

Analysis of Ontology Development, Editing, Mapping, Prompting, Visualizing and Analyzing Tools Based On Different Paradigm

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Abstract: Ontologies are helpful for to enable the interoperability across different systems and semantic web applications. It plays a vital role for capturing domain knowledge as well as the knowledge of the domain that can be recycled and distributed across many applications and groups. Appropriate tools are available to develop ontology more efficiently and effectively. But finding those tools are quite difficult and some tools might be available as open source while some may be commercial. There are varieties of tools that can be used to make user more comfortable with their features. Each and every tool might provide best feature when compared with other tools. To build the ontology, tool support is must. So, developers or users should know the different tools that are available to build the ontology more efficiently. But, the users should know the different tools which are available, most of the tools are not currently in existing. The users also do not know the information of the tools that can be available in ontology. The tools can be used to build proficient ontology. Some of the tools are open source which can be used to work with the tool and some tools are commercial. In all recent survey, only particular tools are compared to find out the best tool. This survey will be helpful to know about different set of ontology tools that are currently available. Each tool may be used for different purposes. Therefore, this survey will be helpful to find the better tool when compared with other tools. The comparison table helps to find the best tools from other tools. Graph and pie charts are drawn that helps to find the best tool based on the numbers of paradigm the tool satisfies. It also tells the overall paradigms satisfied by set of tools. Therefore, this survey will be useful to find the best tool in all the set of tools.

Keywords: Ontology, Semantic web, Editing tools, etc.

I. Introduction

The word ontology was taken from philosophy; where it means a systematic explanation of being. In last decade, this word has become relevant for the Knowledge engineering community. Guarino and giavetta 1995 propose to use the words 'Ontology' (with capital 'o') to refer to the philosophical and knowledge engineering senses respectively. We have read many definitions about what ontology is and have also observed how such definitions have changes and evolved over the years. Ontology is a formal, explicit specification of a shared conceptualization of a domain of interest. It is one of the most popular representation model used for knowledge representation, sharing and reuse. Ontology may also be defined as, the vocabulary which consists of essential terms and relations of area and also it combines the terms and relations with the help of rules which can be used to define extensions to the language.

In the last decades, many implementation languages are developed for Ontologies. Those language include AI- based ontology language, KIF, Ontoligua, OCML, FLogic for First order logic; LOOM for description logic. Therefore with the help of these languages, Ontologies are implemented. The main purpose of this comparison is, to make known to the user about different set of tools available as well as to find the best tool from the set of tools. The tools include Ontology tools, Ontology development tools, Ontology editing tools, Ontology mapping tools, Vocabulary prompting tools and Ontology visualization / Analysis tools. Each and every tool is taken survey and about ontology editing tool is explained briefly in this paper.

II. Problem Specification

2.1. Problem Statement

There are some problems that are to be noticed while doing survey on tools. Those problems are mentioned below.

- In recent survey papers, people have made survey on only the particular tools.
- The user or developer is not aware of various set of tools that are available for developing the ontology with efficient tool.
- Many tools are even not well known to the users.

- In recent survey papers, only comparison among the tools has been done, displaying that information in the form of charts, graphs, etc will be helpful to understand much better.

2.2. Problem Solution

Solution can be provided to solve those problems and they are explained below.

- Different set of tools can be made survey.
- Due to this, much of the available tools will be known to the users.
- When providing charts and graphs to display the data, will make much easier to evaluate the tools.
- This charts and graphs will also be helpful to find the best tools among the other tools.
- This evaluation will be made to all the different sets of tools that are available in ontology.
- In future, this information makes developer to produce tools with extra functionality.

III. Ontology Development Tool

Ontology Editing tools are those that can offer comprehensive and comparative tools focused on web ontology editing. There are totally 14 ontology editing tools which are explained below.

Anzo for Excel: Ontology editor that comprises of RDFS and OWL can be used directly in Excel which can be done using Anzo for Excel and is developed in Java and .net language.

Atop: A topic map browser and also an editor which is written in Java that supports XTM 1.0 specification is called as ATop.

Hozo: Hozo that can be used as a visualization and development tool combines together with control constructs group also has a limited prototype.

