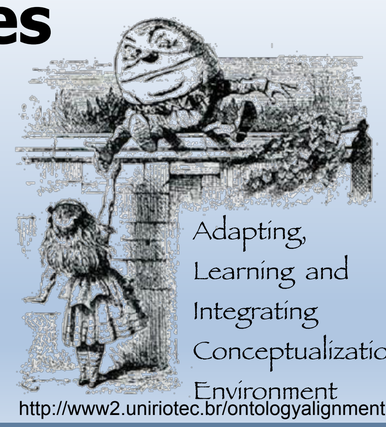
Paving a Research Roadmap on Network of Ontologies

Fábio Santos, Kate Revoredo and Fernanda Baião

Department of Applied Informatics

Federal University of the State of Rio de Janeiro (UNIRIO), Brazil

{fabiomarcos.santos,katerevoredo,fernanda.baiao}@uniriotec.br



http://www2.uniriotec.br/ontologyalignment

Abstract

Network of Ontologies is the pairwise match of a set of ontologies. The challenges faced in this area are not completely known and understood, neither are their relations to ontology matching counterpart issues. The goal of this paper is to identify challenges and applications of a Network of Ontologies and relate them to the existing challenges of Ontology Matching.

Systematic Review

Table 1: Research questions

#	Main Research Question	#	Secondary Research Question
RQ1	Which challenges on network of ontologies have been found in the literature?	RQ 1.1	Which type of challenges may arise in a network of ontologies context (match, repair, large scale, social and collaboration, others) compared with traditional ontology processing?
		RQ 1.2	Are challenges in network of ontologies context the same described in [8]?
		RQ 1.3	When and where have the studies been published?
		RQ 1.4	Which research methodologies have been followed?
RQ2	Have network of ontologies been used in industry practical applications?	RQ 2.1	In which areas network of ontologies are being applied?

- 1st step: search string executed on Scopus - 67 publications returned.
- 2nd step: inclusion and exclusion criterias applied to abstract - 43 publications remained.
- 3rd step: exclusion criteria applied to the whole text – 10 publications remained.

Table 2: Selected papers after complete reading

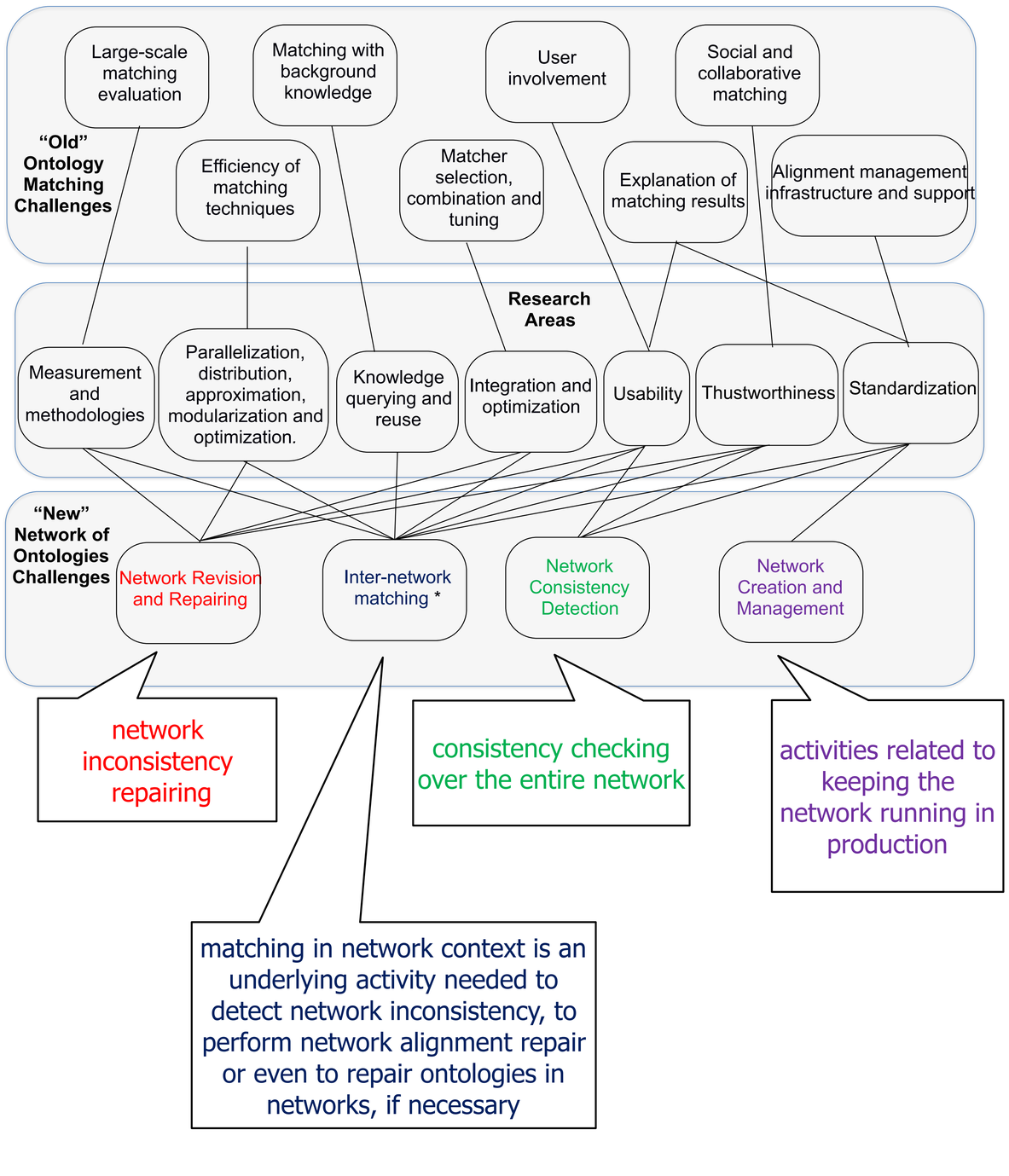
#	Title, Authors, Publication Year, Source
1	Lambrini, S., Achilles, K. "Composable Relations Induced in Networks of Aligned Ontologies: A Category Theoretic Approach" Axiomathes 25.3 pp.285-311 (2015).
2	Euzenat, J. "Revision in networks of ontologies" Artificial intelligence v.228 pp.195-216 (2015).
3	Euzenat, J. "First experiments in cultural alignment repair (extended version)" European Semantic Web Conference. Springer International Publishing, pp.115-130 (2014).
4	Lambrix, P., and Qiang L. "Debugging the missing is-a structure within taxonomies networked by partial reference alignments" Data & Knowledge Engineering vol.86 pp.179-205 (2013).
5	Le Duc, C., Lamolle, M., Zimmermann, A., Curé, O. "DRAOn: A Distributed Reasoner for Aligned Ontologies" ORE pp. 81-86 (2013).
6	Rohrer, Edelweis. "Formal specification of ontology networks" The Semantic Web: Research and Applications pp.818-822 (2012).
7	Dıaz, Alicia, Regina Motz, and Edelweis Rohrer. "Making ontology relationships explicit in a ontology network." AMW v. 749 (2011).
8	Rohrer, Edelweis, Regina Motz, and Alicia Diaz. "Modelling a web site quality-based recommendation system" International Journal of Web Information Systems vol.7 n.4 pp. 396-420 (2011).
9	Kutz, Oliver, Immanuel Normann, and Till Mossakowski. "Chinese whispers and connected alignments" Proceedings of the 5th International Conference on Ontology Matching. vol.689 pp.25-36 (2010).
10	Ji, Qiu, et al. "RaDON—repair and diagnosis in ontology networks" The semantic web: research and applications pp.863-867 (2009).

