SEMANTIC WEB PROJECT PROPOSAL

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Project Title:
Ontology Validation using Language Models and Knowledge Graphs

Introduction
Our project aims to develop a system that validates ontologies using Language Models (LMs) and publicly available Knowledge Graphs (KGs). The system will take an ontology file as input and perform the following tasks related to the ontology.

Tasks
1. Ontology Hierarchy Validation
2. Property Domain/Range Validation
3. Property Characteristics Identification
4. Property Hierarchy Validation
5. Inverse Property Validation
6. Disjoint Properties Validation
7. Integration and Other Tasks (if time permits)

Timeline
Week 1: Ontology Hierarchy Validation(T1)
Week 2: Property Domain/Range Validation(T2) & Property Characteristics Validation(T3)
---------- Mid Project Evaluation (15th April)----------
Week 3: Property Hierarchy Validation(T4) & Inverse Property Validation(T5)
Week 4: Disjoint Properties Validation(T6), implementing additional tasks, and integrating the different modules(T7)

Distribution of tasks

Aaditya Gupta : T3, T5, T7

Sarthak Maini : T2, T4, T6

Rest is combined work: T1

Task Description:

1. **Ontology Hierarchy Validation**: Ensure the subclass-superclass relationships are correctly structured, validating that each subclass has a valid superclass and vice versa.
2. **Property Domain/Range Validation**: Validate that the assigned domain and range of properties are suitable based on class definitions and instances. Confirm that property usage adheres to the specified domain and range constraints.
3. **Property Characteristics Identification**: Identify and validate properties as symmetric, transitive, functional, or reflexive, ensuring correct application within the ontology's context. Confirm that these characteristics are accurately reflected in the ontology.
4. **Property Hierarchy Validation**: Validate the organization of properties in a hierarchical structure, ensuring each sub-property has a valid super-property and vice versa to verify coherence among properties.
5. **Inverse Property Validation**: Ensure correct specification of inverse properties for every relevant property within the ontology.
6. **Disjoint Properties Validation**: Validate that properties stated as disjoint do not share any common instances.
7. **Integration and Other Tasks (if time permits)**: Integrate modules to create a cohesive validation system. Additional tasks may include circular definition checks and validation of ontology design patterns, depending on the project's progress.