Semantic Web Technologies Effects on Information Retrieval in Digital Libraries: An Annotated Bibliography

Janeen Schiff

Info 522: Information Access & Resources

December 4, 2011

Introduction and Scope

        This annotated bibliography discusses how the Semantic Web affects information retrieval in digital library platforms. With the creation of the Sematic Web in 2004 by Tim Berners-Lee, the visionary founder of the World Wide Web, many articles based on his creation of semantic web technologies and its effect on information retrieval when implementing digital libraries have spawned a growing amount of research on how the technologies can better serve the information seeking community. Several articles in this bibliography discuss the level of usability with the technologies and how the structure of digital libraries can affect the results positively. One study included in this evaluation challenges the effectiveness of searching using semantic web data and suggests that the use of IR- Style keyword searching is a better method for retrieving more accurate data finds. The articles included range from 2003 – 2011 and were selected because this topic reflects the changing nature in the way information is accessed. This list of articles reflects the most up to date research in the field. Much attention has been brought to the field of library and information science in regards to the semantic web because it aims to transform the current web structure from information on documents into a web of meaningful data connections. The articles were published in the United States, United Kingdom, India, and Greece showing the universality of the topic. It is important to mention the concept of the Semantic Web technologies effecting information retrieval as an advanced topic because it has been unpopular within the novice community of researchers because of its complexity. However, for professionals the semantic web seeks to integrate metadata in such a way that it is more user friendly for the average web browser.

Description

        The Semantic Web or web of data created by Tim Berners-Lee, the visionary and founder of the World Wide Web, focuses itself as being a portal which gives computers the ability to understand natural languages used by humans. It aims to process information by expressing it in a language called Extensive Markup Language (XML) that can transform information to be read by machines in the context of the semantics of data. The structure of this semantic data along with a structured model of terms called ontologies will enable the web to think on a quantitative level of processing. With the help of authority vocabularies, ontologies, and natural language processing, the semantic web can create a higher level of search retrieval giving well defined meaning by linking data and reusing the same data to connect across many different documents on the web. The use of ontologies, providing a metadata scheme, a controlled vocabulary, and a machine processable portal that comprehends these connections, will enable computers to help according to Giri (2011) with the precise communication to support an exchange between semantic terms (Giri, 2011, p.120). The capability to create one's own ontology that combines controlled vocabularies and natural languages can help to create a better understanding of the processes of the search techniques being used and give a higher rate of return on search results. Fripp (2010) claims with many library resources being presented on the web digital libraries are at a great advantage to using semantic web technologies to support systems by overlapping communities of all sizes by using linked data to classify web documents to enable subject analysis (Fripp, 2010, p.585). Some limitations however, to the technology stated in the literature are far too complex for the general user because of the advanced semantic search formulas. Libraries have advantages to design systems that allows for interoperability and authority between systems that can create a high-speed

information network to open up possibilities to increased information retrieval with simple user interfaces that mask this computer language.

Summary of Findings

With the high demand of electronic resources digital libraries are being pressured to create more speed on information retrieval and to create a system that retrieves with the simplicity of natural language keyword searching. The goal is to have a meaningful user interface to improve information retrieval on a computer system. This presents a challenge to get machines to manipulate information meaningfully to users. The Semantic Web aims to create a language which can be expressed semantically so it can be understood in a machine processable way. Dutta (2006) explains the semantic web in an extension of current web in which information is given well defined meaning where people and computers can work together.

Limited amount of research is dedicated to the concept of using linked data and a faceted classification schemes on the web. According to Fripp (2010) the connection of linked data to effective semantic understanding has the ability to index, annotate, and connect web documents automatically by using semantic concepts as a means of organizing metadata. Ultimately the use of linked data can benefit the searchers ability to obtain effective results by linking modern information techniques created across systems at a greater level of interoperability that promises to add a semantic layer of meaning to information when querying.

