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RESEARCH ARTICLE

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AN SCALABLE ONTOLOGY MEASUREMENT APPROACH FOR SEMANTIC ONTOLOGIES USING DISTANCE METRIC

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ABSTRACT

The objective of this paper is to improvise the performance of the ontology using Graph Derivation Representation (GDR) approach. Reusing of ontology offers extraordinary profits by measuring and comparing ontologies. On the other hand, the condition of other methodologies for measuring ontologies disregards the issues of both the polymorphism of ontology representation and the expansion of certain semantic information. One approach to handle these issues is to devise an instrument for ontology estimation that is steady, the fundamental criteria for programmed estimation. In this paper, we introduced a diagram deduction representation based methodology (GDR) for stable semantic estimation, which catches structural semantics of ontologies and locations those issues that cause flimsy estimation of ontologies. This paper makes three unique commitments. Initially, we present and characterize the idea of semantic estimation and the idea of stable estimation. We show the GDR based methodology, a three-stage procedure to change ontology to its GDR. Second, we formally examine critical properties of GDRs in view of stable semantic estimation and correlation which can be accomplished effectively. Third yet not the minimum, we hope to measure up the GDR based methodology. A novel approach of experimental comparison is conducted based on ontology measurement entities and distance metric, which compares the similarity of two ontologies in terms of their GDRs.

Keywords : ontology, GDR, polymorphism, semantics

1. INTRODUCTION

Ontology is the complete set of concepts which describes the domain. Ontology learning is the automatic or semi-automatic creation of ontologies which includes extraction of corresponding domain's terms and the relationships between those concepts from a corpus of natural language text and encoding them with an ontology language for easy retrieval. Ontologies have been broadly connected in numerous fields such as information administration, Semantic Web, data combination, semantic inquiry and so on. A remarkable playing point of ontologies is that they give an information offering framework that back-up the representation and offers space information by formalizing significance of substance and data. As the size also the quantity of ontologies keep on expanding, the reuse and the stable estimation of ontologies offer a few critical profits. In the first place, the exertion of building new ontologies can be minimized by reusing the existing ontologies as opposed to begin without any preparation.

The main advantage of this approach is to reuse the existing ontologies and encourage the information interoperability. This paper consists of six sections namely related works, system architecture, methodology, proposed work, results and discussions and conclusion.

2. RELATED WORK

This section brings the works carried out in the past.

Razmerita.L, (2011) discussed the Information Management System Learning Information Package (IMS LIP) and Knowledge Management (KM) techniques for personalization is extended beyond customization and adaptation mechanisms at the level of the user's interface. This paper emphasized on personalized user support for knowledge workers and places the link between user modeling. The support of knowledge worker's activities, such as create knowledge, share knowledge and get feedback based on his/her activity in the system and focuses on the role of semantically enhanced user modeling services for personalized user support within KMS. The drawback lies on the knowledge worker who needs to be self-sufficient and sometimes needs to unlearn unnecessary knowledge and old habits that get in the way of working smarter and not harder and will improve the Semantically enriched resources and ontologies can support the development of a new range of services to enhance user support and lifelong learning. Integration of associated reasoning mechanisms can open up the possibility of making knowledge assets intelligently accessible, associate various types of intelligent personalized services, and create a next generation of services in a corporate setting or on the Web.

Nagy.M, et al.(2011) proposed that by using the Automated Question Answering System (AQUA) technique the Distance metric Structural similarity(DSSim) compares and scales well with other well-established ontology mapping systems and discussed the problems that need to be addressed before one can achieve such machine intelligence for ontology mapping and introduced a multiagent ontology mapping framework semantic similarity between concepts, relations and properties. DSSim takes the extended query and the ontology input as labeled graphs. The semantic matching is viewed as graph like structures containing terms and their interrelationships. The similarity comparison between a pair of nodes from two ontologies is based on the analysis of their positions within the graphs. The drawbacks lies in the DSSim needs to be improved because it manages conflicting beliefs for a particular mapping when different agents have built up conflicting beliefs for the correctness of a mapping candidate. The problem occurs when the mapping algorithm has already selected a mapping candidate and later on in the mapping process. The system adds another mapping that contradicts the previous one. DSSim does not always produce the best precision and recall for each track; however, the mapping quality is stable throughout different domains.

