Multi-Domain and Heterogeneous Data Driven Innovative Problem Solving: Towards a Unified Representation Framework

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Abstract. The exponential increase in the amount of knowledge produced has sparked an interest in the TRIZ community in using artificial intelligence and natural language processing to systematize various steps of the process. However, exploiting large volume of multi-domain and heterogeneous data sources simultaneously is still a work in progress. We propose a general knowledge formalization framework to represent information relative to various data sources. By having formalized representations of various knowledge sources, we can establish stronger links between otherwise unrelated sources and thus pair innovation problems with multi-domain solutions and uncover potential hidden solutions that are hard to discover otherwise. A demonstrative case study related to efficient energy generation is provided to illustrate possible uses of the framework. We noticed that the formalization of some data sources (such as web content) can be challenging since their structure varies wildly. Also, contrary to established sources (patents, scientific articles), web sources can contain a lot of noise or false information.

Keywords: TRIZ, Natural Language Processing, Knowledge Management, Knowledge Engineering, Artificial Intelligence, Deep Learning, Information Retrieval, Knowledge Representation.