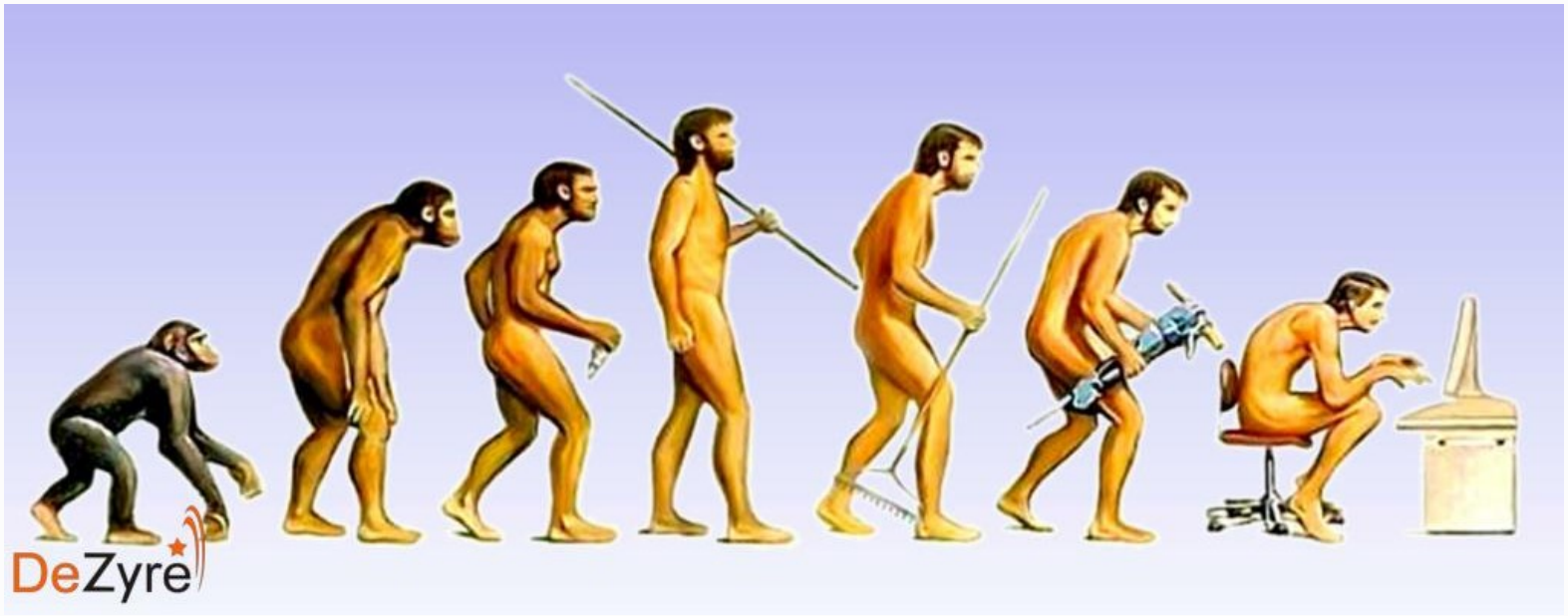

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innovations in IT since the 2000s

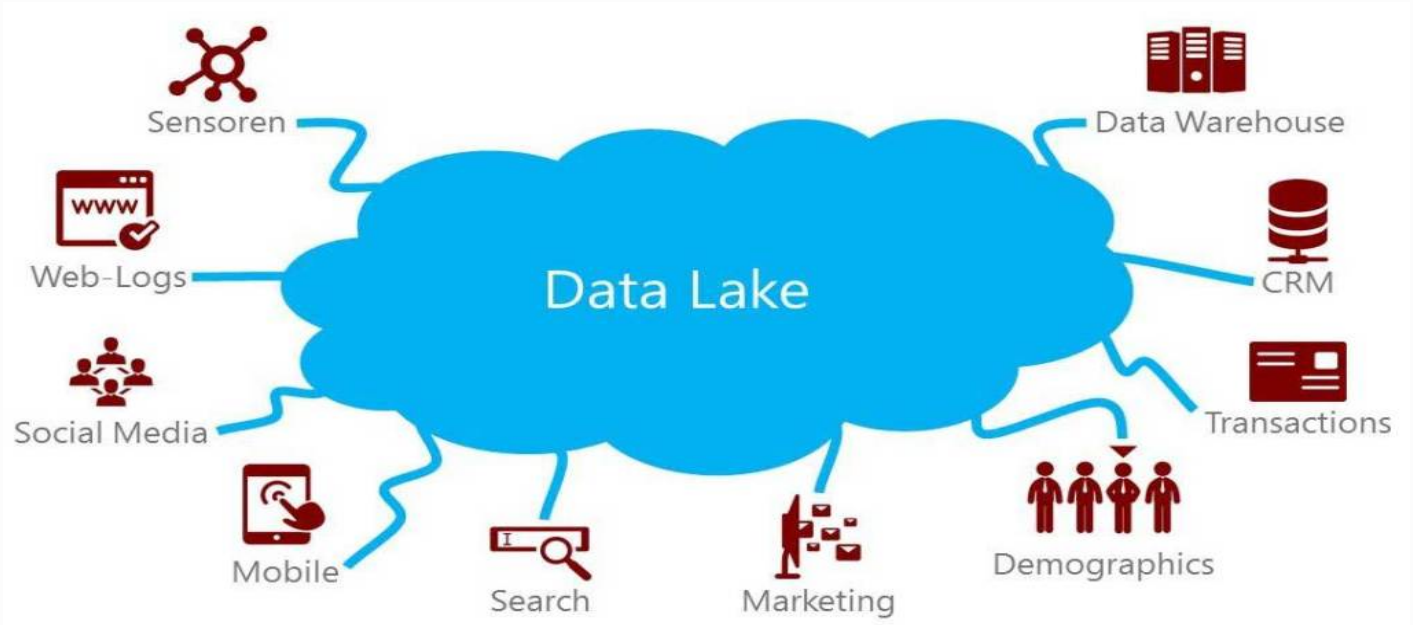
- NoSQL DBMSs
- Internet of Things
- Data Lakes

