The Organizational Environment - The Importance of Data

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Abstract

This paper proposes to present both theoretical and practical aspects related to the importance of data and knowledge in the organizational environment.

In this sense, theoretical aspects related to knowledge-based systems, their components, methods and techniques of working with the help of knowledge, the concepts of knowledge processing and their development, respectively the most complex part of the work, the processes of creation, processing and development of ontological data.

The ontology created in the web language Owl/Rdf proposes an interesting approach to the organizational environment of an entity. The Ontosparql program aims at a dynamic processing of the knowledge embedded in the ontology, facilitates obtaining information about Protege, Semantic Web, XML, Dbpedia.

Key words: organizational agents, ontology, knowledge, Class instances
J.E.L. classification: M1, M15, M21

1. Introduction

A computer that learns to understand the language used by humans through interfaces and can improve sensory perception, giving the impression that it is in contact with humans can be called an intelligent computer. In order to cope with human-specific tests, the computer needs a huge amount of information, not from a single field but from several fields related to the respective tests.

Both intelligence and information cannot be separated, they must be seen as elements that complement each other. Although people have the ability to provide useful information, showing intelligence and competence, they are still limited in knowledge unlike an intelligent system, which can sum up more knowledge both from one field and from other fields having a much larger beach of knowledge.

Considering the extraordinary advances of recent times, such as cars that do not require human drivers, computers that break the record at Jeopardy (IBM, Watson), Siri, Google Now, Cortana - they are evidence of the use of knowledge, based on exorbitant investments , all starting from an organized knowledge base with a construction that facilitates easy user access.

2. Literature review

In the specialized literature there are different approaches to knowledge representation methods, so according to the studies carried out by Robert MacGregor (Robert, 1991, p.65) the main representation models are: the formal logic model, the production rules model, the structured knowledge model and the of uncertain knowledge (semantic networks).

According to Luger (Luger, 2008, p.76) there is a degree of uncertainty attributed to the information taken from different databases, specialized materials, expert courses. There may be erroneous references, incomplete information or information that is already included in another specialized field.

According to Ron Brachman (Brachman, 2008, p.132), among the first concepts of knowledge representation were semantic networks, falling into this category are data structures and algorithms for general fast search.

The following concepts that were developed were represented by frameworks and rules. The structural language had different mechanisms for expressing and fitting the components in the data structure, through slots. Slots are analogous to relationships in entity-relationship modeling and properties in object-oriented modeling.

The period and area of development of knowledge representation methods overlapped strongly with that of research on data structure and algorithms associated with computer science.

In early systems appears the programming language LISP, modeled after the lambda calculus concept, being "a formal system of mathematical logic used in expressing calculations based on abstract functions, using connection between variables and substitution" (Stuart et al, 1995, p.230) .

Two concepts about which Ron Brachman states that understanding and applying them is essential, are meta-representation and incompleteness (Brachman et al, 2004, p.69).

According to R. Brachman and H. Levesque (Brachman et al, 2004, p.87) "Meta-Representation - in the field of computer science it is called "reflection". It refers to the ability of a system to have access to information regarding its own state. A good example of this would be Smalltalk's meta-object protocol or CLOS, which gives developers access to the object class and empowers them to redefine the database structure dynamically, right at runtime."

Also Brachman and Levesque (Brachman et al, 2004, p.135) define "Incompleteness - Traditional logic requires additional axioms and constraints to face the challenges of the real world, unlike the world of mathematics. It is also useful to associate a certain degree of confidence with a statement, for example the phrase: "Pythagoras is a man", with a degree of confidence of 50%, is more relevant than "Pythagoras is a man". This was among the first innovations in expert systems research, which developed by adding commercial tools and the ability to associate trust factors with rules and conclusions. In more recent studies they have called this technique: "fuzzy logic".

3. Research methodology and findings

Ontologies

At the beginning of their development, the knowledge base of SBCs was relatively small This knowledge was intended to solve real problems, not just to demonstrate different concepts For example, expert systems were not used for general medical diagnosis, but for certain types of diseases specific.

Over time, artificial intelligence evolved and with it, there was a need for larger, modular databases that could be interconnected and integrated, so what we call "ontological engineering" appeared, which aimed at the design and creation of databases consistent data that can be used for various projects (Berton et al., 2015, p.69).

Depending on the purpose of constructing the ontology (Frederick et al, 2002, p.139) there are several construction methods and respectively languages. Ontologies, according to some of the classic definitions, can also be represented by a dictionary. However, to be used by the semantic web, ontologies must be used by computers and thus must be expressed in languages that both computers and humans can easily understand (Ongenae et. al, 2013, p.125).