Samir Tartir ,et al.(2011) in their paper discussed that by using the OntoQA technique we can categorize the quality of ontologies into three groups: schema, knowledgebase (KB) and class metrics. These metrics serve as a means to evaluate the quality of a single ontology or to compare ontologies when more than one candidate fits certain requirements for providing metrics to quantitatively assess the quality in each group it is a tool for quality analysis and providing experimental results. The drawbacks is that the OntoQA would allow the calculation of domain-dependent metrics that make use of some standard ontologies in a certain domain and will improve the web-enabled tool where users can enter their ontology files' path and uses the application to measure the quality of the ontology.

Yuzhong Qu (2012), et al. stated that by using the falcon technique, a novel keyword-based ontology search engine, would be used as part of the Falcons system. It retrieves concepts whose textual description is matched with the terms in the keyword query and ranks the results according to both query relevance and popularity of concepts. The popularity is measured based on a large data set collected from the real Semantic Web. Each concept returned is associated with a query-relevant structured snippet, indicating how the concept is matched with the keyword query and also briefly clarifying its meaning. Meanwhile, the system recommends several query-relevant popular ontologies, which can be used by users to restrict the results to the ones in a specific ontology. It is difficult to investigate other query types besides keywords, e.g., controlled natural language and improves the method of snippet generation in order to better present ontology structures. It is also interested to consider other metrics for ontology evaluation and recommendation.

Alexander Maedche, et al. proposed the lexical and conceptual algorithm and modeled ontologies in three different phases about a commonly well-known domain given some additional background knowledge in form of domain texts. The ontologies generated by the different subjects are served as input to an empirical evaluation study of our similarity measuring framework. They prepare the ground for their proposal and their empirical evaluation study by formally specifying the ontology structure and its semantic refer to subsequently. In the two sections thereafter, they propose measures for describing the similarity of different ontology parts at the lexical and conceptual level. The drawback here is that this process only measures the keyword similarity in ontologies but doesn't match tree measurement so will improve the measuring knowledge in ontologies based on graph.

3. SYSTEM ARCHITECTURE

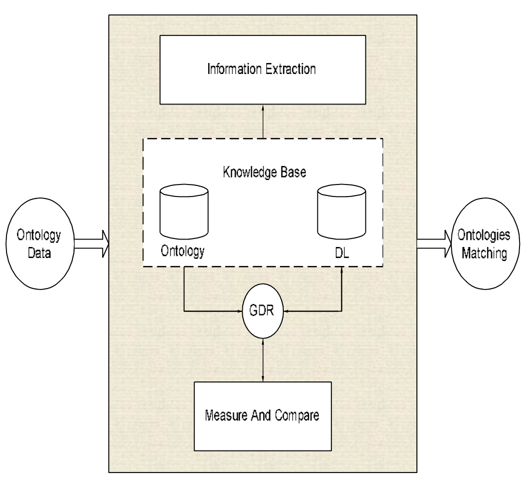

Figure 1: System Architecture

The system architecture of Graph derivation representations (GDR) shows the graphical semantic descriptions of ontologies. The ontology data is given as an input for the system. The Information extraction phase, identify the edges, leaf node and parent node in owl parser. DL(Description Logic) and Ontology inside the knowledge base are the two databases will be converted to GDR, then the comparison and measuring of the GDR shows the efficient graph.

4. METHODOLOGY

4.1 Graph Derivation Representation

The fundamental concept of ontology representation is that there is an absence of uniform ontology representation model for stable ontology estimation and correlation. Existing ontology dialects and models center more on expressiveness instead of stable ontology estimation. We build up the graph derivation representation (GDR) based methodology for measuring and looking at structural semantics of ontologies, pointing towards the objective of uniform ontology representation.

