



HAL
open science

A Technology Intelligence Recommendation System based on Multiplex Networks

Foutse Yuehgoh, Nicolas Travers, Sonia Djebali

► **To cite this version:**

Foutse Yuehgoh, Nicolas Travers, Sonia Djebali. A Technology Intelligence Recommendation System based on Multiplex Networks. Quatrième édition du Symposium MaDICS, Jul 2022, Lyon, France. hal-04091130

HAL Id: hal-04091130

<https://hal.science/hal-04091130>

Submitted on 7 May 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Introduction

- Our research work focuses on recommendation systems for **technology intelligence**.
- Data targeted in this domain correspond to technological evolutions visible on the Web for which a **domain expert** wishes to remain informed of the competition or the uses.
- The amount of data produced on the Web leads to information overload.
- Thus, there is a significant challenge in recommending documents where the mass of data must be searched, sorted and evaluated against the needs of the experts.

Objectives

The **multidimensional profile** of the experts is considered by modeling them via an interaction graph. This representation poses the following problems:

- Find the representation of interactions to facilitate **recommendations** in a relevant and efficient way,
- Promote **multi-faceted** recommendations linked to the multiple nature of the information of interest to the expert,
- Make **real time** recommendations.

References

1. Cozzo, E., De Arruda, G.F., Rodrigues, F.A., Moreno, Y.: Multiplex networks: basic formalism and structural properties. Springer (2018)
2. Ning, N., Yang, Y., Song, C., Wu, B.: An adaptive node embedding framework for multiplex networks. Intelligent Data Analysis 25(2), 483–503 (2021)
2. Ning, N., Yang, Y., Song, C., Wu, B.: An adaptive node embedding framework for multiplex networks. Intelligent Data Analysis 25(2), 483–503 (2021)

