Using rules for predicting future M&As

12.1.2022

MOTIVATION

→ **M&As** happen for a plethora of reasons

Financial features + text mainly capture growth, risk, etc.

→ Commonly fail to capture other insights

- A buyer tends to acquire similar companies to prior M&As

- Specific trends over a time-period (dot-com rush, bio/pharma focus, SPACs, etc.)

→ Rules application

- Easy to **incorporate SMEs knowledge**

- **Explainable** by design

FRAMEWORK

→ Given a specific buyer and a year, find the most probable target companies

In BRAIN, use the M&As from the N previous years as evidence facts

→ Use a **Knowledge Graph** to model all known facts

- Attributes of companies (financial features, sectors, etc.)

- Relations between companies (past M&As, similarity, competitors, etc.)

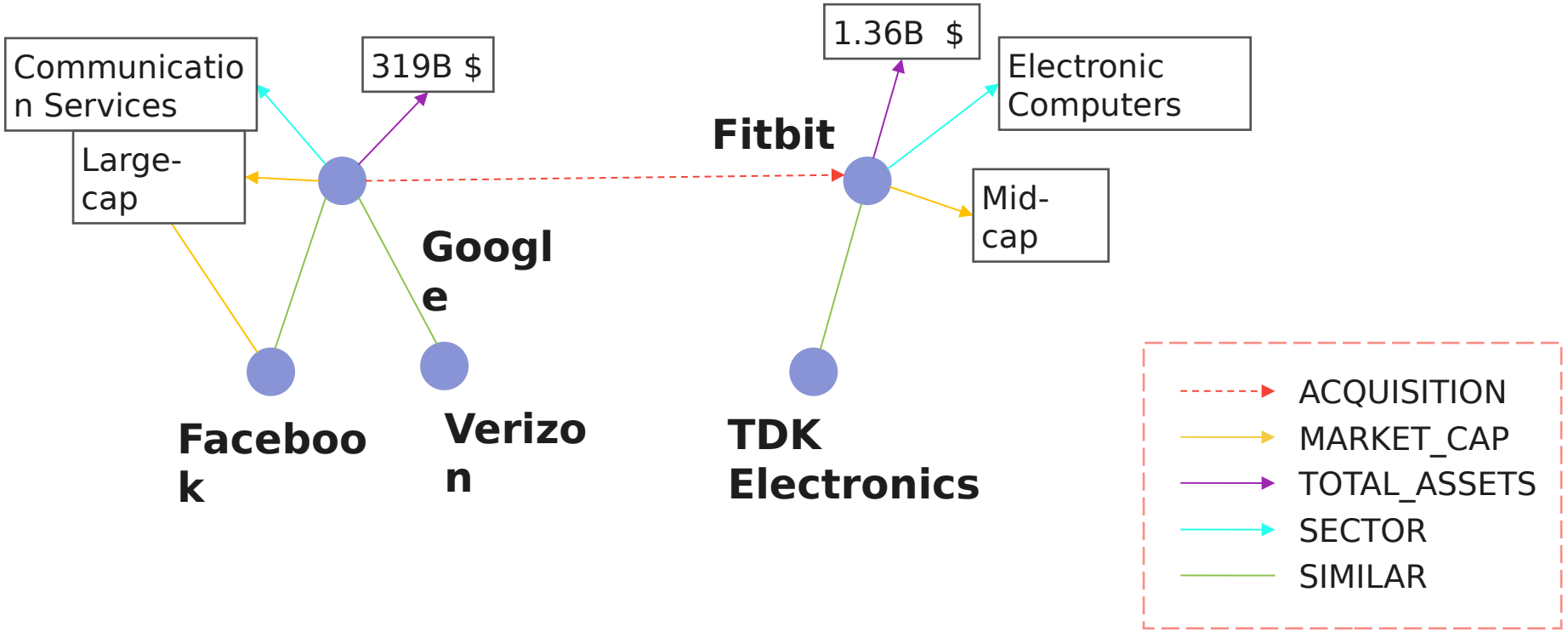
→ Infer missing links using the KG and the rules

- PSL (on hold)

