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Construction for Research Paper Selection Ontology using Protégé

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Abstract

Nowadays the information retrieval system mainly based on topic based classification or text matching keywords. These keywords may return a vast amount of irrelevant information, and it does not successfully meet the user's exact requirements. To overcome this problem, semantic environment is developed, and a technique named ontology is used. This paper constructs the ontology for selecting the research papers in both 'computer science' and 'others' domain which is named as research paper selection ontology(RSO) using the tool protégé 4.3.

Keywords – ontology, protégé, class, properties, individuals, hermit

INTRODUCTION

There is vast amount of data in World Wide Web, to search the expedient information from this vast data is highly challengeable today. The Web 2.0 is mostly based on keyword search as it matches the keywords from the given data. This model fails to give the actual semantic information in some case. To overcome this issue, Web 3.0(W3C) is been proposed by Tim Burner's Lee and named as semantic web.

As Tim Burner's Lee says, "The semantic web is an extension of the current web in which information is given well defined meaning" [1]. The data in semantic web are elucidated by machine, that Web 2.0 fails to do. To explain the data by machine Ontologies are used [2] for storing the semantic web. It defines domain, concepts and relationship between them and thus afford a domain language that is meaningful to both machines and humans. The Web Ontology Language(OWL) is widely accepted as a standard language for sharing web contents [5] and implemented by protégé OWL. It is used to construct a knowledge base repository that can be used with various text mining process for concept extraction and can give support to construct the automatic information learning system.

For many research funding agencies, international journals, national journals, such as either government or private agencies, the selection of research project proposals is an important and challenging task, when large numbers of research proposals are collected by the organization in manual manner. The objective of this paper is to help these funding agencies, journal publications and etc., to get started with the semantic web by creating the research paper selection ontology(RSO) so that the selection process becomes an easier way.

Ontology

Ontologies are the main core part in semantic web. Tom Gruber defines the ontology as "a set of representational primitives to domain a, model of knowledge or discourse". The ontology leads an easier software and knowledge maintenance, and contributes to the semantic interoperability between applications [3]. On Semantic Web, vocabularies defined the concepts and relationship(terms) used to describe and represent an area of concern. The word 'ontology' is referred as same as vocabulary whereas it is used for more complex, quite formal collection of terms.

Chapter Organization

The paper is organized as follows: In section 2, related works are represented along the comparative views of ontology editors. The proposed approach on constructing the research paper selection ontology(RSO) is given in section 3. The section 4, shows overall visualization of RSO. The conclusion and future work, is discussed in section 6 and followed with references.

RELATED WORKS

The ontology has been created in various domain. The main advantage in ontology creation is it has no procedures for construction. The developer shall erect ontology based on their own ideas and their appropriate domain. This section described the development of ontology for the domain of poultry science using protégé. The goal of this paper is to help poultry projects to get started with semantic web technology. This paper describes the classification of poultry science among the domains involved in it using protégé. This also defines the classes, properties and features such as reasoners to check semantic consistency. Under this construction of framework of ontology, the doctors and other technicians who involved in the domain will achieve a mass of both the linguistic information and the context-based knowledge information that has been demonstrated [7]. Nishchol et.al, generates the ontology for university domain. This paper explains the terms of university through university ontology [15]. They focus to create an ontology for their graduating university as the ontology creation has no protocols to follow so this author tries to develop the university ontology to get the accurate information about their university [9].

The objective of this paper is constructing ontology for online

ontologies. Reuse of existing ontologies offers a much cheaper alternative than building new ones from scratch, yet tools to support such reuse are still in their infancy. This paper presents a fresh view on constructing ontologies automatically, by identifying, ranking, and merging fragments of online ontologies. The idea is based on reusing the increasing number of online ontologies to build new ontologies, rather than the current costly habit of starting from scratch [10].

David shotton, present his ideas on CiTO, the Citation Typing Ontology, it is an ontology labelling nature of reference citations n research articles and scholar works. The citation is described in terms of factual relationships between citing publication and cited publication. This paper describes CiTO and illustrates its usefulness both for the annotation of bibliographic reference lists and for the visualization of citation networks. CiTO is written in the Web Ontology Language OWL [11]. Obrst et. al., builds an ontology of cyber security. The cybersecurity shows the unique challenge to the situation awareness of users and analysts, since it is a unique combination of human and machine elements, whose complex interactions occur in a global communication network [12]. Maria Golemati et. al., creating ontology on user profile. This work aims at creating a user profile ontology that incorporates concepts and properties used to model the user profile. This ontology can be used as a reference model, in order to alleviate the aforementioned issues [13].

