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SURVEY ON ONTOLOGY CONSTRUCTION TOOLS

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The paper presents a detailed survey on ontology development tools. Ontology development tool is used for building a new ontology from scratch or reusing existing ontologies. Some of the popular ontology construction tools are Ontolingua Server, WebOnto, OilEd, OntoSaurus, Protégé, SWOOP, TopBraid Composer, WebODE, OntoEdit and NeOn toolkit. The current work briefly describes the ontology development and presents a comparison summary of the ontology methodologies with respect to their features. The survey helps the ontology developer to understand the ontology development tool features and the various ontology development tools available in the current state of the art with the respective feature support by the tools.

Keywords: Ontology; Types of Ontology Tools; Ontology Development Tools and Comparison of Ontology Development Tools.

1.Introduction

Semantic Web is central to enhancing human or machine interaction through the representation of data in a machine-readable manner [1]. To represent data in machine readable format, ontology is a good technique. Ontology plays a vital role in artificial intelligence, semantic web, software engineering, information retrieval, knowledge representation, knowledge sharing, knowledge integration, knowledge reuse, and so on. An ontology is a formal, explicit specification of a shared conceptualization [2]. Implementing ontologies in an ontology language is complex and time consuming task without any kind of tool support. To ease this task several ontology building environments were created by various research groups and software development organizations. There are several kinds of ontology tools such as ontology development, ontology merge, annotation, ontology based querying etc. Few tools provide most of the functionalities either directly or through plug-in support.

2. Ontology Construction Tools and Features

The current work presents ontology construction tools survey. Some of the popular ontology construction tools are Ontolingua server [3], WebOnto [4], OilEd [5] [6], OntoSaurus [7], Protégé [8], Swoop [9], TopBraid Composer [10], WebODE [11], OntoEdit [12], Neon Toolkit [13].

After a comprehensive survey on ontology development tools with the respective features, a comparative table is presented. Table 1 shows the summary of comparison, X-axis shows various ontology development tools and Y-axis shows their features.

Table 1. Comparison of ontology development tools

Features \ Tool	Ontolingua server	OntoSaurus	OilEd	WebOnto	Protégé	SWOOP	TopBarid composer	WebODE	OntoEdit	Neon toolkit
Availability	Free	Free & Open	Free & Open	Free	Free	Free & Open	Commercial	Free	Free	Free & Open
Versioning	No	No	No	Y/N	Y/N	Yes	Y/N	No	Y/N	Yes
Collaborative	Yes	Yes	No	Yes	Yes (Collaborative Protégé)	Yes	Yes	Yes	No	Yes
Graphical class/property taxonomy	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Back up management	No	No	No	Yes	No	Y/N	Y/N	Yes	No	Yes
Support growth of large ontologies	Yes	Y/N	No	Y/N	Yes	Yes	Y/N	Yes	Y/N	Yes
Querying	No	No	No	Y/N	Yes	No	Yes	No	Y/N	Yes
User interface	No	Y/N	Yes	Y/N	Yes	Yes	Yes	Yes	Y/N	Yes
Consistency check	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
OWL editor	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Extensibility	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Ontology libraries	Yes	No	Yes	Yes	Y/N	Y/N	Y/N	No	No	Yes
Architecture	Client/Server	Client/Server	Standalone	Client/Server	Standalone	Standalone	Client/Server	N-Tire	Standalone	Standalone
KR paradigam of Knowledge model	Frames+, FOL	DL	DL	Frames+, FOL	Frames+, FOL+, Meta classes	DL	DL	Frames+, FOL	Frames+, FOL	DL
Import	Ontolingua, DAML+OIL, CLIPS	LOOM, IDL, KIF, C++	RDF(S), DAML+OIL	OMCL	RDF(S), OWL	RDF(S), OWL	RDBMS, OWL, RDF(S)	RDF(S), DAML+OIL, OWL	RDF(S), DAML+OIL	RDF(S), OWL
Export	Ontolingua, DAML+OIL, CLIPS	LOOM, IDL, KIF, C++	RDF(S), DAML+OIL, OWL	OMCL, Ontolingua, RDF(s), OIL	RDF(S), OWL, CLIPS	RDF(S), OWL	OWL, RDF(S), XML	RDF(S), DAML+OIL, OWL, CLIPS	RDF(S), DAML+OIL, OWL	RDF(S), OWL
Storage	Files	Files	Files	Files	Files, DBMS(JDBC)	Files	Files	DBMS(JDBC)	Files	Files
Reasoner	JTP, Prolog, CML, Epikit	PowerLoom, Stella	FaCT	-	Pellet	Pellet	Pellet	Prolog	OntoBroker	Pellet2, Hermit, OntoBroker
Merging	Chimaera	None	None	None	Prompt, OWLDiff	Yes	Y/N	ODE Merge	Yes	Yes
Debug/Repair	No	No	Very Little	No	Very Little	Yes	No	No	No	Yes
Built-in inference	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Y/N	Yes
Implemented in	Lisp	Lisp	Java	Lisp	Java	Java	Java	Java	Java	Java Eclipse

Note: Yes indicates a supported feature in the language, No indicates unsupported features, and Y/N indicates features that need further explanation

3. Conclusion

The paper presents a comprehensive survey on ontology development tools and their comparison. Many tools are open sources except TopBraid Composer. The tools SWOOP and NeOn toolkit provide versioning features. Except OilEd and OntoEdit, other tools provide environment to build ontologies collaboratively. The tools WebOnto, WebODE and NeOn toolkit provide backup management functionalities. The tools protégé and NeOn toolkit provide many functionalities for developing ontologies.

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