According to Tim Berners-Lee (2008) who believes passionately the web can become a fractal system of networks creating a great amount of interoperability between interacting agents, connecting many communities that have data in common and creating a web that is more sociable and smart. This vision is the backbone of all semantic web technology models. The fractal nature of semantic systems can support a large amount of information and reuse that data to create a mutual consideration to connections of understanding across different fields of knowledge and supports the theory of how they can be exploited to develop effective systems of retrieval.

The role of ontologies is an important aspect to the success of semantic web searching, as Diri (2011) states, because it promotes shared use and a common understanding on communication between people and applications. Also a large amount of research has been conducted to show how the study of semantics and the diversity of approaches provide by meaning for terms within linguistic studies can relate to the information seeking behaviors of user with digital repositories. There is, however, little study on the results of surveys and research conducted by libraries who have already integrated these systems and what the opinions of patrons might be.

According to Almeida (2011) on the use of semantics in searching it is possible to increase meaning of documents through descriptive metadata when querying for information. The semantic sequences of technologies used in computer languages and structured systems of authoritative vocabularies takes on a linguistic approach that argues the use of formal semantics to reduce the amount of confusion between the definition of the meaning in planning a system and the semantics used by that system (Almeida, Souza, & Fonseca, 2011, p. 199). Creating ontologies to understand a unique vocabulary structure with Resource Description Framework (RDF) schema and coded using a syntactic layer of XML computer hyperlinks, which is not intended to be comprehensible for humans, does illustrates that concepts can be expressed in a machine actionable way.

3

Another advantage of semantic search techniques on the web that can contribute to information management practices is by enabling features such as semantic querying and navigation. According to Koutsomitropoulos *et al.* (2006) having ontology rich content can improve searches and knowledge discovery with queries which are semantically equivalent to traditional keyword searches. XML- based language structure that support metadata schemes on the web will allow retrieval of entities other than items to produce new results and implicit knowledge that was impossible to be retrieved otherwise. Several other studies support this idea of constructing queries using XML-based query languages supported by systems as Tho *et al.* (2006) also reports since semantic metadata in encoded in the webpages using enhanced metadata description languages, information is able to match queries accurately and efficiently.

However, there have been criticisms that support effective unstructured keyword searching over the semantically meaningful natural language structure. The semantic web model for data (RDF/S ontologies scheme) as claimed by Tho *et al.* (2009) is a complicated standard language that can be effective if the user has a detailed knowledge of underlying schema and ontology languages (Tho, *et al.*, 2009, p. 263). An alternative approach suggested by Tho (2009) is to adopt an more user-friendly unstructured query strategy like keyword searching similar to the very popular model of casual searching on Google, Bing, and other web search engines. Experiments on this unique model of combined keyword search with semantic ontologies have been conducted to measure the effect on precision and recall on retrieval results and search performance.

Several studies further the discussion on the use of natural language processing techniques to create systems thesauri and ontological structures and other auxiliary tools to assist the user system interaction to a higher degree of automation with certain transactions. Morales-del-Castillo (2009) argues that libraries moving forward by offering services on the web can benefit from combining semantic web technologies with NLP techniques that favors the development of improved services. This offers accurate information according to the user's needs using common data models and syntax that guarantees interoperability of resources making the exchange of communication become clearer between agents and users.

The future of digital libraries using semantic web technologies is still in infancy. Many researchers are evaluating the use of these technologies and how they affect information retrieval in a library setting. Further examination is still needs to focus on the user's ability to use the technology. Although some conclusions have been presented to support further research on conclusions in favor of these techniques much work is needed to provide support for future successes. Burke (2009) states the main criterion for the success is the ability to create metadata and ontologies automatically on a larger scale with the evaluation and testing of semantic systems with real users in many technological contexts. Librarians have a key component to the future success of the semantic web, cataloging and classification. She argues huge amount of data contained in the Online Public Access Catalogs of libraries can insure the interconnectablity between sharing data systems and can create a rich metadata structure that can be automatically converted into RDF schema. Morales-del-Castillo et al. (2009) reiterate the conclusion that interoperability of resources making it easier for digital libraries to establish the exchange of information networks between each other.

