

Semantic Web Based Ontology Development using Cloud Environment

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Abstract— The Ontology is the main issue of semantic web architecture as the model of knowledge and recognition of knowledge. In this approach, ontology modeling for the semantic web based on cloud environment has been proposed. First step involves, the process of creating cloud model on ontology is presented. Second step involves, semantic web is used to express ontology from concept cloud climbing-up. Third step, analysis are done based on air conditioner performed in knowledge representation. The result provides the accurate value to create domain ontology in terms of cloud model.

Key words: Ontology Modeling, Cloud Model, Domain Ontology & Semantic Web

I. INTRODUCTION

In today's world the internet is been used by every person. Internet and the World Wide Web (WWW) are technological innovations that have revolutionized the way people access and share information. The WWW can be imagined to be a huge global database, the current size being estimated at more than 18 billion Web Pages. Search engine companies like Google and Bing are constantly working on making web search better. The fact remains that users still have to read through the presented links for finding the required information, which is often difficult due to the thousands of documents/links returned in response to a user query.

With response to this problem, new research initiatives and commercial enterprises have been set up to enrich available information with machine- process able semantics. This support is essential for "bringing the web to its full potential". It is necessary that an effective ontology modeling should be introduced to describe the information in semantic web by cloud environment [5].

II. CLOUD MODEL

The cloud model is a model of the uncertainty transition between qualitative concept and quantitative description. In the real spatial world, there often exists more than one uncertainty at the same time, which has to be handled during the process of uncertainty-based data mining. Given some conditions, the certainties and uncertainties can be transformed one another. The precise entity in the macro-world may become uncertain in the micro-world. An inexact entity at a certain extent has arrived at some precision when the cognition is enough to match the decision-making.

Assume that U is a quantitative universe of discourse which is described by a precise value, $X_m U$, and T is a qualitative concept in the universe of U. If the certainty $CT(x) \in [0, 1]$ of element x ($x \in X$) attached to T is a tendency to a random number (Equation 1), then the distribution of concept T mapping from U to region [0, 1] in universe of discourse is known as cloud.

$$CT(X): U \rightarrow [0, 1] \quad \forall x \in X \quad (X \in U) \quad XL \quad CT(X)$$

The cloud model has three digital attributes: Expected value (Ex), Entropy (En) and Hyper-Entropy (He), which will integrate the fuzziness and randomness of spatial

concepts in a unified way. Fig. 1 shows a digital attributes of cloud model, which Ex is 0, En 3 and He 0.3.

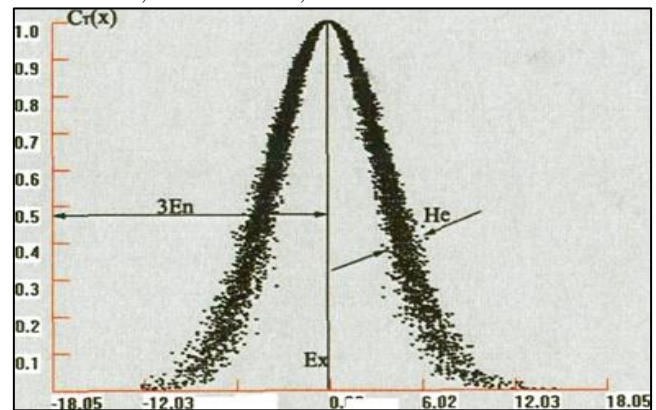


Fig. 1: Digital Attributes of Cloud Model

In the universe of discourse, Ex is the position corresponding to the center of the cloud gravity, whose elements are fully compatible with the spatial linguistic concept; En is a measure of the concept coverage, i.e. a measure of the spatial fuzziness, which indicates how many elements could be accepted to the spatial linguistic concept; and He is a measure of the dispersion on the cloud drops, which can also be considered as the entropy of En. Because a large number of random phenomena obey normal distribution in nature, normal cloud model [6] is constructed firstly, and its universality has been proved [7]. Now the cloud model has been applied in an increasing number of fields.

III. ONTOLOGY MODELING

The semantic information retrieval based on ontology utilizes the ontology to standardize and formalize the user's query request and the description of resources. By means of mapping the information resources into the local ontology and dealing with the semantic reasoning we can fully exploit the relationship contained in the resources, and then solve the problem with the resources object lack of semantic information fundamentally in order to content the user's retrieval requirement.

In this section, above all, we give a discussion on the existing framework of the semantic web. After that the domain ontology modeling based cloud model will be presented. In addition, the critical step in the process of ontology modeling is also introduced.

Semantic web is not a completely new type of web, but an expansion of the existing web. In the environment of semantic web we can define the semantic information of the resources well, so that the machine is able to comprehend and deal with the information on the web automatically. Information retrieval as the most important and direct way to use the web resources implies that improving the process of the query transaction is a powerful and effective means to make effective use of web resources [8].