slideserve.com/DeZyre

What is a data lake?

Definition (Sawadogo et al., 2019)

A data lake is a **scalable storage** and **analysis** system for data of any type, retained in their **native format** and used ***mainly*** by **data specialists** for knowledge extraction.



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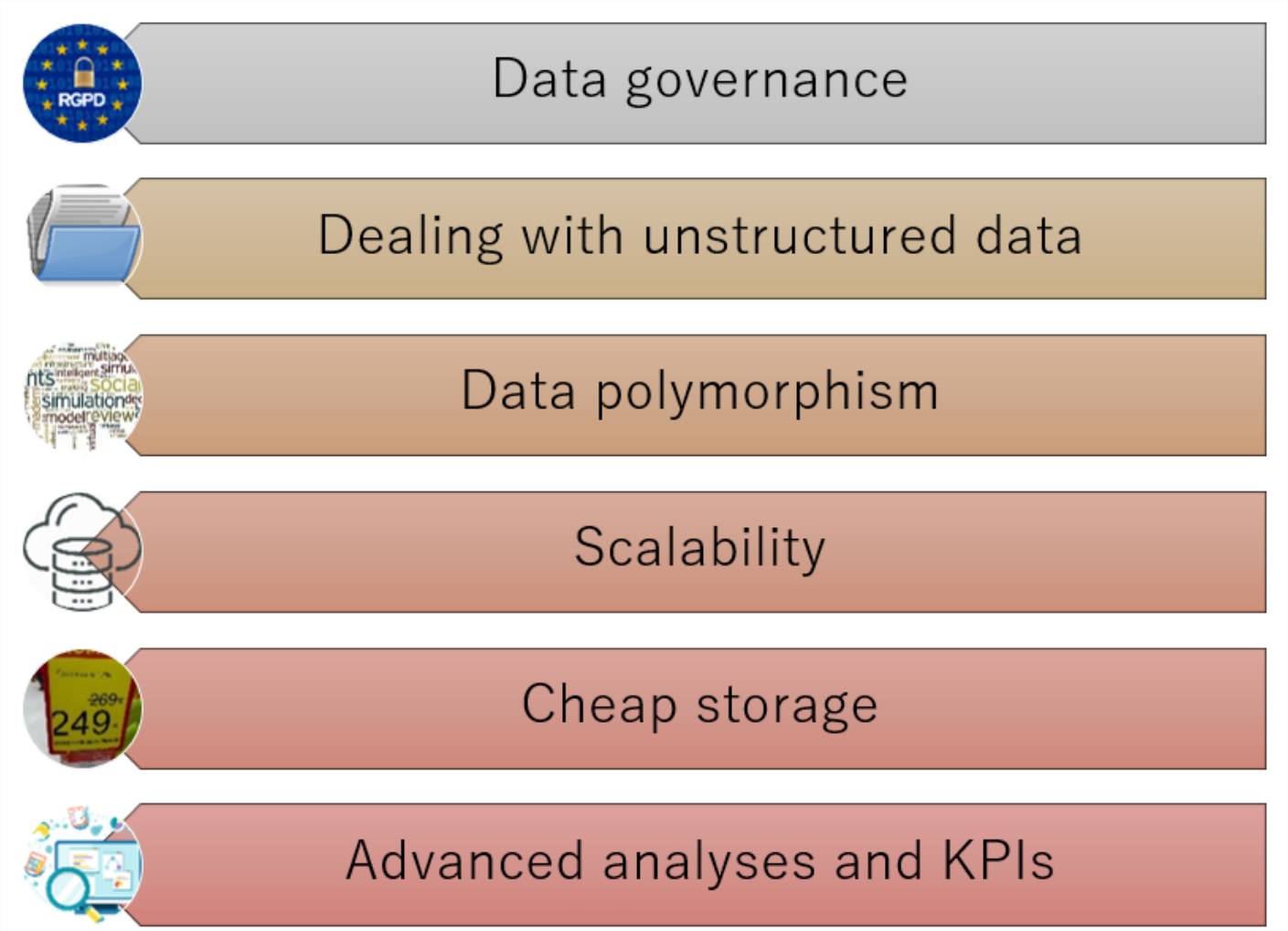
Benefits of data lakes