Table 3: Identified challenges and applications

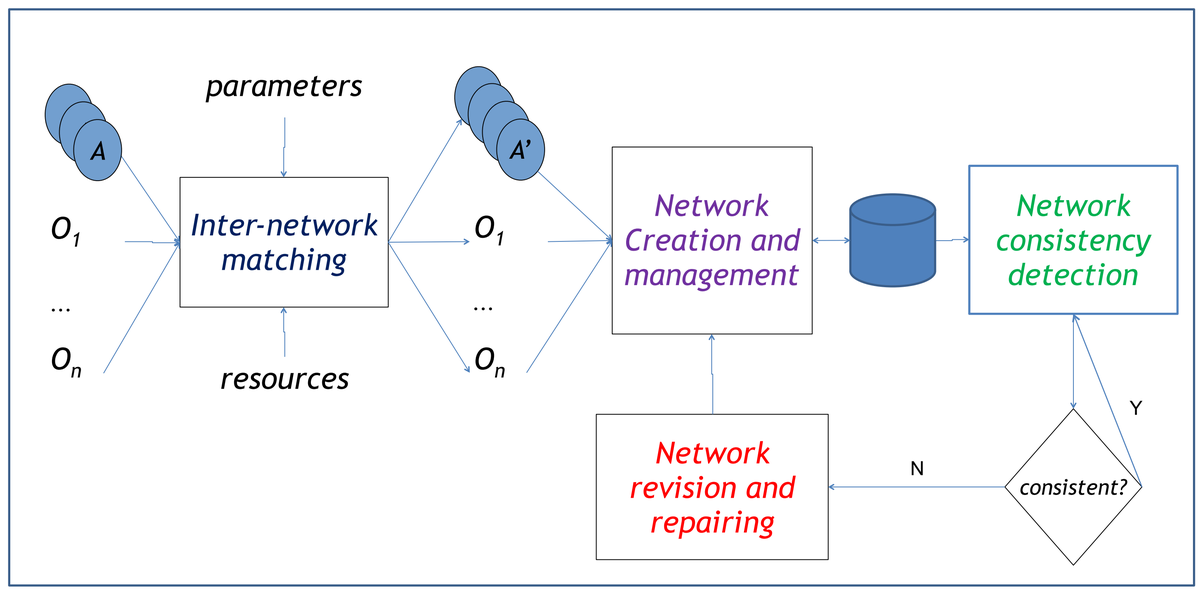
Paper# (from Table 2)	Network of Ontologies Definition	Challenges	Application
1	X	network consistency detection	N/A
2	X	network revision and repairing	N/A
3		network revision and repairing	N/A
4		network revision and repairing	N/A
5	X	network consistency detection	health
6		network consistency detection	semantic web
7	X	network revision and repairing	semantic web, health
8		network consistency detection	web site recommendation system
9		network revision and repairing	N/A
10		network revision and repairing	N/A

For details of the systematic study please refer to:
Santos, F., Revoredo, K., Baiao, F., Network of Ontologies – A Systematic Mapping Study and Challenges Comparison, Technical Report. Relate-DIA/UNIRIO, RT-0005/2017, 2017.
http://www.seer.unirio.br/index.php/monografiasppgi/article/view/6833

Challenges on Network of Ontologies



Network of Ontologies Management



Future Work

We plan to

- extend the systematic mapping to other research databases.
- detail challenges and track advances in this area proposing opportunities for new researchers.
- conduct experiments using some techniques we found, to clarify strength and weak points of each approach, aiming to get a deeper understanding to future studies.
- create a knowledge dictionary to map definitions and approaches used by author and by techniques guiding research team.

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