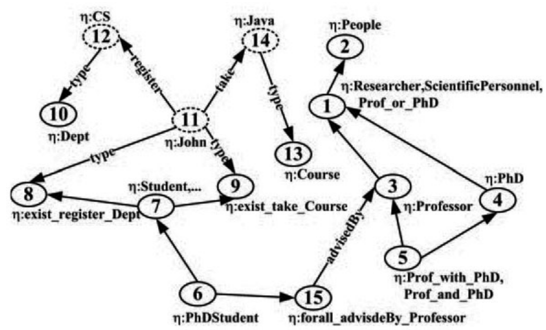

Figure 2 : Example for GDR

4.2 Generating GDR: An Overview

Graph derivation representations (GDR) are the graphical semantic portrayals of ontologies. The objective of producing GDRs of ontologies is to gauge and think about ontologies in view of their GDRs for stable semantic estimation. The requirement is to consider the two fundamental issues. The first issue is the way to build the structural semantics of an unique ontology GDR under the state of protecting the semantics of the ontology. On the other hand, the unequivocal semantic data in the ontology ought to be safeguarded in its structural semantics of GDR. Then, the understood semantic information in the philosophy ought to additionally be expressly communicated by its structural semantics of GDR. Considering that ideas are the center of ontological semantics, which needs to make express of all the characterized complex ideas and unearth the taxonomic and non-taxonomic relations between them. Particularly for the complex ideas that are characterized by other complex ideas in an iteratively settled style, a recursive process needs to be received to figure out all the characterized complex ideas and the certain relations between them. All the things are considered and the proposed methodology can create the complete structural semantics of GDR for a ontology. The second issue is the means by which to treat a ontology' GDR to fulfill both the essential estimation criteria and the necessities of programmed estimation. The objective of treating an GDR is to standardize the GDR so it can be measured accurately and successfully by utilizing the current ontology measures.

```
Require: G_O = (V_O, E_O, ρ, λ, η)
    MV ← ∅
    for all i ∈ V_O do
        for all j ∈ V_O^C \ {i} do
            if (i, j) ∈ E_O and η(i, j) ∩ {R} ≠ ∅ then
                MV ← findIntermVertices(i, j)
                if MV ! = ∅ then
                    E_O ← E_O \ {(i, j)}
                end if
            end if
        end for
    end for
```

Figure 3 : Pseudo code for Non direct transitive relations with respect to R

```
Require: G_O = (V_O, E_O, ρ, λ, η)
    S ← Circle(G_O)
    while S ! = ∅ do
        v_k ← min{v_i | v_i ∈ S ∧ 1 ≤ i ≤ |S|}
        for all each v ∈ S \ {v_k} do
            η(v_k) ← η(v_k) ∪ η(v)
            if (v_k, v) ∈ E_O then
                η(v_k, v_k) ← η(v_k, v_k) ∪ (η(v_k, v) \ {subClassOf})
                E_O ← E_O ∪ {(v_k, v_k)}
            end if
            if (v, v_k) ∈ E_O then
                η(v_k, v_k) ← η(v_k, v_k) ∪ (η(v, v_k) \ {subClassOf})
                E_O ← E_O ∪ {(v_k, v_k)}
            end if
            for all each v' ∈ V_O \ S do
                if (v, v') ∈ E_O then
                    η(v_k, v') ← η(v_k, v') ∪ η(v, v')
                    E_O ← E_O ∪ {(v_k, v')}
                end if
                if (v', v) ∈ E_O then
                    η(v', v_k) ← η(v', v_k) ∪ η(v', v)
                    E_O ← E_O ∪ {(v', v_k)}
                end if
            end for
        end for
        V_O^C ← V_O^C \ {S \ {v_k}}
        S ← Circle(G_O)
    end while
```

