Preface

SemREC 2023 was the third edition of the Semantic Reasoning Evaluation Challenge (SemREC), co-located with the 22nd International Semantic Web Conference (ISWC 2023).

Despite the development of several ontology reasoning optimizations, the traditional methods either do not scale well or cover only a subset of OWL 2 language constructs. The performance of the SPARQL query engines that support reasoning is also limited. As an alternative, neuro-symbolic approaches are gaining significant attention. However, the existing methods cannot deal with very expressive ontology languages. To find and improve the performance bottlenecks of the reasoners, we ideally need several real-world ontologies that span the broad spectrum in terms of their size and expressivity. However, that is often not the case. One of the potential reasons for ontology developers to not build ontologies that vary in terms of size and expressivity is the performance bottleneck of the reasoners. SemREC aims to deal with this chicken and egg problem.

The third edition of this challenge included the following tasks.

- Task-1 - Ontologies. Submitting a real-world ontology that is a challenge in terms of the reasoning time or memory consumed during reasoning.
- Task-2 - Systems
  - Ontology/RDFS Reasoners. Submitting an ontology/RDFS reasoner that uses neural-symbolic techniques for reasoning and optimization. In terms of technique used, the submissions could fall under any of the below (or related) categories.
    - Using learning-based techniques for performance optimization of traditional reasoning algorithms [6].
    - Inductive reasoning techniques based on a sub symbolic representation of entities and relations learned through the maximization of an objective function over triples [4, 5].
    - Techniques that can learn deductive reasoning using ontology axioms [1, 2, 3].
    - Neural Multi-hop reasoners [7, 8].

There were two submissions to the challenge – in the task two category.

1. **Enhanced GAT: Expanding Receptive Field with Meta Path-Guided RDF Rules for Two-Hop Connectivity**
   Julie Loesch, Michel Dumontier and Remzi Celebi
2. **Evaluating Different Methods for Semantic Reasoning Over Ontologies**
   Fernando Zhapa-Camacho and Robert Hoehndorf

Each submission was reviewed by at least two reviewers and their feedback was forwarded to the authors. Since this is a challenge, both the submissions were accepted.

Task 2 Winners

Evaluating Different Methods for Semantic Reasoning Over Ontologies
Fernando Zhapa-Camacho and Robert Hoehndorf

The winner was decided based on the performance of submitted systems assessed against the provided datasets. Performance evaluation encompassed factors such as OWL expressivity, dataset sizes, and correctness measures. Additional details can be found at https://semrec.github.io/evaluation2022.html.

Organization

In this section, we list the people who organized and contributed to the success of this event.

Challenge Chairs

- Gunjan Singh, KRaCR Lab, IIIT-Delhi, India
- Raghava Mutharaju, KRaCR Lab, IIIT-Delhi, India
- Pavan Kapanipathi, IBM T.J. Watson Research Center, USA

Challenge Program Committee Members

The challenge program committee helped review the submitted papers. The organizers would like to thank them for their valuable time.

- Monika Jain, IIIT-Delhi, India
- Nidhi Goyal, Mahindra University, Hyderabad, India
- Mayank Kharbanda, IIIT-Delhi, India

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