Data lakes challenges

"Data swamp" syndrome

- Data swamp: inoperable DL
- Poor metadata management
- Poor data governance

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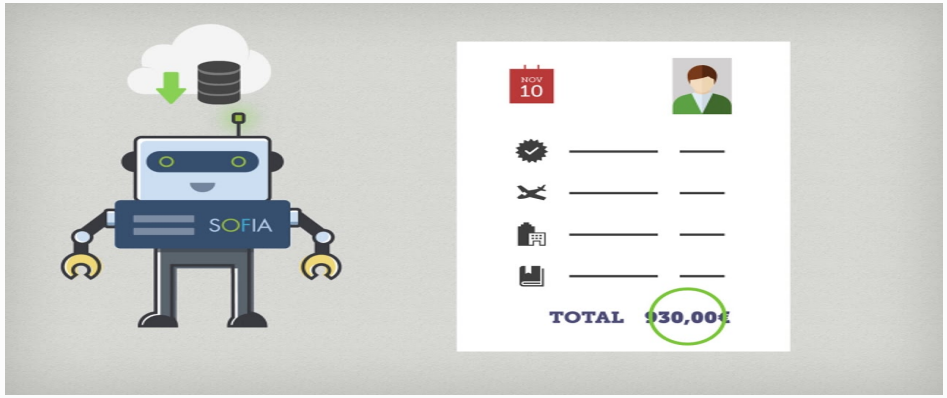
Enabling industrialized analyses

- Opening DLs to business users
- Rich and intuitive metadata
- OLAP analysis

openflyers



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Main Purposes

- Enable industrialized analyses from data lakes
- Focus on textual data analysis
- Alternative solution to text data warehouses

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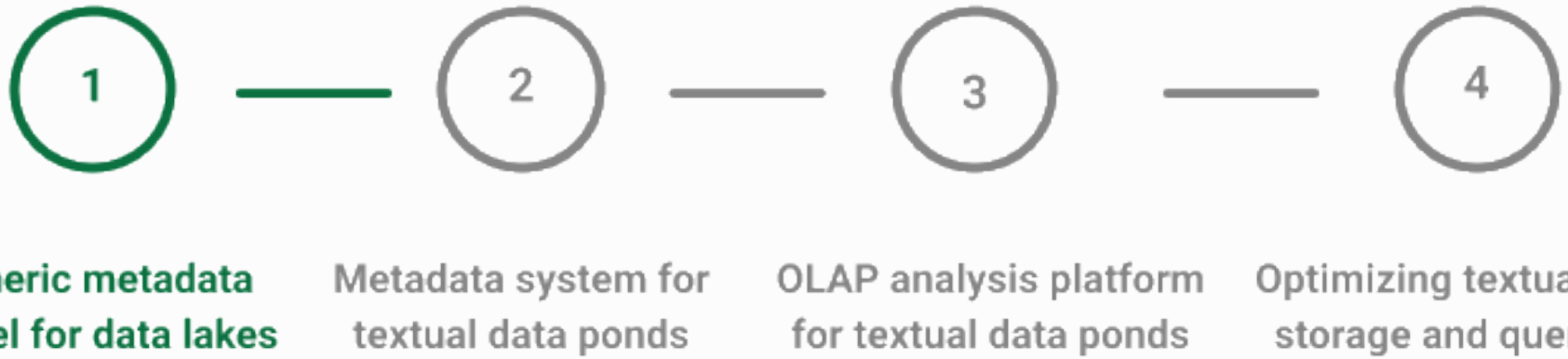