Lexaurus Editor: Vocabularies, taxonomies and thesauri can be edited and also created in off-line is termed as Lexaurus Editor. It is not open source software.

The Model Futures OWL Editor: Simple OWL tools with features like UML, thesaurus and imports altogether combined is termed as Model Futures OWL Editor. The current build version is 0.2.0.3.6 and this software runs in window 2000/ XP.

OBO – Edit: An open source ontology editor that is written in Java which is currently mothballed that means put into long term storage is termed as OBO-Edit.

Onotoa: Eclipse-based ontology editor tool used for topic maps with graphical UML-like interface is termed as Onotoa. It is being used as a TMCL- draft and XTM export because of UML-like interface.

OWLviz: OWLviz is available as a plug-in and it is also an attractive visual editor for OWL. It is designed to be used with Protégé-OWL editor.

PoolParty: SKOS and text extraction for tag recommendations that can be used for triple store thesaurus management environment is called as PoolParty. It is written in Java.

SKOSEd: SKOSEd is a plug-in which is written in Java for Protege 4 which allows creating and editing thesauri represented in the Simple Knowledge Organization System (SKOS).

TemaTres: Web based thesaurus management package which is open source; written in PHP and Javascript is called as TemaTres. This tool can be supported in windows, Mac OS, Linux platforms.

ThManager: SKOS RDF vocabularies can be created and visualized with controlled vocabularies like taxonomies or classification schemes using a tool called as ThManager. It is open source tool and it is implemented in Java.

Vitro: A web based ontology and instance editor that has customizable public browsing which is a Java web application that runs in Tomcat server contained may be defined as Vitro.

Vocab Editor: An RDF/OWL/SKOS vocabulary diagram editor which has both client and server side implementation is named as Vocab Editor.

IV. Analysis Of Ontology Editing Tools

Ontology Editing tools are those that can offer comprehensive and comparative tolls focused on web ontology editing. There are totally 14 ontology editing tools which are explained below.

