

A Survey Of Ontology Evaluation Techniques For Data Retrieval

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Abstract: *Ontologies are used in various fields such as knowledge management, information extraction and semantic web. From the point of view of a particular criterion of application, the problem mainly faced is to determine that which of the ontologies would best suit a particular problem. The (re)use of ontologies without anomalies is a critical point in the industrial area in order to produce successful projects; hence the selection of an evaluation technique is mandatory. This paper presents the comparison of various evaluation methods based on different parameters that will help the users to select the best one based on the situation they are in.*

Keywords: Ontology, Information extraction, reuses.

- Data-driven based evaluation

I. INTRODUCTION:

Ontology is a representation or model of knowledge, a “formal, explicit specification of a shared conceptualization”. The ontology is usually described in a particular formal language and must match the syntactic requirements of that language. There are six basic methods for ontology based evaluation:

1. .Onto metric based evaluation:
2. Natural language based evaluation:
3. Onto Clean based evaluation:
4. Eva Lexon based evaluation:
5. Data Driven based evaluation:
6. Task based evaluation:

The remainder of this paper is organized as follows. Section II, explains various methods for ontology evaluations. In section III, a tabular method that

presents a comparison between various parameters. Finally a conclusion of this paper is drawn in section IV.

II LITERATURE SURVEY:

This sections gives a brief introduction about various techniques along with the uses and the important parameters. The techniques that are presented are as follows:

- Onto-metric based evaluation.
- Natural language based evaluation
- Onto-clean based evaluation
- Eva-lexon based evaluation

A. ONTOMETRIC BASED EVALUATION

The onto metric based evaluation is based on the Analytic Hierarchy Process (AHP), that is a multicriteria decision method. It presents a set of processes that the user is expected to carry to obtain the measures of stability of existing ontologies. The Fundamental aspect for choosing ontology is basic decision criteria. The following are the features specified using the dimensions.

- The ontology’s content.
- The language used in the ontology.
- The methodology followed to develop the ontology.
- Software environments.
- Costs.

The objectives and the characteristics are the important parameters when evaluation of the ontology with Onto metrics is concerned. The application of this evaluation technique includes ontology-based applications, web servers, complex multi criteria decision making This method helps to justify decisions taken, to “clarify ideas”, and to weigh up the advantages and the risks involved in choosing one ontology from other options[2].

B NATURAL LANGUAGE BASED EVALUATION

The natural language based evaluation is completely based on ontology population and semantic metadata creation. Ontology population includes populating an ontology of concepts with instances drawn from textual data. The second, semantic metadata creation involves associating the text with the correct concepts in the ontology. Natural

language applications involving ontologies are a relatively new area of research. Methods for ontology evaluation includes

- Precision metrics.
- Recall metrics.
- Cost based evaluation metrics.
- Tennis measure.
- Lexical comparison level measure.

It is the most well known and most used method. The requirement is that it needs to be adapted as a standard for ontology content evaluation. Support for knowledge intensive industries in monitoring information resources on the Web is the main fields where this field is prominent. The evaluation methods specified above are used in industries to compare different systems rather than working on a single system [1].

C. ONTO CLEAN BASED EVALUATION.

Onto Clean based evaluation mainly comprises of formal ontology evaluations. The OntoClean methodology is also based on philosophical notions for a formal evaluation of taxonomical structures. The four major fundamental notions are as follows:

- Rigidity.
- Unity.
- Identity.
- Dependence.

The main focus of this method is to help the users to clean the taxonomies. It provides structural and fundamental insight into the model. The relevance and usage if this model for the industry use is very limited. It requires specific training and it should be planned. The main application of this evaluation method is to clean the upper level of the WordNet taxonomy [4].

D.. EVA LEXON BASED EVALUATION:

It basically consists of professional services of an IT-company embracing semantic web technology. It helps in tuning ontologies for the customers. It consists of an automated evaluation procedure that makes it easy for a laymen. This evaluation method is applied on the results of automatic ontology mining techniques that aims to create ontologies, and not to populate ontologies with instances, thus making it an “automated” process. The life cycle of the

- The scope of the vocabulary
- The wellness of the taxonomy.
- The adequacy of the non-taxonomic relations.