The amount of research that can be done related to improving information retrieval in digital libraries is growing every day. In the past ten years we have seen these concepts evolve into a new way of thinking about how users retrieve information and how libraries can advance this research further by supporting patron's needs for effective and efficient information retrieval. These studies can benefit library and information professionals to better understand the concepts and develop information resources to advance the topic and to fully reap the benefits of the Semantic Web.

_____

Bibliography

Entry 1:

Almeida, M., Souza, R., & Fonseca, F. (2011). Semantics in the semantic web: a critical evaluation. *Knowledge Organization, 38*(3), 187-203.

Abstract: "In recent years, the term "semantics" has be widely used in various fields of research and particularly in area related to information technology. One of the motivators of such an approach is the vision of the Semantic Web, a set if development underway, which might aloe one to obtain better results when querying on the web. However it is worth asking what kind is semantic can we find in the Semantic Web, considering that studying the subject is a complex and controversial endeavor. Working within this context, we present an account of semantics, relying on the main linguist approaches, in order to then analyze what semantic is within the scope of information technology. We critically evaluate a spectrum, which purposes the ordination of instruments (models, language, taxonomic structures, to mention a few) according to a semantic scale. In addition to proposing a new extended spectrum, we suggest alternate interpretation with the aim of clarifying the use of the term "semantics" in different contexts. Finally, we offer our conclusions regarding the semantics in the Semantic We and mention future direction and commentary works."

Annotation: Presented in this article is a critical evaluation of the semantic web technologies and how the semantics of linguistics is related to the field of information technology. The author makes a claim to the use of the semantic field of linguists and the diversity of approached taken over the years to improve the process of knowledge representation and information retrieval. Although, helpful in understanding the connection between the semiotic field and the web in terms of a knowledge organizational system, it takes on an argument that some essential parts of context of use and the orientation of semantics is missing.

Search Strategy: I selected Library Literature and Information Science because of its wealth the peer reviewed journal in the field of library and information science. This search first conducted in Dialog was an initial keyword search combining two terms semantic web and information retrieval. I then logged on to the library databases and selected LISA where I entered the authors name and date of publication.

Database:	Library Literature & Information Science [Dialog]
Method of Searching:	Keyword Searching, author searching
Search String:	s semantic web and information retrieval
	s1
Scholarly/Referred Status:	After locating the article in Dialog with the above steps, the article was also located on Library Literature & Information Science under peer reviewed tab. Also, Ulrich's list it as a scholarly journal.

Entry 2:

Burke, M. (2009). The semantics web and the digital library. *Aslib Proceeding: New Information Perspectives, 61*(3), 316-322.

Abstract: "The purpose of this paper is to discuss alternative definitions of and approaches to the semantic web. It aims to clarify the relationship between the semantic web**,** Web 2.0 and Library 2.0. Design/methodology/approach - The paper is based on a literature review and evaluation of systems with semantic web features. It identifies and describes semantic web projects of relevance to libraries and evaluates the usefulness of JeromeDL and other social semantic digital library systems. It discusses actual and potential applications for libraries and makes recommendations for actions needed by researchers and practitioners. Findings - The paper concludes that the library community has a lot to offer to, and benefit from, the semantic web, but there is limited interest in the library community. It recommends that there be greater collaboration between semantic web researchers and project developers, library management systems providers and the library community. Librarians should get involved in the development of semantic web standards, for example, metadata and taxonomies. Originality/value - The paper clarifies the distinction between semantic web and Web 2.0 in a digital library environment. It evaluates and predicts future developments for operational systems."

Annotation: This article claims to clarify a distinction between the semantic web and Web 2.0 design, methodology and approach to digital library implementation. As part of a larger pool of articles, it evaluates clearly the literature and current system being used in Europe as an overview of the introductory aspects of the connections between the two concepts working off of Tim Berners-Lee original concept of the semantic web. It is useful in understanding what how one effect the other builds on a complex body of work already done by discussing the future developments between semantic web and digital libraries.