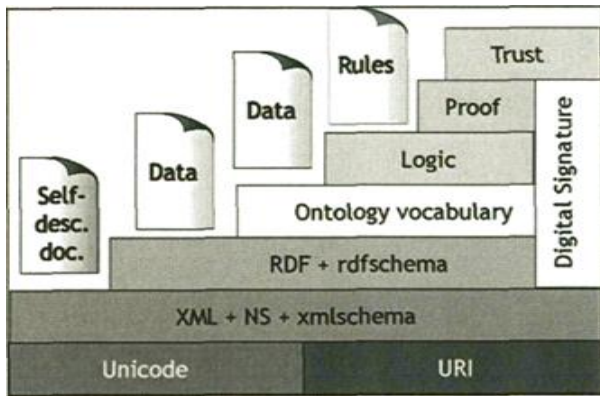


Fig. 2: The Architecture of Semantic Web

The framework of the semantic web proposed by Berners-Lee in 2000 includes 7 layers [3]. As shown in Fig. 2, URI and Unicode layer are the basic means of identifying semantic web objects and using the unified international character sets. XML, name space and XML Schema define the interoperability standards of the semantic web. RDF and RDF Schema (both are known as the RDF (S)) are used to describe and define the semantic web resources. Ontology layer are used to define the relationship between different concepts, which also supports the evolution of vocabulary. Logic layer provides a framework to describe the rule-based system. Proof layer carries out the rules and makes the corresponding assessment. Trust layer provides detection mechanisms for the application whether to trust a given proof or not. Digital signatures and encryption technology are used to strengthen the security of the web. The current information resources on web are mostly decentralized semi-structured (XML) or unstructured (Html) documents. Information resources are not noted by the semantic web standard. The query request cannot content well. The semantic information retrieval system based on ontology implements the information retrieval at the semantic aspects (levels) by means of analyzing the semantic explanation of the user's query request and dealing with the document structure.

IV. DOMAIN ONTOLOGY MODELING

The goal of ontology modeling is to pick up the common knowledge of the given area and provide the explanation of the area above in common in order to confirm the approved glossary in the area. Given the clear definition of the glossary and the relationships among them according to different layer of the formalized model, it can implement the reasoning of domain knowledge. From the perspective of knowledge-sharing ontology can be viewed as the set of concept definitions which serves as a common communicate language between different kinds of the knowledge system.

In the practical applications based on ontology, it is a fundamental task to create ontology. Taking the requirement of the special area and the situation of the concrete project into account, the process of the ontology modeling is different corresponding to the factors above. At present, there is not a standard method to create ontology, but in the course of the ontology creating practice, researchers sum up some useful principles used to guide the ontology modeling. As the same as the above mentioned, the methodology of the ontology modeling is also not mature so

different project should depend on different method according to its real circumstances. Guided by the principles and the methodology of the ontology modeling, the process of creating ontology is generally divided. By now, we illustrate the framework of creating ontology, which describes the sequence step of the creating process. In that the creating process of the ontology is an iterative process, it is imperative to fill in the outline of the primary framework for the ontology modeling in order to renew the details. In the next section, the critical process concept climbing based on cloud model will be introduced.

V. KNOWLEDGE REPRESENTATION OF AIR CONDITIONER MODEL

The knowledge representation model for the air conditioner style includes three layers such as the air conditioner style layer, the attribute layer corresponds to its style, and the parameter layer corresponds to its attribute. Fig. 3 shows the model of air conditioner style knowledge.

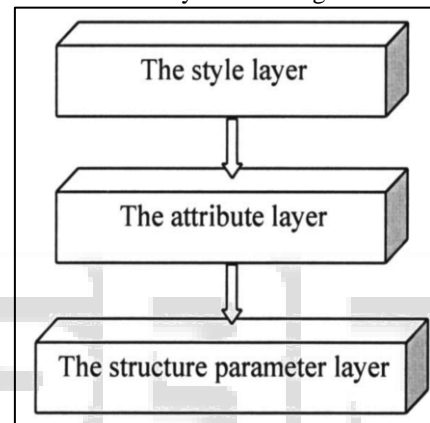


Fig. 3: Knowledge Representation of Air Conditioner Style Knowledge

VI. CONCLUSION

The process of the concept climb based on cloud model reflects the creating process of the domain ontology which can express clearly the inheritance relationship between the concepts in the given area. There are more than one kind of relationship between the concepts extracted from the research domain while the inheritance relationship viewed as the most general and important kind of relationship. In the above experiment just one kind of the attributes is used to describe the process of concept climbing based on one dimensional cloud model. Generally speaking, the category of the concept depends on more than one kind of the attributes so that two or more than two dimensional cloud model are needed to express the process of concept climbing. The definition of concept climbing originated from data mining area as a result studying further the connection between cloud theory and data mining from the ontology modeling point will be a well direction of how to improve the ontology creating method.

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