Ontology Editor – Protégé

Protégé is a free, open- source editor for developing the ontologies is produced by Stanford university. It is a java-based application (multi-platform). It also has the plug-ins like ontoViz; (i.e.,) downloaded as GraphViz, so that the end-user visualizes the ontologies. The backbone of protégé is that it supports the tool builders, domain specialists and knowledge engineers. This is the difference between the existing tools and protégé, whereas in existing they targeted only at knowledge engineers and lack of flexibility in meta- modeling. [7]

Jorge Cardoso [4] undergoes the survey on most widely used editors and conclude that protégé tool is used by 68.2% users. The results clearly point out that Protégé is ahead of all other editors. Fig.1 shows the comparative view of editing tools for ontology.

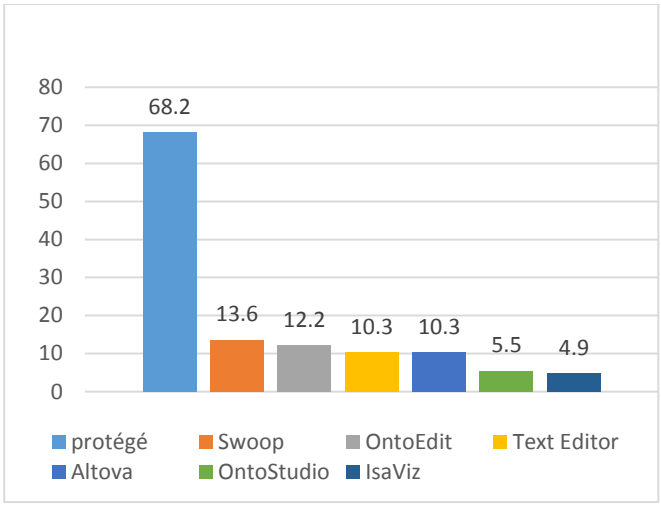

Figure 1. Comparison of ontology editors

PROPOSED WORK

In this paper, the proposed work is done on development of Research Paper Selection Ontology(RSO) using Protégé 4.3.0 tool. The Semantic Web can be observed as a network of ontologies and other Web resources. An OWL ontology can be regarded as a network of classes, properties, and individuals. These concepts can have references to concepts in other ontologies [5].

Class hierarchy

The first step to complete on ontology construction, is OWLclasses tab. Classes(instances) defines names of the relevant domain and their logical characteristics. Classes may be organized into a superclass-subclass hierarchy, which is also known as a taxonomy. Subclasses specialize (‘are subsumed by’) their superclasses. [6]

In this work, there are two classes named as ‘Computer Science’ and ‘Others’ and the subclasses are created as data mining and cognitive science on behalf of ‘Computer Science’ and marketing and electronics for ‘Others’. Fig. 2 shows the class and subclasses for Research Paper Selection Ontology(RSO).

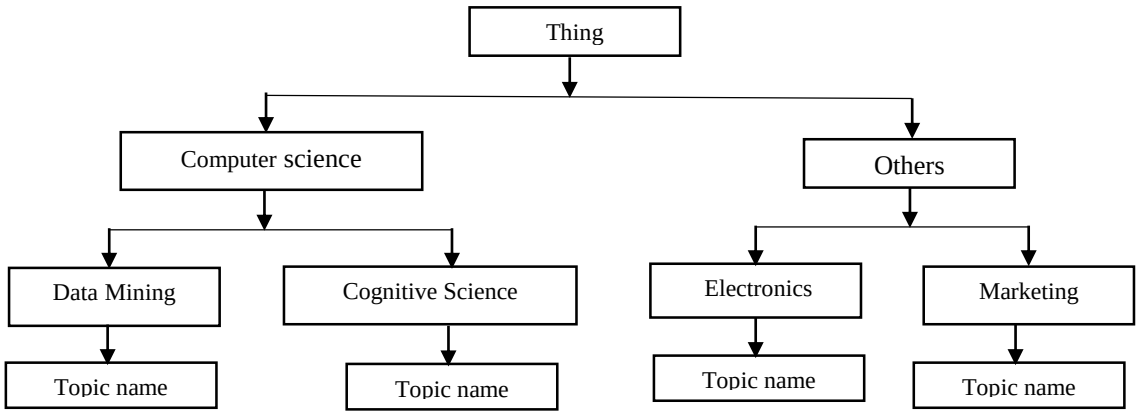

Figure 2. RSO class

Properties

Properties (sometimes also called slots, attributes or roles) define the relationships between classes, and allow to assign primitive values to instances. Properties are binary relations on individuals - i.e. it links two individuals together. It has two types- data property and object property. Object property is a relationship between instance and data values. It can store references to individuals or classes from the ontology. Data property supports enumerations of symbols (owl: oneOf), and all reasonable XML Schema datatypes, grouped into booleans, floats, integers, and string types, and it gives the relation between instance and individuals.

