Editorial

Lorna Uden

School of Computing,
Faculty of Computing and Digital Technologies,
Staffordshire University,
Mellor Building, College Road, Stoke-on-Trent, ST4 2DE, UK
Email: L.uden@staffs.ac.uk

Welcome to V15N2 issue. This issue consists of four papers. The first paper is 'ONTMAT1: ontology matching using a reasoner and property restriction' by Saida Gherbi and Mohamed Tarek Khadir. This paper presents an ontology matching approach called ONTMAT1, which aims to automatically provide correspondence relations among both fundamentally heterogeneous ontologies through diverse similarity calculations between their entities. The automatic approach for ontology matching, implemented on four levels, has been proposed. The first level compared names of individuals and concepts by applying a terminological technique using a Pellet reasoner and WordNet for background knowledge, along with the string metric n-gram as a similarity measure. Similarities obtained were saved in two matrices for individuals and concepts, respectively. Level 2 suggested a weight based on the property restriction semantic to automatically evaluate the impact of structural similarities on the final similarity. The third level matched the property restriction using this previously calculated weight. The same weight was then applied to calculate the structural alignment of concepts. Finally, terminological and structural similarities were aggregated by the proposed weight and the fuzzy relations were described.

The approach has been simulated and tested online under the Ontology Alignment Evaluation Initiative (OAEI) 2019 Conference task. When tested under OAEI 2019, ONTMAT1 proved to be comparable to most top-ranked systems on the conference track. It would be useful to include the exploration and implementation of semantic methods of description logic, such as applying inference rules to evaluate the impact of a given class on their neighbours.

The second paper is 'RDF object description generator' by Yanji Chen, Mieczyslaw M. Kokar and Jakub J. Moskal. The work described in this paper is related to the development of applications for cognitive radio networks, where individual radios ('RF devices', or 'nodes') may provide and request services to and from other nodes in the network. While the problem of generation of XML instances based on an XML schema is well-established, it is not necessarily the case for generating RDF/OWL instance data (A-Box) given an ontological model (T-Box). This paper describes RODG, an efficient generic RDF synthetic instance data generator, which can generate large numbers of high-quality random RDF descriptions of objects of a specific class type. Details of the object description generation process are presented, including the process to generate an OWL API Java model and the algorithms to generate instance data from the model.

RODG and the generated benchmark datasets were evaluated using six ontologies with respect to scalability/performance, dataset quality and dataset space coverage. The evaluation results demonstrate that RODG is generic, scalable, and the generated datasets are of high quality and have good space coverage with respect to the ontologies used as input. These authors argue that apart from applying RODG to their specific use case of generating description of RF devices, they believe that it can be used in the application scenarios where large synthetic RDF datasets with similar quality characteristics are needed for testing systems that implement semantic web solutions. Further work is needed to verify that.

The third paper is 'Digital twin: current shifts and their future implications in the conditions of technological disruption' by Jari Kaivo-oja, Osmo Kuusi, Mikkel Stein Knudsen and Iris Theresa Lauraéus. According to these authors, digital twin plays a pivotal role in the vision of smart manufacturing. It enables a data analytical shift from ex-post data gathering and analytics towards predicting the future. Simultaneously, the arenas in which digital twin is applied is widening, so that analytics companies are now, e.g., selling the idea of a 'digital twin of an organisation' (DTO). This article elaborates digital twins approach to the current challenges of knowledge management when Industry 4.0 is emerging in industries and manufacturing.

These authors argue that there are very few studies, on the impact of digital twin from a knowledge management perspective. This article summarised this ongoing discussion. They observe three major shifts ongoing with digital twins: first, there is a drive towards the added complexity of the environments modelled by digital twins. Secondly, the paradigm offers a general shift from analysing ex-post data to predicting the future. Third, in the future, digital twin can move from cyber-physical integration of physical and virtual entities towards cyber-physical integration of larger interconnected networks presenting a new digital twin interaction-puzzle. These authors further argue that identification of these shifts and their implications is a new addition to the scientific literature in the field. The article presents five scenarios of technological disruption based on Clayton M. Christensen's model. This is a novel extension of Clayton M. Christensen's original idea and model. It is only a conceptual idea that needs to be verified.

The last paper is 'A knowledge governance framework for open innovation projects' by Reinhard Bernsteiner, Thomas Dilger and Christian Ploder. According to these authors, to remain competitive in today's market, businesses must cooperate with partners like suppliers, customers, or even competitors across organisational borders. Open innovation is proposed as an answer to this. This paper defines a framework that guides managers to setup and run open innovation projects. This framework has its focus on sharing knowledge with external partners in a predefined and regulated way to avoid unintentional knowledge leakage. These authors argue that the developed framework:

a supports all internal and external knowledge sharing activities

b enables the organisations to select and adjust the suitable mechanisms to a specific project.

This framework is only conceptual and has not been used in real life. It is important to apply this framework in practical open innovation projects. Its effectiveness cannot be verified until empirical studies have been conducted. The small number of experts interviewed also contributes to its limited contributions. More studies and practical implementations are necessary to make sure that the proposed framework is valid.