Search Strategy:	I selected LISA because of it large variety of articles on the topic. I selected the quick search or browse search bar with the words of semantic web and digital libraries with refinements with limitations the years 2006-2011 and specified in social science in the drop down menu.

Database:	Library and Information Science Abstracts
Method of Searching:	Browse Searching (Quick Search as an option in LISA)
Search String:	Semantic web and digital libraries
Scholarly/Referred Status:	After searching the results I selected the article under the peer reviewed tab in LISA. I located the journal in Ulrich which was classified as an academic/scholarly journal. When visiting the Alsib website it stated it is a "peer-reviewed high-quality journal".

Entry 3:

Burner-Lee, T., & Kagal, L. (2008). The fractural nature of the semantic web. *Association for the advancement of Artificial Intelligence: AI Magazine, 29*(3), 29-34.

Abstract: "In the past, many knowledge representation systems failed because they were too monolithic and didn't scale well, whereas other systems failed to have an impact because they were small and isolated. Along with this trade-off in size, there is also a constant tension between tire cost involved in building a larger community that can interoperate through common terms and the cost of the lack of interoperability. The semantic web offers a good compromise between these approaches as it achieves wide-scale communication and interoperability rising finite effort and cost. Tire semantic web is a set of standards for knowledge representation and exchange that is aimed at providing interoperability across applications and organizations. We believe that the gathering success of this technology is not derived from the particular choice of syntax or of logic. Its main contribution is in recognizing and supporting the fractal patterns of scalable web systems. These systems will be composed or many overlapping communities of all sizes, ranging from one individual to the entire population that have internal (but not global) consistency. Tire information in these systems, including documents and messages, will contain some terms that are understood and accepted globally, some that are understood within certain communities, and some that are understood locally within the system. Tire amount of interoperability between interacting agents (software or human) will depend on how many communities they have in common and how much ontology (groups of consistent and related terms) they share. In this article we discuss why fractal patterns are an appropriate model for web systems and how semantic web technologies can be used to design scalable and interoperable systems."

Annotation: This article is unique to the technologies of the Semantic Web in terms of the fractal nature of language and culture. The author, a leader in the creation of Web based languages and the creator of the Semantic Web, claims that the web can became a fractal system of web technologies to create an amount of interoperability between interacting agents on the web using helpful examples to illustrate this point. Although very useful in relation to how semantic web technologies can better support connections between relations of words on the web to

promote better information retrieval, the fractal patterns of interweaving terms can be used locally or globally depending on the use of ontological representation on the web.

Search Strategy: I searched in Web of Science selecting all the databases available for author Time Burners-Lee because he is known in the information science field to be the father of the Semantic Web. I also limited by search by years because it is a fairly new topic.

Database: Web of Science (ISI)

Method of Searching: Author searching

Search String: Author= (Berners-Lee T*) Timespan=2000-2011. Database=SCI-EXPANDED, SSCI, A&HCI. Lemmatization=On

Scholarly/Referred Status: After located the article in Web of knowledge is "the world's leading citation database", I was assured because it's a database that is known for its scholarly research. Additionally, *Association for the advancement of Artificial Intelligence: AI Magazine* was listed in Ulrich as an Academic/scholarly journal.

Entry 4:

Dutta, B. (2006). Semantic web technology: towards meaningful retrieval. *SRELS Journal of Information Management, 42*(2), 149-154.

Abstract: "The World Wide Web has a great impact on the way people communicate and their transactions. It has helped transform communities towards knowledge economy, broadly speaking into a knowledge society. Now the web is facing a significant change introducing the concept of Semantic Web. In this paper, an overview of Semantic Web technology and its prospects are presented. It explains the different layers involved in the implementation of semantic web for representing on the web, the paper discuses applications of semantic web technology in information retrieval."