Table 1: Ontology Editing Tools

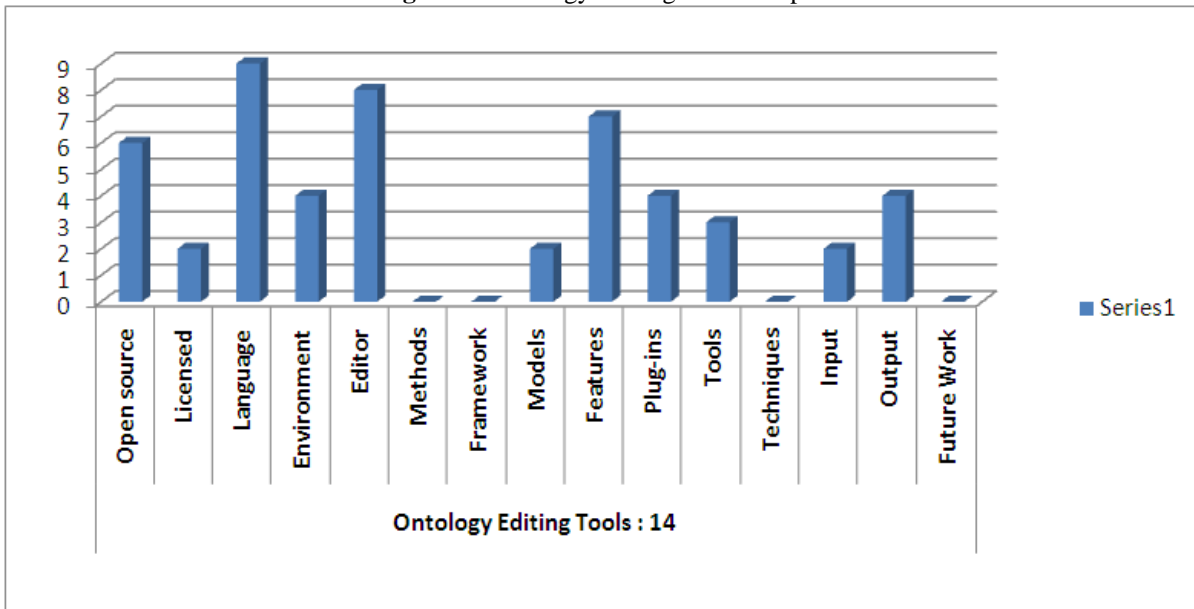
S.No	Tool Name	Open Source	Licensed	Environment	Language	Editor	Methods/ Framework	Models	Features	Tools/ Techniques	Component / Algorithm	Plug-in	Input /Output	Interface	Future Work
1.	Anzo for Excel	No	No	No	Javascript, Java, .Net	Ontology Editor	No	No	Select, collect, combine, share and reuse	Tool: Visualization tool	No	Anzo for Excel	Input: Spreadsheet Output: Ontology	No	No
2.	Atop	No	No	No	Java	No	No	No	Supports XTM 1.0 specification	No	No	No	No	No	No
3.	Hozo	No	No	No	No	No	No	No	No	Tool: Ontology Visualization and development tool	No	No	Input: No Output: Heavy weight Ontologies	No	No
4.	Lexaurus Editor	No	Yes	No	No	Offline vocabulary editor (Lexaurus)	No	No	1. Easy to use 2. Multilingual 3. Customizable, etc	No	No	No	No	No	No
5.	The Model Futures OWL Editor	Yes	No	Windows 2000/ XP/ Vista	No	Tree based editor	No	No	No	Tool: Navigator tool	No	No	No	No	No
6.	OBO – Edit	Yes	No	No	Java	Ontology editor	No	Graph oriented	1. Editing interface, 2. Fast reasoner 3. Powerful	No	No	No	No	No	Improve interoperability with OWL, built-in support
7.	Onotoa	No	No	No	No	Ontology editor	No	No	No	No	No	Eclipse	No	No	No
8.	OWLviz	No	No	No	No	Visual editor	No	No	No	No	No	Eclipse	No	No	No
9.	Pool Party	No	Commercial software	Windows, Mac, Linux	Java	No	No	Triple store model	No	No	No	No	Input: No Output: RDF graphs	No	No
10.	SKOSEd	No	No	No	Java	No	No	No	No	No	No	SKOSEd	Input: SKOS Output: No	No	No
11.	Tema Tres	Yes	No	Windows, Mac, Linux	PHP, Javascript	No	No	No	1. Simple, 2. Functional user interface, 3. Sophisticated capabilities, and 4. Ability to import or export	Tool: Thesaurus Management tool	No	No	No	No	No
12.	Th Manager	Yes	No	Windows, Unix	Java	No	No	No	1. Multiplatform 2. Multilingual, etc	No	No	No	Input: No Output: Visualizing SKOS RDF vocabularies	No	No
13.	Vitro	Yes	No	No	Java	Instance Editor	No	No	1. Create ontologies 2. Edit instances 3. Build a public web site and 4. Search data	No	No	No	No	No	No
14.	Vocab Editor	Yes	No	No	Python and Javascript	Vocabulary diagram editor	No	No	No	No	No	No	No	No	No

V. Result Analysis

5.1. Ontology Editing Tools

In these 14 ontology editing tools, there are 6 open source software, which is free to use and the user can edit the code; and 2 licensed software, that can have trial version of the software and it can be used by buying (purchasing) the software with paying some amount. The software tools were developed in Java programming language because it is platform independent and it has many features in built as well as JavaScript, .Net, PHP and Python, each language having their own pros and cons. Most of the software tools may be supported in Windows, Linux, UNIX, XP, Vista and Mac OS environment. In 14 ontology editing tools, 8 of them are editor tools which can be used to make the software more efficient. These editor tools can be used to edit the RDF, RDFS, XML and OWL files and it is helpful to produce the expected output. Some of the tools support framework which has the built-in feature of the software that provides additional facilities. Here, no framework or methods has been supported by these tools. Models like Graph oriented and Triple stores models are also used.

Figure 1: Ontology Editing Tools Graph



In the above graph, the vertical column shows the number of fields that have been taken as a paradigm and horizontal row tells the total number of paradigms, each tool has fulfilled. The paradigms that each tool has satisfied are completely shown from the above graph.