- Path traversal heuristic => Explanation readily available

→ **App** for insights and EDA

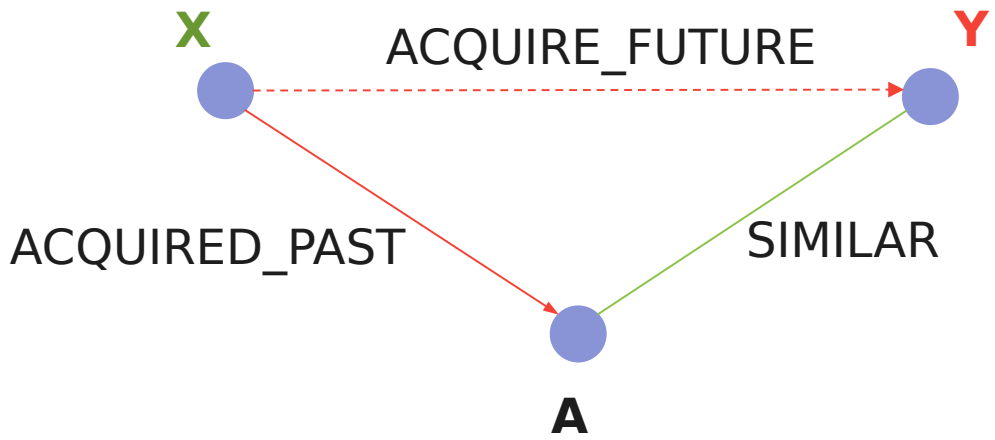
Knowledge Graph



Rules (1)

“A buyer acquires similar companies to past targets”

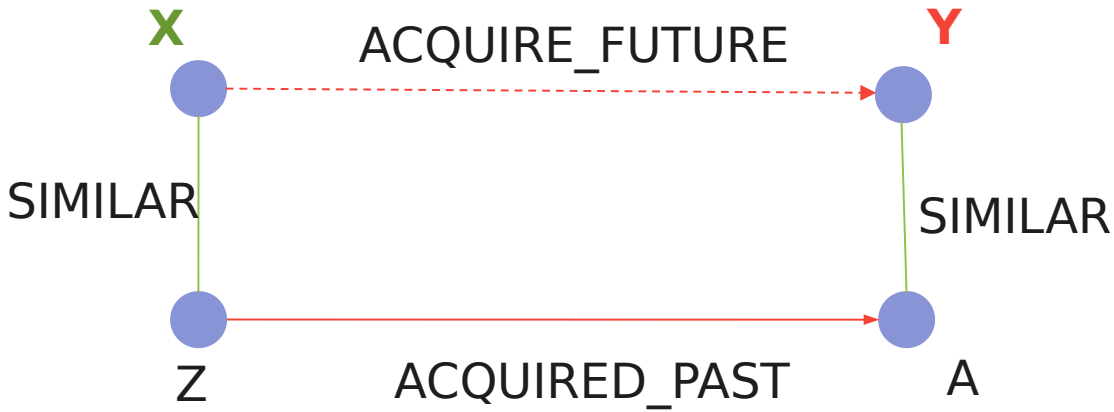
ACQUIRED_PAST(X, ^ SIMILAR(A, Y)=> ACQUIRE_FUTURE(X, Y)
A)



Rules (2)

“Competing companies tend to acquire similar targets”

SIMILAR(X, Z) ^ACQUIRED_PAST(Z, A) ^ SIMILAR(A, Y)=> ACQUIRE_FUTURE(X, Y)



PIPELINE

1. A specific test year is selected (e.g. 2010)
2. M&As in the previous 3 years are used as evidence (e.g. 2007-2009)
3. The KG is created for the given test year
4. Apply the rules for each buyer from the buyer-target test pairs
5. Rank candidate targets for each buyer
6. Measure the Hits@K for each pair
7. Repeat steps 1 through 6 for all years
8. Report aggregate results over all years

RESULTS

→ We have 4.3K M&As from 2000-2020

8K companies

4 simple rules, based on prior acquisitions

→ Predictions for 43% of the cases (no possible candidates generated for the rest)

=> Due to rules being based on previous M&As

→ Out of these, in 22% of the cases the correct solution was given as a candidate

Hits@1	Hits@10	Hits@100
10.38%	12.08%	43.47%

CONCLUSIONS

→ **Proof-of-Concept** on a rule-based system for M&A prediction

Usefulness of representing the data in a KG

Initial results with a few hand-crafted rules

System with explainable predictions

App for EDA and demo purposes

→ More expressive ruleset

Enrich the KG with further information

Inference using PSL

Constraints on possible targets

Combination with ML models / GNNs on the KG

Thank you for the attention.