The main languages (Ivanovic, 2014, p.89) used to define ontologies are based on XML, a language that is very easily interpreted by computers. RDF (Resource Description Framework) is based on XML syntax, which uses a graph representation model to make statements about resources recognized by URIs (Uniform Resource Identifier).

URIs have a primary key value for RDF, meaning that a URI will uniquely identify a resource. RDF is intended to provide metadata about web resources (author, description, date) or knowledge representation models and allow different applications to interact.

The key element of an RDF document is the triplet (Jussi, 2004, p.167). A triplet is a sentence with a subject, predicate and object (property). The resources identified by URIs are the subject and predicate, and the object is a single resource or value.

Through RDF, several types of predefined resources can be represented, but new types of resources 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 is a language designed to define ontologies. It is a language that extends RDFs.

Protege designed in Java, at Stanford University being open-source, is a platform for the development of knowledge-based applications as well as an ontology editor. This platform stands out for a series of particularities, among which we highlight the support for RDF, its own format for storing information, a graphic interface for creating ontologies. This graphical interface allows the user to create classes, properties or instances, facilitating the design of inheritance relationships between classes, and relationships can be defined by setting the domain and co-domain of properties.

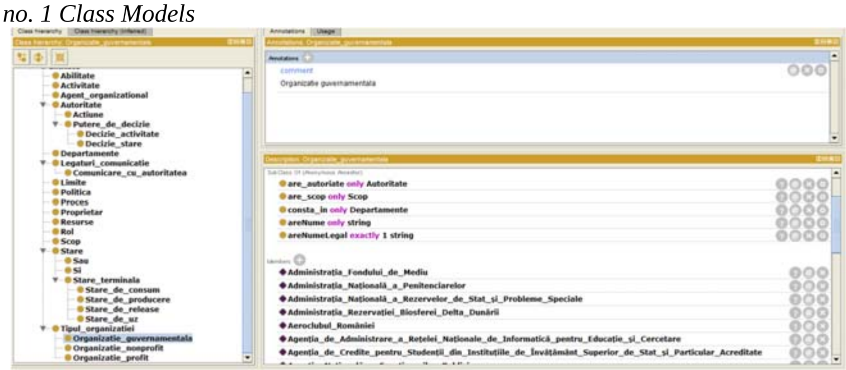
By adding plugins to Protege, the user has access to a wider variety of processing options. Certainly, the most used plugin is the one that facilitates access to the mechanisms of the OWL language. Saving, editing, creating, importing ontologies in OWL format but also working with knowledge bases through the JDBC driver in which ontologies can be stored are the options offered by it.

Organizational ontology

Any type of economic entity is based on departments, a grouping of organizational agents (members of a department or subdivision), a set of roles that members play in the organization, and a set of goals that members try to achieve. In addition to goals, there is a set of constraints on the activities carried out by organizational agents. Thus, with the help of Protégé, we created an ontology that sums up the elements of an organizational economic environment and the relationships between them. The ontology consists of classes, subclasses, data properties, class properties and instances.

a) Classes

Figure no. 1 Class Models

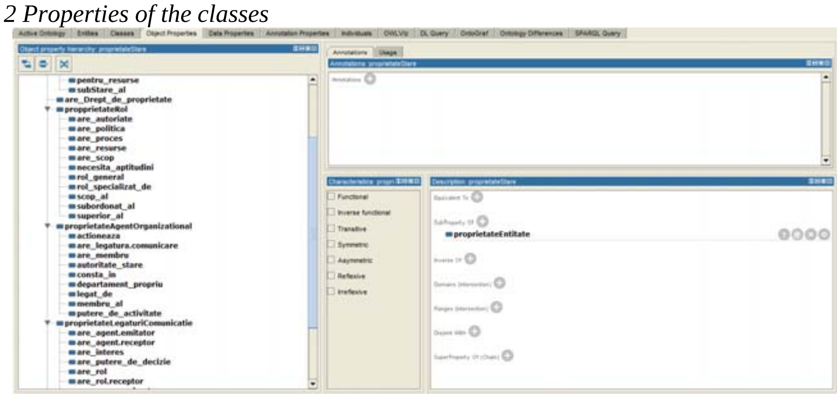


Source: Own elaboration

b) Properties of the classes

Each class has certain properties that apply to both the members of the class and the members of the subclasses, facilitating the creation of a link between them.