It also consists if the following processes: insertion, deletion and substitution. It is used for quantitative evaluation that provides bootstrapping approach. The major application of this method is to tag any ontological relation[6].

evalaxon based evaluation consists of the pre-modeling stage. It basically works at linguistic level. The main application of this ontology based evaluation method is at the industrial level [2][5].

E. DATA DRIVEN BASED EVALUATION:

This is the most prominent method. In this the data is compared with the existing data. This availability of the previous data is the pre-requisite for this evaluation technique. The architecture includes the following parameters.

Identifying keywords/terms.

This is essentially a form of automated term recognition, and thus the whole panoply of techniques existing can be applied (Maynard and Ananiadou, 2000). In our simple test case we applied Latent Semantic Analysis (Hofmann, 1999) and used a clustering method.

Query expansion.

.Because a concept in the ontology is a compact representation of a number of different lexical realizations in a number of ways, it is important to perform some form of query expansion of the concept terms. In our test case, we used WorldNet to add two levels of hyponyms to each term in a cluster. There are other ways to expand the a term using (for example) IR techniques.

Ontology Mapping.

Finally, the set of terms identic- feed in the corpus need to be mapped to the ontology.

BREWSTER et al is the application that used the data driven based evaluation. It extracted a set of relevant domain-specific terms from the corpus of documents, using latent semantic analysis[3].

F. TASK BASED EVALUATION:

The task based evaluation helps to employ a number of different ontologies and to measure their performance on specific tasks. The maximal

evaluation of ontology can judge an ontology at least on three basic levels based on the task based evaluation:

This section mainly elaborates and tries to give an overview of various differences on the key parameters of different techniques. Table 1 below illustrates and contrasts between various parameters. Based on the uses specified the reader will be in a better position to select a particular method.

Table 1: Comparison of various methods

IV. COMPARISION

SR NO	Methods for Ontology Evaluation	FOCUS	Key parameters	Prerequisites	Uses	Lifecycle stages
1.	Ontometric based evaluation [2][5]	Helps the users to choose the ontologies for the new project.	Objectives , characteristics	Analytical hierarchy process(AHP)	ontology-based applications, web servers, complex multi-criteria decision making	After ontology release
2.	Natural language based metrics [1]	Helps the users to evaluate the content of the ontologies.	Ontology population, semantic metadata creation.	Semantic comparison approach, cost based metric, lexical comparison measure.	Precision and Recall for prediction.	Pre-modelling stage except Maedche's string matching measure for lexical comparison.
3.	OntoClean based approach [4]	Helps the users to clean the taxonomies.	Rigidity, unity, identity, Dependence	a set of axioms, constraints ,guidelines , taxonomy of properties	supporting method to ensure formal correctness	1.Pre-modelling stage . 2.Modelling stage.
4.	Eva Lexon based approach [2]	Helps the users to create ontologies and not to populate them.	Simplicity of the text	A corollary of Zipf's law, statistical formula to compare two proportions	Ontology mining, industry	Pre-modelling stage
5.	Task based approach [6]	It is used for quantitative evaluation that provides bootstrapping approach.	Insertion, deletion, substitution.	concepts vocabulary, hierarchy/granularity semantic relations	Tagging Ontological Relations	Not Specific
6.	Data Driven approach [3]	Helps the users to select according to the data they require.	Existing data,	latent semantic analysis, keywords/terms. Query expansion	BREWSTER by comparing with the existing data	Not Specific

V. CONCLUSION:

Ontology based evaluation remains an important problem as and when ontology based computing is considered. Various novel based approaches has been proposed. There is no such single method that will be efficient alone. No one rather can predict what method will be apt, suitable for the problem. In our view, we would like to propose an automated system that will not only provide ease but also an efficient way to compute the output.

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