Figure 4: Pseudo code for cyclic inheritance of GDR

5. PROPOSED WORK

The proposed technique used for stable semantic measurements based ontology consists of three phases. In Phase 1, spawn a GDR for each concept in a given ontology by recursively applying a series of derivation. In Phase 2, utilize the integration operations to merge multiple GDRs to produce an initial integrated GDR for the given ontology. In Phase 3, spawn the complete GDR representation for the given ontology by treating those relations that cause unstable semantic measurements, such as the problems of non-direct transitive relations, cycles of inheritance, and double counting. Three original contributions: Elucidate the concepts of semantic measurement and stable measurement and develop a graph derivation representation (GDR) based approach, which recursively transform an ontology to its GDR by a series of derivation rules. We suggest two classes of GDR treatments to polymorphism of ontology representation for automatic and reliable measurement and comparison of the structural semantics of ontologies. We provide the formal analysis of the important properties of GDR. A GDR based graph isomorphism approach is also used to stably compare the similarity of two ontologies.

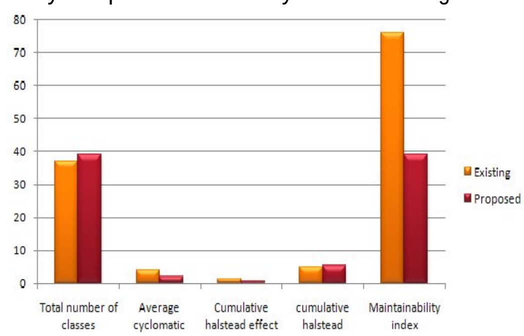

Figure 5 : Comparison of ontologies

6. RESULTS AND DISCUSSIONS

The effort of constructing new ontologies can be significantly reduced by reusing existing ontologies instead of starting from scratch. The reuse of ontology is its potential to significantly facilitate the data interoperability in heterogeneous information systems by sharing a common ontology. An ontology-based measure utilizing taxonomical features without using tuning parameters to weight the contribution of potentially scarce semantic features. A similarity function is used to determine similar entity classes by a matching process based on synonym sets, semantic neighborhoods, and distinguishing features.

7. CONCLUSION

In this paper, we have presented a GDR derivation primarily based approach to stably live and estimate ontologies. By theoretical analysis of the properties of GDR, we have a tendency to show that the GDR of associate degree ontology is semantic-preserving and unique in terms of labels, connecting structure and isomorphy, that guarantees the stable linguistics ontology activity. Finally, the proposed work analyzes and measures the utility of GDR approach and compared the GDR with standard graph models (GM).

First, the GDR approach offers stable and reliable linguistics live of ontologies and provides a possible answer for machine controlled ontology comparison and commotion. Second, the commotion and comparison supported GDRs area unit a lot of helpful and substantive for the ontologies with an outsized range of advanced concepts. Thus, the GDR primarily based approach may also be used as a complementary mechanism by the present ontology measurement approaches. The additional exploration shows that new ways for ontology can be used to semantically clean and upgraded structures in GDRs.

The proposed system is only used to compare the ontologies but not considered the incomplete and noisy data. This work can be further extended to uncertain data cleaning process through Fuzzy Demission Tree Induction Algorithm.

REFERENCES

[1] Maedche and S. Staab, "Measuring similarity between ontologies," in *Proc. 13th Int. Conf. EKAW*, Sigüenza, Spain, 2002, pp.251–263.

[2] M. Nagy and M. Vargas-Vera, "Multiagent ontology mapping framework for the semantic web," *IEEE Trans. Syst., Man, Cybern. A, Syst., Humans*, vol. 41, no. 4, pp. 693–704, Jul. 2011.

[3] Y. Qu and G. Cheng, "Falcons concept search: A practical search engine for web ontologies," *IEEE Trans. Syst., Man, Cybern. A, Syst., Humans*, vol. 41, no. 4, pp. 810–816, Jul. 2011.

[4] L. Razmerita, "An ontology-based framework for modeling user behavior-A case study in knowledge management," *IEEE Trans. Syst., Man, Cybern. A, Syst., Humans*, vol. 41, no. 4, pp. 772–783,Jul. 2011.

[5] S. Tartir, I. B. Arpinar, M. Moore, A. P. Sheth, and B. Aleman- Meza, "OntoQA: Metric-based ontology quality analysis," in *Proc. IEEE ICDM Workshop KADASH*, 2005.

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