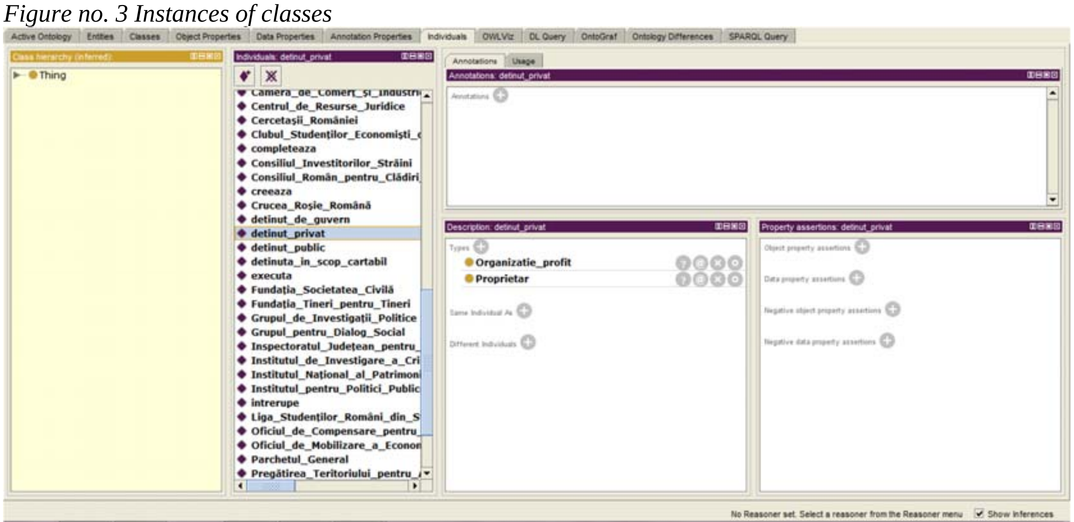
Figure no. 2 Properties of the classes



Source: Own elaboration

c) Class instances - define the members of a class with properties and attributes. The difference between subclasses and these is given by the fact that courts cannot have a subordinate.

Figure no. 3 Instances of classes

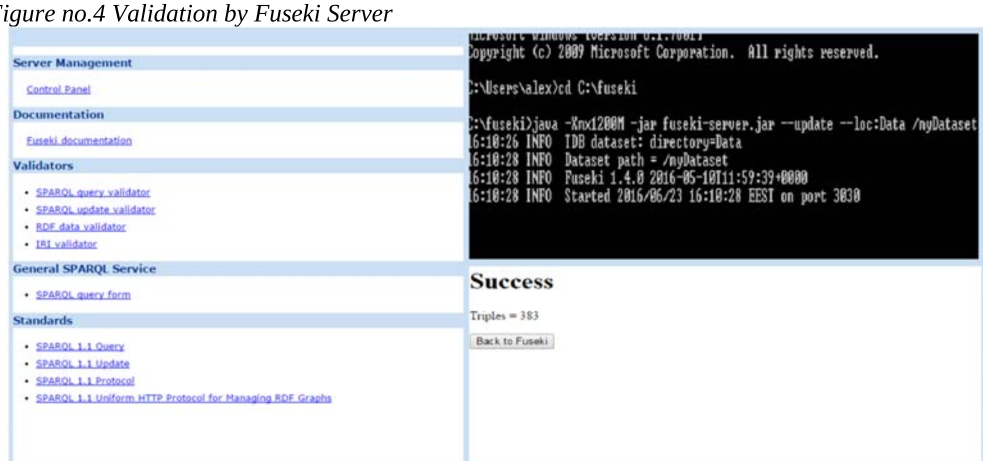


Source: Own elaboration

d) Ontology validation through Fuseki Serve

Once the ontology is loaded on the Fuseki server, it can be seen that the ontology is correct, the success message "triples=365" confirms that there are 365 sentences that have a subject, predicate and an object (property).

Figure no.4 Validation by Fuseki Server



Source: Own elaboration

4. Conclusions

Considering the very large evolution of information, the classic methods of storage no longer cope with the present, they gradually become obsolete methods, therefore it is more useful for an encyclopedia or a dictionary to be in electronic format. In order to obtain a number of advantages, modern society needs a large amount of information from different fields that must be used correctly and in a timely manner, thus ontologies make this information available.

Although artificial intelligence has taken a fairly large scale, ontologies represent an important step in the development of artificial intelligence because knowledge bases facilitate and facilitate the development of new programs that simulate human behavior.

The effort to transform Wikipedia information into ontologies in the Dbpedia knowledge base will signal a transition to a new stage in web information exchange.

For an economic entity, the Ontosparql Program, associated with the organizational ontology, can be useful because it enables the user to control the relationships between agents, their activity, the tasks they have to perform. Unlike regular databases that are quite difficult to manipulate (we are talking about updating databases), ontologies constitute a model of an organizational framework, a model that can be manipulated according to the entity's requirements.

5. References

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