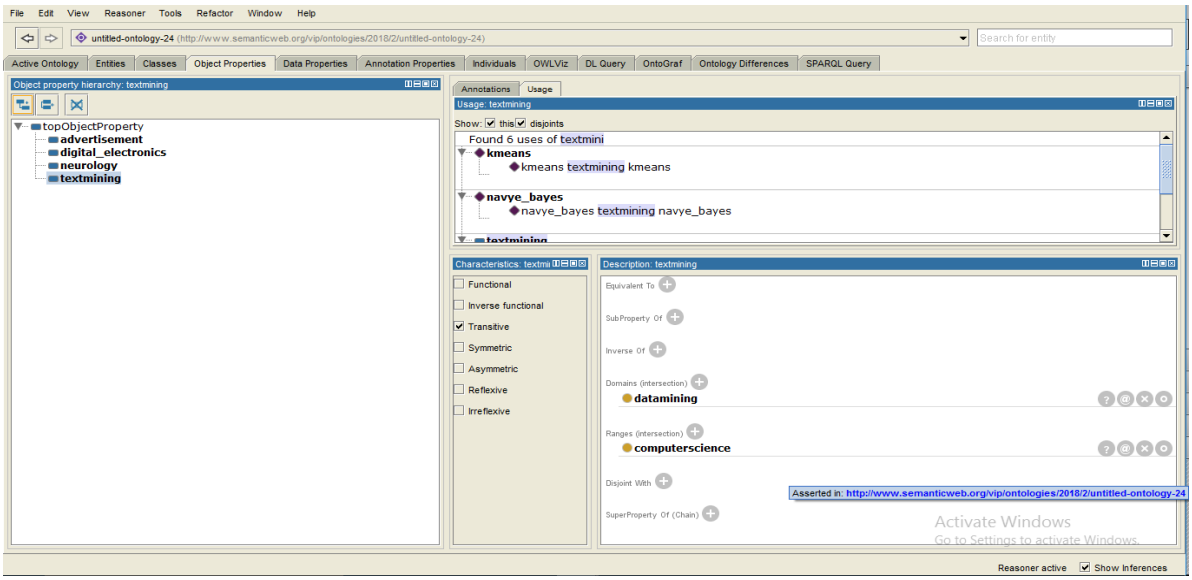

Figure 3. Representation of object property

The properties have a domain and range specified. It links individuals from the Domain to individuals from the Range [6]. If an individual is the Subject(Domain)of a relation using this property, then it must be a member of this class. If an individual is the Object(Range) of a relation using this property, then it must be a member of this class. In this paper, there are object property as advertisement, neurology and text mining with the property characteristic as transitive. Fig 3 shows the representation of object property.

The data property as classification, clustering, cognitive architecture, media and telecommunication. The characteristics of these property is functional.

Individuals:

Individuals used to represent the objects in domain and also known as domain of discourse. Fig 4 shows the individuals of research paper selection ontology(RSO).

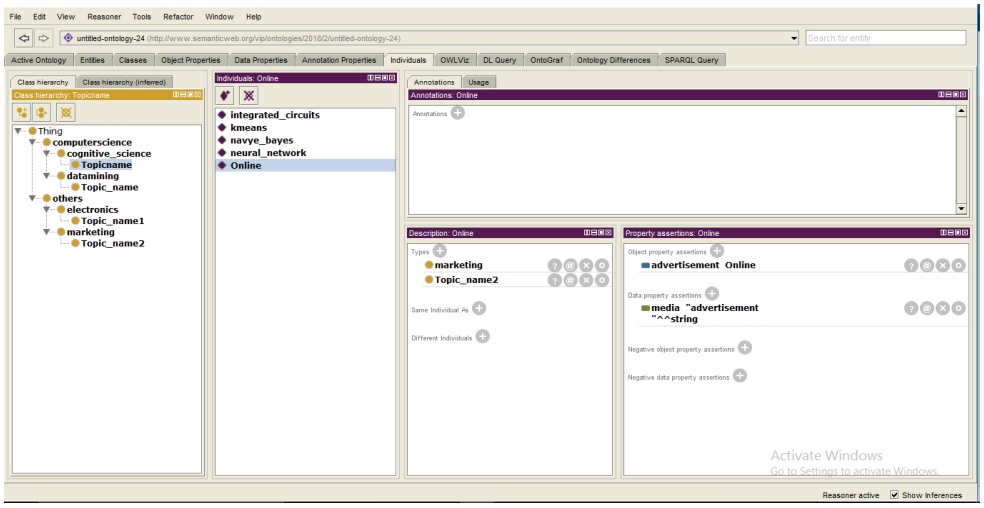

Figure 4. Individuals of RSO

Reasoner process

A reasoner is a program that infers logical consequences from a set of explicitly asserted facts or axioms and typically provides automated support for reasoning tasks such as classification, debugging and querying. The inconsistence in ontology is sensed by reasoner. The tool protégé supports various reasoner. The illegal mistakes developed by the creator are spotted by the reasoner. In this paper, hermit 1.3.8 reasoner is used. HermiT is the first publicly available OWL reasoner. HermiT can check the OWL files to determine the consistency of the ontologies and to identify the hierarchical relationships between the classes. This reasoner is based upon the hypertableau calculus. It also provides the faster process for classifying the ontologies [8].