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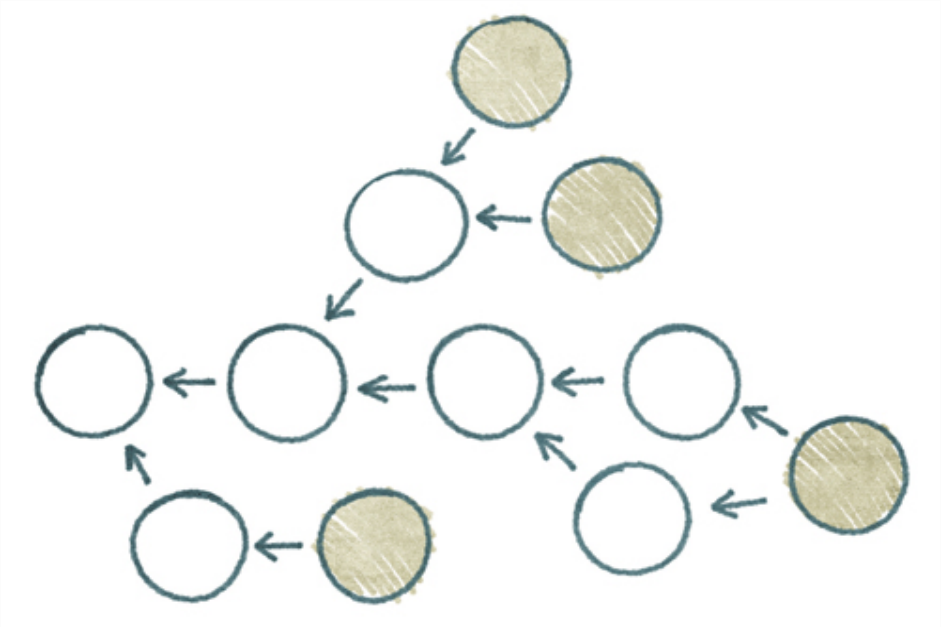
Data provenance-centric models

- DAG organization : nodes = data objects
- Vertices = operations (users, transformations, etc.)
- Help to understand, explain and repair inconsistencies in the data.



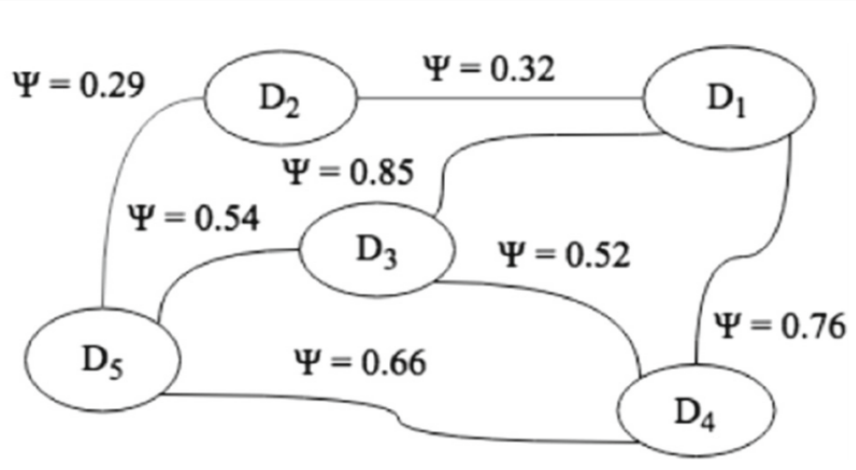
ericsink.com

Similarity-centric models

- Allow to recommend related data
- Make it possible to detect data clusters

Simple variant

- Unoriented graph
- Nodes = data objects
- Edges = similarity strengths



[Maccioni and Torlone, 2018]

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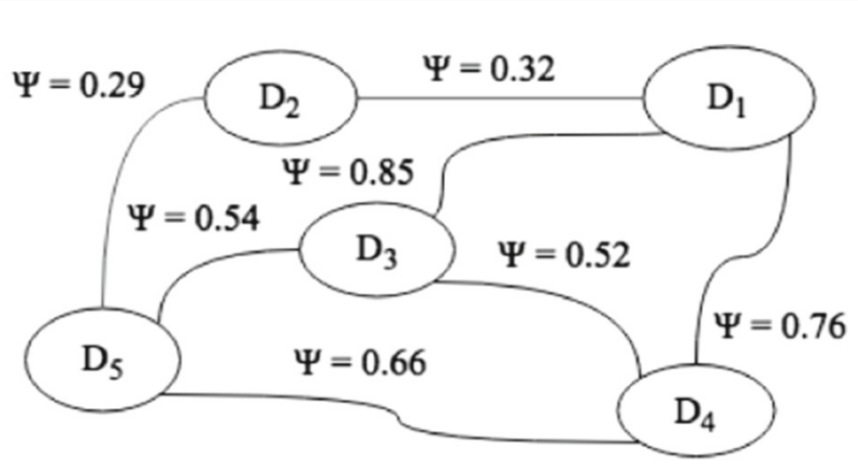
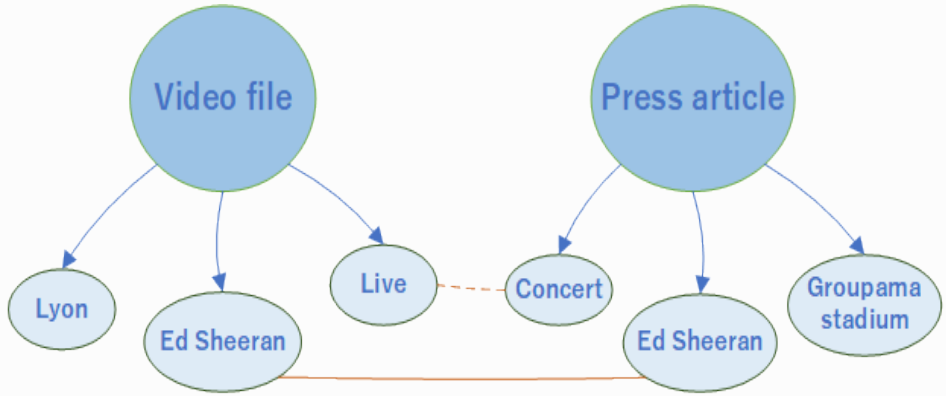