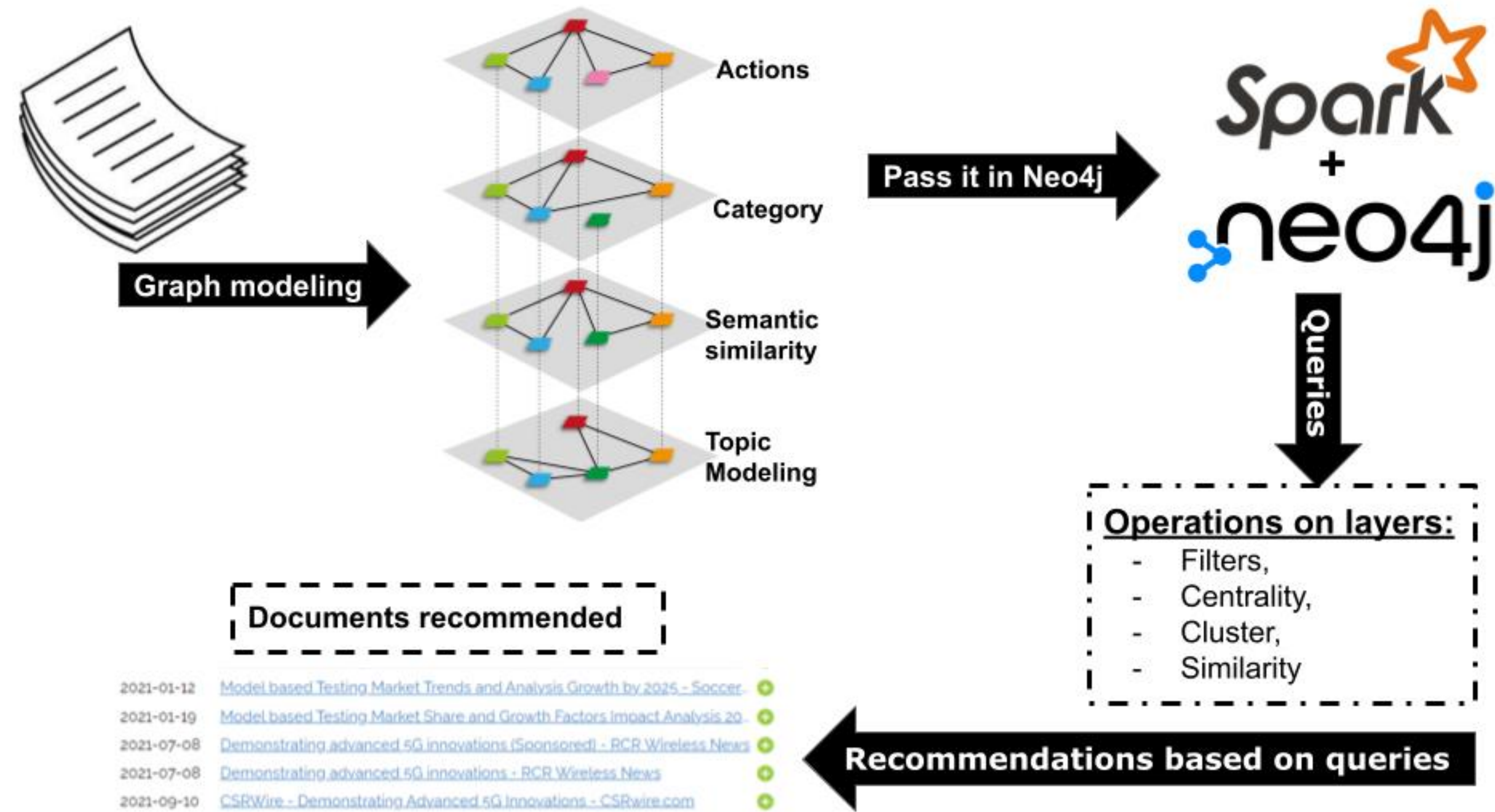


Fig. 1. Our multiplex framework for technology intelligence recommendation

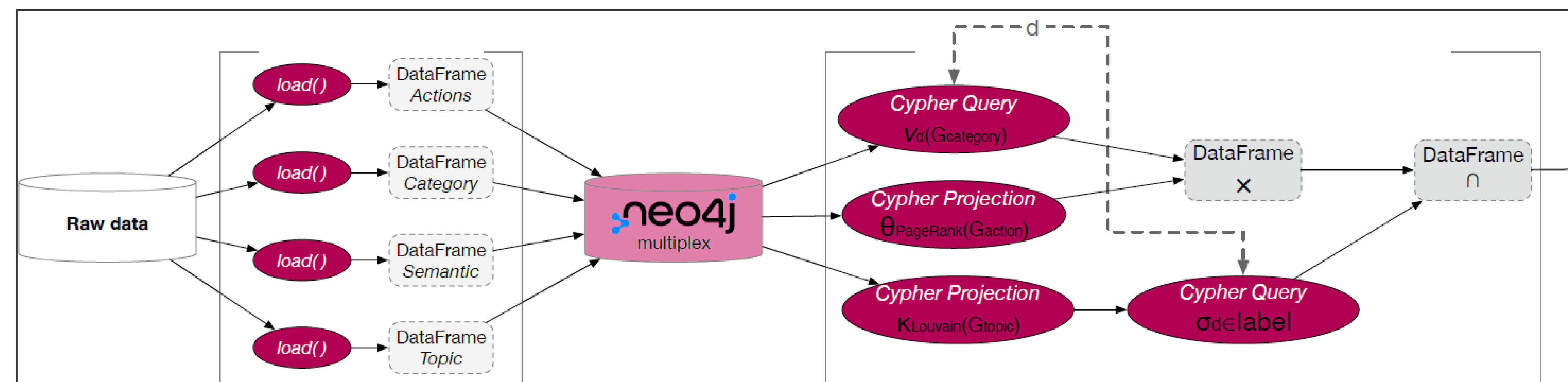


Fig. 2. Interactions of the multiplex network with Neo4j & Spark

Method

- **Action layer:** links between documents by similarity of expert behaviors via their actions on them in the system.
- **Semantic layer:** the similarity of textual content given between documents is similar.
- **Category layer:** membership similarities between predefined categories thanks to the experts' ranking.
- **Topic layer:** thanks to an unsupervised LDA topic extraction approach, we can link documents via their common topics.

✓ The operations on the multiplex give rise to transformations of the graph to produce different types of recommendations.

✓ Example: filter on actions & clustering on categories, community of topics & pageRank on semantics, etc.

Conclusion

- We want to offer adaptive recommendations.
- The **flexibility** of Neo4j proves that this approach is promising and could help us manage important aspects such as real-time recommendations.
- In future work, we will experiment with the **framework** to demonstrate its flexibility and effectiveness.