OVERALL OUTLOOK OF RSO

The ontograph tab in protégé shows the complete view of each classes, subclasses and its members associated with it. This graph also depicts the relationship between each classes. The colors used in this graph distinguish different properties. Fig 5 shows the visualization of RSO. This paper makes a clear note on selecting a research paper, like in class 'Computer Science' the sub classes are cognitive science and data mining and the members are neural network, k-means, naïve Bayes, so that the paper proposals can easily recognize in which group the proposals are belongs to. If the agencies are not aware of specific topic, then they go for 'Topic Name' subclasses.

CONCLUSION AND FUTURE WORK

This proposed work attempts to create an ontology on research paper selection. The research ontology is constructed to categorize the concept terms in different discipline areas and to form a relationship among them. By constructing this ontology, the papers are able to assigned to that appropriate domain through system itself. The future work can provide a way to classify and cluster the research proposals.

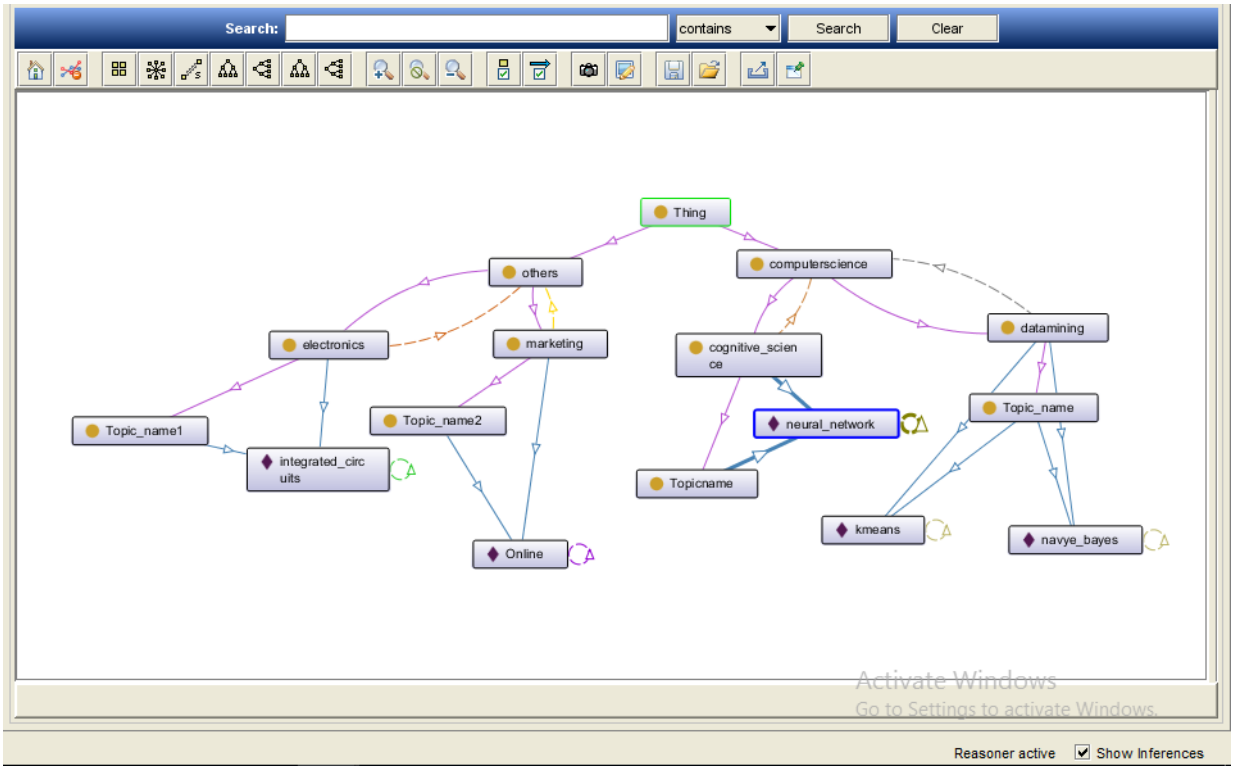

Figure 5. Visualization of RSO

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