From the below chart, it is clear that 2 tools namely Anzo for Excel and OBO-Edit have fulfilled 7 paradigms from the 12 paradigms; TemaTres and ThManager have fulfilled 6 paradigms; The Model Futures OWL Editor, Pool Party and Vitro have fulfilled 5 paradigms; Lexaurus Editor and Vocab Editor have fulfilled 4 paradigms; SKOSEd have fulfilled 3 paradigms; Atop, Hozo, OWLViz and Onotoa have fulfilled 2 paradigms; Therefore, from this calculation, it is clear that Anzo for Excel and OBO-Edit are the best tools when compared with other tools as it has fulfilled most of the paradigms. The fulfilled paradigms of the ontology editing tools are also represented via pie chart. This will be helpful to find the maximum number of paradigms fulfilled by each tool.

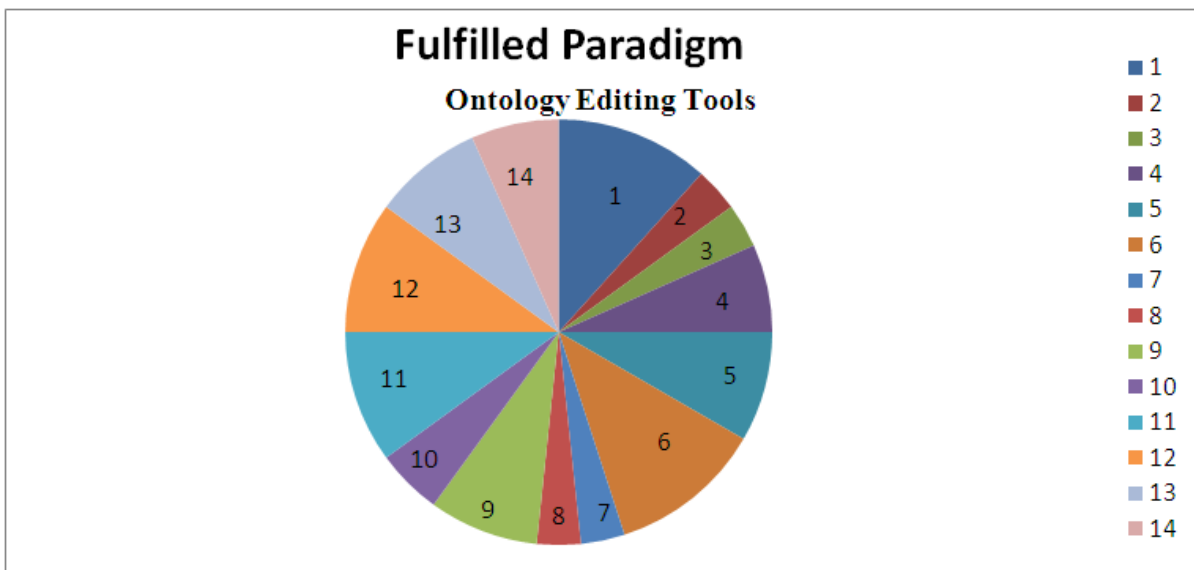


Figure 2: Ontology Editing Tools Paradigm

From the above chart, it is more clearly shown that the tool numbers 1 and 6 which indicate Anzo for Excel and OBO-Edit are the best ontology editing tools as it provides more number of fulfilled paradigms.

VI. Conclusion

This survey will be very useful for the developers or users to know more information about different set of tools which are available for different purposes and it is focused on the comparison of tools with various paradigms. Totally 70 different set of tools are taken for this survey which includes ontology tools, ontology development tools, ontology editing tools, ontology mapping tools, vocabulary prompting tools, ontology visualization and analysis tools. In those 70 tools, only 14 ontology editing tools are explained briefly in this paper and the similar data collection is followed for all the different set of tools. After the comparison table is drawn, the details collected is represented in the form of bar graphs and this graph tells us the information about how many paradigms a set of tool has been satisfied. It also shows the paradigm which has not been satisfied by any of the tool. By representing the details in bar graph, helps to find the exact information about the tools. In future, a lot of developments can be made with this survey. It will be helpful for the developers as well as users to enhance the functionality of the tool. The details are represented in the form of graph; chart will be useful to understand better. Further, more paradigms can be included to make the tool more efficient while making comparison among the tools. Through this survey, the best tools is identified which will provide the better result while developing the ontology.

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