Decomposition into droplets

- Data object = several nodes
- Connections are deduced from similarity between related “droplets



[Maccioni and Torlone, 2018]

Discussion (Sawadogo et al., 2019)

Metadata model/system	SE	DI	LG	DP	DV	UT
SPAR (Fauduet and Peyrard, 2010)	✓	✓	✓			✓
Terrizzano et al. (2015)	✓	✓			✓	✓
Singh et al. (2016)	✓	✓	✓	✓		
GOODS (Halevy et al., 2016)	✓	✓	✓		✓	✓
Ground (Hellerstein et al., 2017)	✓	✓			✓	✓
KAYAK (Maccioni and Torlone, 2018)	✓	✓	✓			
CoreKG (Beheshti et al., 2018)	✓	✓	✓	✓		✓
Diamantini et al. (2018)	✓		✓	✓		

***SE**: Semantic Enrichment - **DI**: Data Indexing - **LG**: Links Generation*
***DP**: Data Polymorphism - **DV**: Data Versioning - **UT**: Usage Tracking*

[Sawadogo et al., 2019b] - BBIGAP@ADBIS 2019

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- No comprehensive metadata model
- Data versioning and data polymorphism as advanced features

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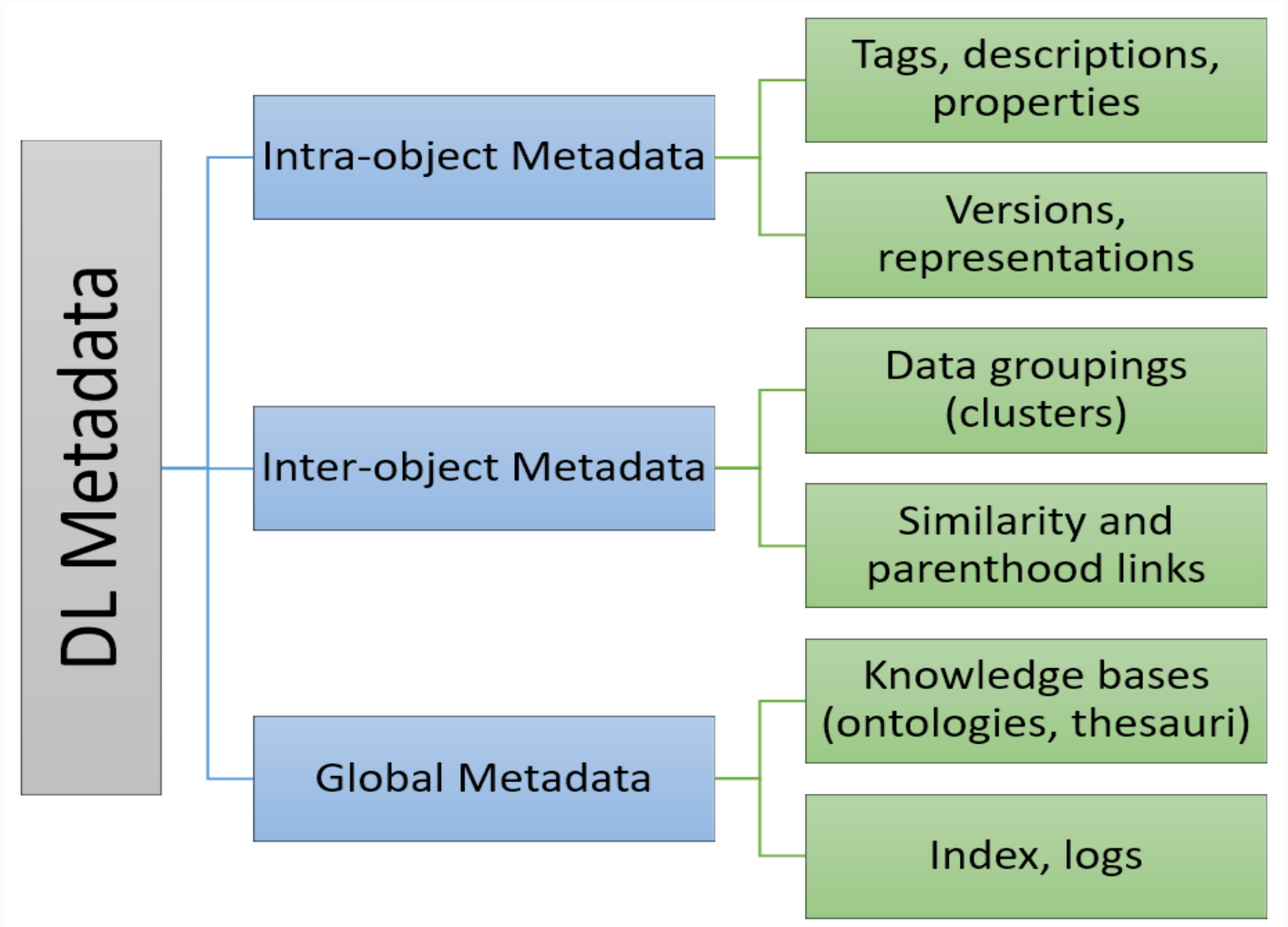
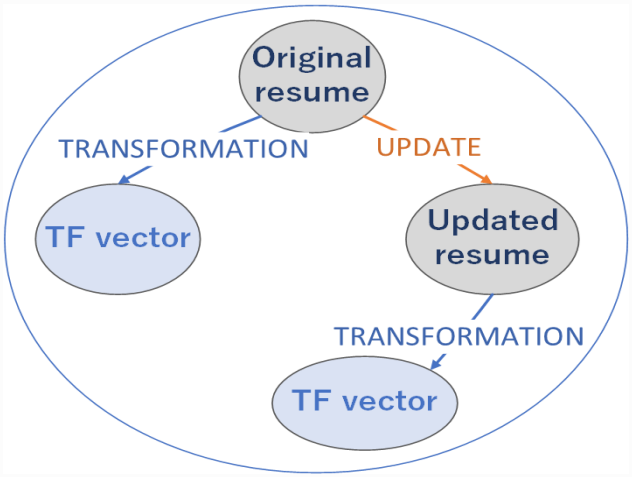
Typology of data lake metadata



[Sawadogo et al., 2019a] - ICEIS 2019

Generic metadata model for data lakes

Intra-objects metadata



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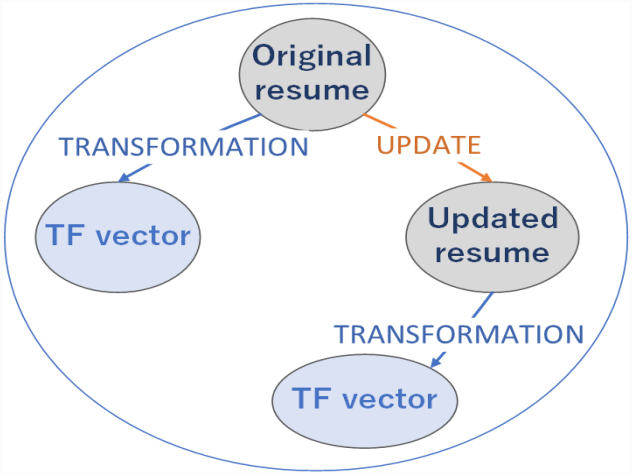

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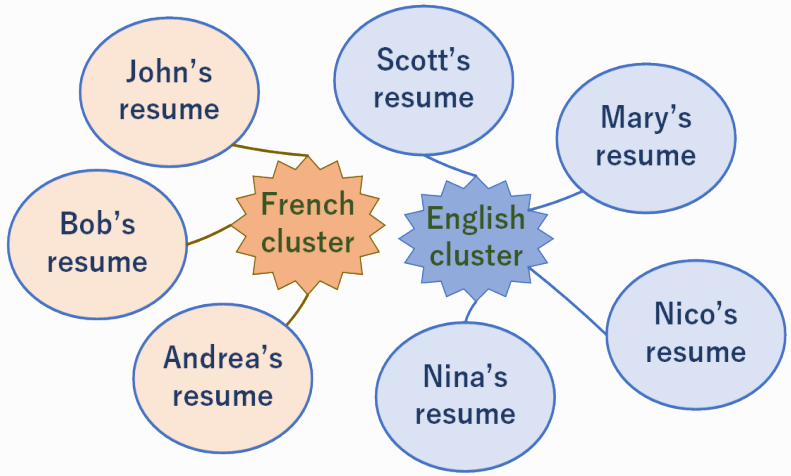

