Proceedings of the 6th Workshop on Deep Learning for Knowledge Graphs (DLKG2023) co-located with International Semantic Web Conference 2023

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Preface

Knowledge Graphs have been used in various machine learning tasks by deriving latent feature representations of entities and relations. Knowledge Graphs represent formal semantics by describing entities and relationships between them, and can use ontologies as a schema layer of reference. This way, it is possible to retrieve implicit knowledge through logical inference rather than only allowing queries that request explicit knowledge. Deep Learning methods have emerged from machine learning approaches and became essential for the resolution of several tasks within the artificial intelligence spectrum. Recently, Deep Learning methods have been used in conjunction with Knowledge Graphs (i.e., to represent relationship of the graph in a vector space, to allow companies find patterns in real-time between interconnected entities, to keep track of inventories of parts further allowing finding materials used in different products, etc.). Therefore, it has become critical that the Deep Learning and Knowledge Graphs communities join forces in order to develop more effective algorithms and applications. This workshop aimed at reinforcing the relationships between these communities and intended to be at the center of shared works around topics such as Deep Learning, Knowledge Graphs, Natural Language Processing, Computational Linguistics, Big Data, etc. Furthermore, this workshop is situated strategically within the realm of Large Language Models, where empirical evidence has demonstrated that Knowledge Graphs play a crucial role in mitigating the prevalent issue of hallucinations.

Therefore, the goal of this workshop was to provide a meeting forum where discussions between the relevant stakeholders (researchers from academia and industry) could be stimulated within the Deep Learning and Knowledge Graphs domains. As in the previous editions, this year we noticed general attention to our workshop given the high number of submissions we received and the high number of participants we noticed during the workshop day (more than 50). Seven papers have been accepted and discussed within the workshop by authors from different international institutions. They covered topics such as question answering using box embeddings, knowledge graph injection for reinforcement learning, usage of LLM to create knowledge graphs, combination of LLMs and knowledge graphs for classification tasks within the tourism domain, universal preprocessing of operators for embedding knowledge graphs with literals, improving knowledge graph completion with node neighborhoods, and comparison of knowledge injection strategies in LLMs for tasks within the scholarly domain.

We had two invited speakers. One was Dr. Andrea Nuzzolese, a researcher at the National Council of Research, who discussed some of the issues of using LLMs to generate knowledge graphs. In particular, he discussed how prompting LLMs with human metacognitive processes is a novel research direction that aims at instilling critical elements of human "thinking about thinking" into LLMs. The hypothesis is that metacognitive prompting can enhance the quality and cognitive-soundness of knowledge graphs resulting from knowledge engineering processes.

One more keynote we invited was Dr. Raphael Troncy, Professor at EURE-COM, who discussed some of the results of the CIMPLE project that makes use of generative AI to counter information manipulation. In particular, the CIMPLE knowledge graph was presented to collect fact-checks, claims, and social media posts that convey some misinformation. The goal was to show that LLM can be used to label misinformation.

We also thank the program committee for their time and work in reviewing the submitted papers. The workshop website includes the program, papers, and further details about the workshop[7].

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[7] `https://alammehwish.github.io/dl4kg2023/`

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