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KNOWLEDGE MANAGEMENT AND ONTOLOGY

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Abstract:
The knowledge society characteristic to the XXI century derives from the information society but is more than this and focuses on how information becomes knowledge. Fulminating evolution of this society has enabled intelligent devices (be they desktops, laptops, tablets, smart phones and others) to be part of everyone's life. These tools not only facilitate rapid access to information, which is considered the most valuable thing today but through the multitude of applications, we can ease the decisions we make every day. In this context our approach aims at building an ontology using OWL (Web Ontology Language) and RDF (Resource Description Framework) in economic and a platform for working with ontologies. The platform will be represented by a web application and will allow users to extend an ontology by adding new concepts such as classes, subclasses, individual properties, but also to see ontology as a knowledge graph. Also users will be able to interact with the ontology by interrogating it using SPARQL language. Consequently, I believe that the proposed application is meant to be a useful application for viewing, querying and extending ontologies.

Key words: knowledge, ontology, knowledge graph, OWL

JEL classification: C43, C60

1. INTRODUCTION

Given the rapidity with which information propagates in both online or offline environments, we can say that today's society has become a mainly informational one. This concept, that literature knows as post-industrial world, it is defined as the society in which production and consumption of information is the most important type of activity. Thus, information has become the primary resource and the society has become one digitized in which the way information is used impacts all areas: economic, political, medical, social, cultural, etc. If we look at the educational dimension, then we turn to platforms, E-Learning and E-Practice which relate to the activities of learning, teaching and practice using specific tools and platform computing environment.

The cultural dimension of the Information Society talks about various initiatives in online and offline environment aimed at preserving and developing cultural heritage through digitization. Thus we can speak of virtual museums and galleries, online art exhibitions and more. Not least, it remains the environmental dimension focused on the concept of Green Computing and aims studies to have an impact on resource efficiency and environmental protection.

At the beginning of their development, the knowledge base of the (KBS) Knowledge Based System had been relatively small [9]. That knowledge was meant to solve real problems, not only to demonstrate various concepts, for example, there were not used expert systems for diagnosis general health, but certain kinds of specific diseases [8]. As time evolved, artificial intelligence evolved with it and it began to show a need for modular larger databases, which can be interconnected and integrated. This application has become the springboard discipline "ontological engineering" aiming to design and create consistent database that can be used for various projects [7].

2. LITERATURE REVIEW

An ontology is a catalog of existing concepts in a field. An ontology contains predicates, semantic of concepts and terms, and how they relate to one another. Other recent definitions of ontologies talk about them as a "knowledge graph" [11].

Considering the most cited definition in area, that of Gruber, "an ontology is a specification of a conceptualization of the field" [6].

Depending on the purpose of building ontology there are several construction methods and languages respectively. Ontologies, according to some of the classic definitions may be represented by a dictionary. In order to be used by the Semantic Web ontologies must be used by computers and so must be expressed in languages that they can be understood easily by both computers and humans [10].

Although numerous fine-grained methodologies exist for building ontologies [1] most reflect best practices for settings in which the individuals have agreed to build a particular ontology (as part of an academic research project, for instance). They address only lightly issues such as legal constraints and future usage by individuals that weren't involved in building the ontology.

The main languages used to define ontologies are based on XML [14], a language that is easily understood by computers. RDF (Resource Description Framework) is based on XML syntax [3], which uses a model representation of graphs to formulate statements about resources recognized by URI (Uniform Resource Identifier) [13].

URIs are the primary key value for RDF, meaning that an URI will recognize the unique resource. RDF (Lassila and R. Swick, 1999) aims to provide metadata about Web resources (author, description, date) designs playback of knowledge and allows different applications to interact.

The key element of an RDF document is the triplet. A triplet is a sentence with a subject, predicate and object (property). The resources identified by URIs are subject and predicate, and object is a resource or a unique value.

Through RDF can be represented several types of predefined resources, but can also be created through the extension called RDF Schema. RDF Schema (RDFS) facilitates the creation of instances, properties and classes using RDF syntax. OWL (Web Ontology Language) [5] is a language designed to define ontologies. Is a language that extends RDF's [4].

An ontology has two parts [15]:

- **Tbox: terminal box** - is that part of ontology containing concepts defined by it. Here are entities: ontology classes, object properties, properties associated to data types.
- **ABox: assertion box** - is the part of ontology containing instances of ontology concepts.

The knowledge base and the ontology is linked one to another via the ontology module. In the maintenance stage, knowledge engineers or domain experts can add, update, revise, and delete the knowledge or domain ontology via knowledge acquisition module [2].

When constructing or working with ontologies is preferable to use tools for creating sites with a user-friendly interface. So it is not required advanced knowledge of OWL / RDF, and it is avoided the writing of cumbersome code. One such tool is Protege.

3. METHODOLOGY

Protégé is a platform for developing applications based on knowledge but also an ontology editor. It was designed in Java at Stanford University, being open-source. Among its special features include support for RDF, own format for storing information, a graphical interface for creating ontologies. Through this interface the user can create classes, properties or instances. In addition, the program facilitates the design of inheritance relationships between classes. Relationships can be defined by setting the domain and co-domain of properties. One kind of tools that can be used and perhaps most used is Protégé that allows working with both the online ontologies and the ontologies stored locally. It runs regardless of operating system, with versions for each distribution system.