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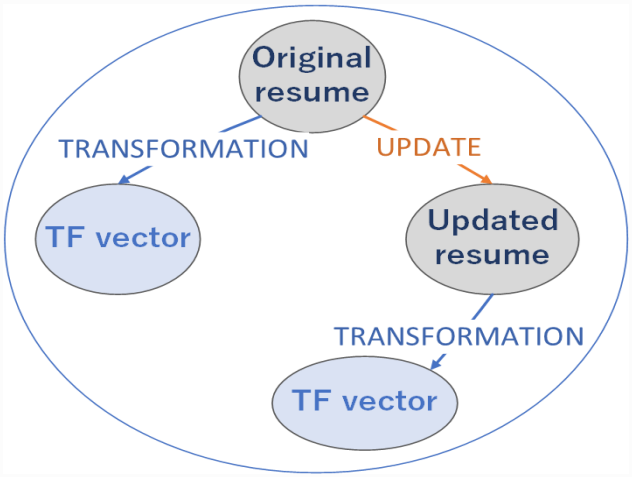

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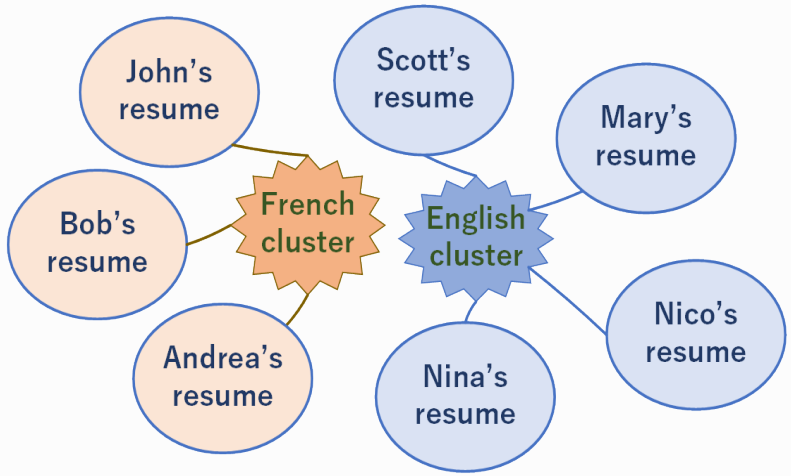