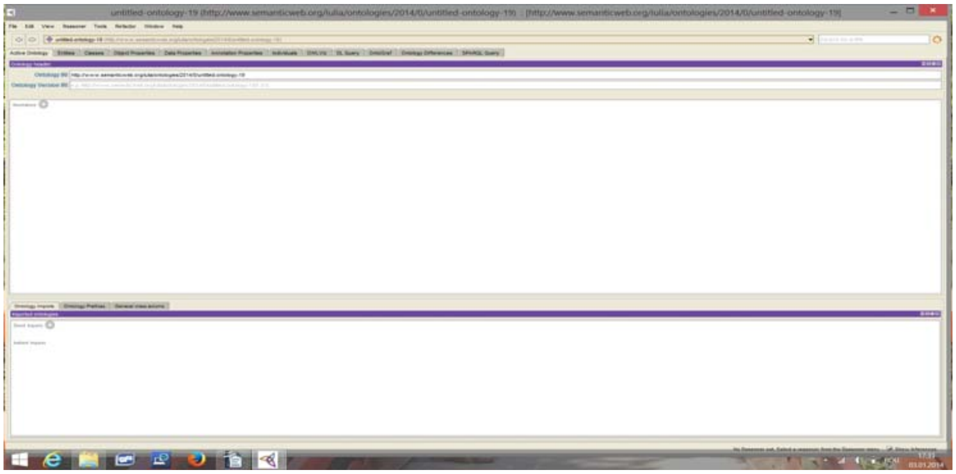

Figure 1. Protégé Tool

Source: http://protege.stanford.edu/download/protege/4.3/installanywhere/Web_Installers/

Figure 1 shows the interface of Protégé. For the visualization of ontology, Protégé program has several tools. As we can see in the picture above the screen has a row of 12 tabs.

By adding plug-ins to Protégé, the user has access to a wider variety of processing options. Clearly, the most used plug-in is the one that facilitates access to OWL language mechanisms. Saving, editing, creating, importing of ontologies in OWL format and work with knowledge base through the JDBC driver in which can be stored ontologies options offered. Ontology structure that we developed (using Protégé) is on the economic field. Ontology consists of classes, subclasses, properties of the data, properties of classes and instances.

The specific technical goals of this scenario are:

- Define an ontology for the economic and financial information domain
- Develop ontology-aware tools for content provision and management
- Develop a hypermedia-based module for content visualization and semantic navigation in web portals.
- Support semantic search in terms of the economic and financial information ontology.
- Include a user modeling component to be used in navigation and search.

To test the app, the ontology was loaded and we tried to expand it by adding instances, properties, and to interrogate knowledge of ontology using SPARQL language.

Three test scenarios will be presented: first scenario is realized adding a new instance, in the second some queries will be written using SPARQL to get relevant information about concepts, and in the third it will be achieved a chart ontology.

The first test scenario: *Adding an instance for a concept.* Next, the steps followed will be accompanied by images.

1. The user fills in the interface the instance name and class name to add the instance.
2. The user clicks on „Add Individual" button and the instance is added.
3. To see the new instance Protégé can be used or it can be written a SPARQL.

The second test scenario: *Writing SPARQL queries.* In this test scenario two SPARQL queries will be written.

1. The user will write the first query that will return all instances. Because it is a Select query type, it will be pressed the Select Query button.
2. The user will write the second query that will return if the ontology includes information's. Because it is a query type Ask, it will be pressed the Ask Query button.

Remember that Ask queries will always return a Boolean result: true or false.

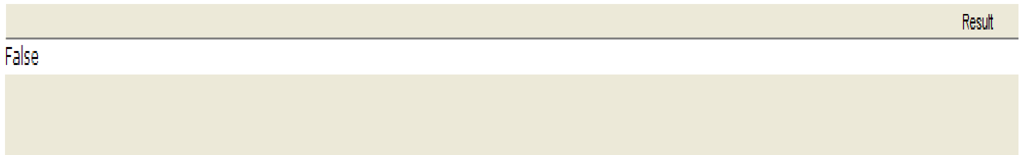

Figure 2. Query result

The third test scenario: *Generating the ontology graph.* To obtain the graph, the user will perform the following steps:

1. Will click on the button Generate Graph.
2. The user chooses the appropriate json file corresponding to the owl file and click

Initially, the chart will only have Thing object. To expand a concept (view subclasses) or to narrow a concept (view superclasses), the user will have to click on that concept.

4. CONCLUSIONS

The most important role of ontology in knowledge management is to enable and to enhance knowledge sharing and reusing. Moreover, it provides a common mode of communication among the agents and knowledge engineer. However, the difficulties of ontology creation are claimed in most literature. Thus, this study focuses on creating ontology by adopting the knowledge engineering methodology which provides tools to support us for structuring knowledge.

Classical methods of storing information gradually become history. In a century where Internet access and computer ownership is commonplace, it is more useful for an encyclopedia or a dictionary to be electronically

Modern society has a large amount of information from all areas to be used correctly to get the benefits. Thus, through ontologies we can obtain the desired information in a timely manner.

Ontologies are a step forward in the development of artificial intelligence, the knowledge base freeing and facilitating the development of new programs that simulate human behavior. Huge effort to transform the Wikipedia information in ontologies in DBpedia knowledge base signals transition to a new phase of web exchange information.

SPARQL allows quick retrieval of information formalized in a knowledge base. Given that information becomes available in a formal way such language allows easy browsing via their existing information. SPARQL language is a query language for RDF triple sets offered by Jena, RAP, Redland. It offers support for handling RDF construction. Provides operations on RDF graphs and it is software platform independent.

SPARQL, associated with organizational ontology can be useful in an economic enterprise, enabling the user to control the relationships between agents, their work, the tasks they have to perform. Importantly, unlike a common database of companies, this ontology is a model of organizational framework, model that can be manipulated depending on the entity's requirements.

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