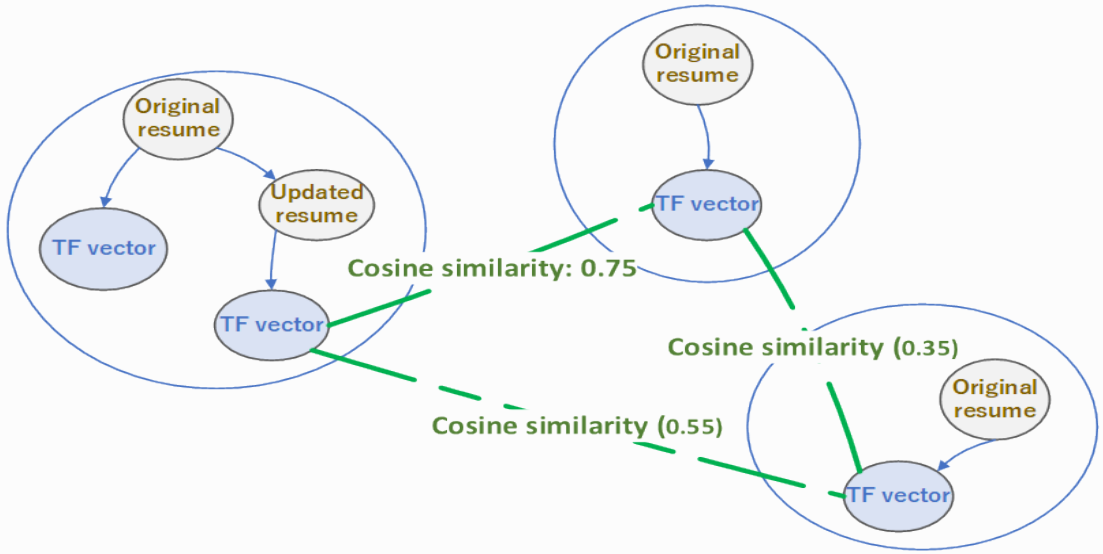

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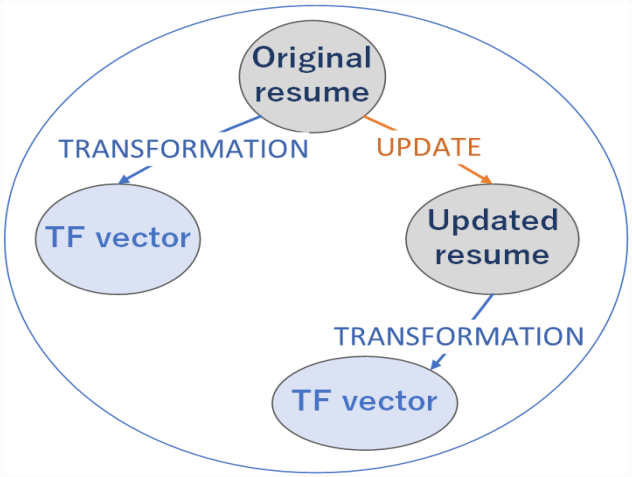

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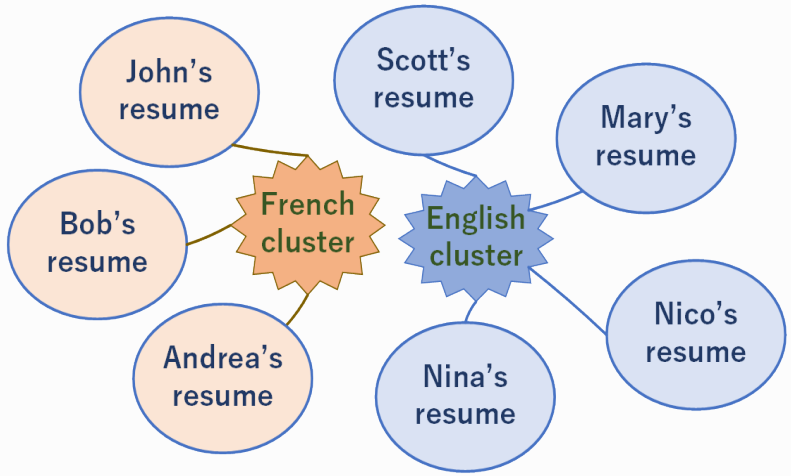
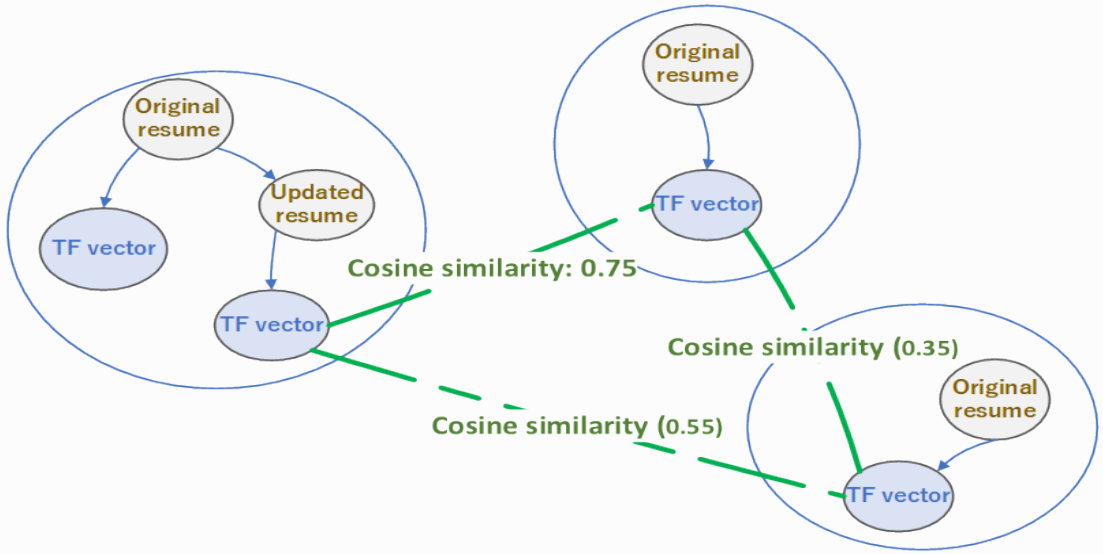


Global metadata

- Not included
- Ontologies = graphs
- Mostly depend on adopted technologies



Expected features

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- **Compliant with FAIR principles**
  - Findable
  - Accessible
  - Interoperable
  - Re-usable

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- **Overview**
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  - Consideration of OLAP analysis in data lakes

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  - 6 key features to evaluate data lakes metadata models/systems
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- **Future works**
  - Implementing our metadata model into a metadata system
  - Designing an OLAP analysis platform for textual data ponds
  - Identifying techniques and tools to ensure scalability

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