Annotation: This paper gives a brief overview of the Semantic Web technologies and how they can manipulate information meaningfully. The author provides a complete overview of semantic web technologies with an easy to understand description of the technology for meaningful user interacting. This article also simplistic in nature gives a good overview of the technology used in the Semantic Web. The author uses past works of Tim Berners-Lee as a foundation for her conclusions and give a developmental view of the procedures with the technology.

Search Strategy: This search was created with LISTA because of its plethora of article in the database. I located the citation in an article and then searched for the keywords and using field code AU for the author last name.

Database:	Library, Information Science & Technology Abstracts
Method of Searching:	A combination of citation surfing, keyword and author searching
Search String:	Semantic Web and information retrieval and AU Dutta
Scholarly/Referred Status:	After locating this article with the above steps while searching I selected the peer referred tab in my search. I also located it Ulrich which list it as an academic/scholarly journal. Finally, I found on the journal website stating, "All papers submitted will be refereed".

Entry 5:

Coyle, K. (2008). Meaning, technology, and the semantic web. *The Journal of Academic Librarianship, 34*(3), 263-264.

Abstract: "The Semantic Web aims to transform the World Wide Web into a web of data instead of a web of documents. Simple text that poses no problem for human beings can be inert in the face of an instrument id the data do not exist in a predictable structure and format. Semantic coding makes the difference between actionable and non-actionable data, but actual use of the Semantic Web technologies is rare, partly because of the complexity of the underlying model and partly because of the Semantic web effort itself is not user friendly. However, libraries are in a unique position to take advantage of the Semantic web because they have a huge store of semantically coded public information in their library catalogs."

Annotation: This article gives a brief overview of the goals for the Semantic web and how manages to create meaning in a machine readable way. The author takes a critical side to how the integration of semantic web technologies has been lacking in understanding and in user friendliness because of the complex computer language that it use to express meaning. This work focuses on the theories of Tim Berners-Lee with little citations and presents an original view of the topic.

Search Strategy:	Using the browse tab, I searched for the Semantic Web, and then selected the Semantic Web for the list of terms. I then browsed through the list of articles until I reached something that was similar to my topic.
Database:	Library Literature and Information Science Full Text
Method of Searching:	Browse Searching
Search String:	Semantic Web

Scholarly/Referred Status: After searching through database for articles I was also looking for the peer reviewed symbol next to the citation and this one was included. Also, it is listed in Ulrich as an Academic/scholarly journal that is created by the American Library Association, the main association in the LIS field.

Entry 6:

Franklin, R.A. (2003). Re-inventing subject access for the semantic web. *Online Information Review, 27*(2), 94-101.

Abstract: "First generation scholarly research on the Web lacked a firm system of authority control. Second generation Web research is beginning to model subject access with library science principles of bibliographic control and cataloguing. Harnessing the Web and organizing the intellectual content with standards and controlled vocabulary provides precise search and retrieval capability, increasing relevance and efficient use of technology. Dublin Core metadata standards permit a full evaluation and cataloguing of Web resources appropriate to highly specific research needs and discovery. Current research points to a type of structure based on a system of faceted classification. This system allows the semantic and syntactic relationships to be defined. Controlled vocabulary, such as the Library of Congress Subject Headings, can be assigned, not in a hierarchical structure, but rather as descriptive facets of relating concepts. Web design features such as this are adding value to discovery and filtering out data that lack authority. The system design allows for scalability and extensibility, two technical features that are integral to future development of the digital library and resource discovery."

Annotation: This article attempts to unify the issues concerning semantic web technologies for subject access on the web. The author also argues that with semantic web technologies with a critical value to the data. The work builds on a larger body of work already done by discussing the use of scholarly research on the web and how semantic web technologies will need to include authority control that are basic to the integrity of the data.

Search Strategy: I choose Social Science Citation Index in Web of Science because it has many articles on Library and Information Science. The advanced search feature was selected because I wanted to limit my search to be specific to my keywords using the Booleans operator 'and' and truncating the word library for different versions of the word. I also limited my search to reflect the English languages and articles, with time span of 2000-2011 and refined my search by selecting Library and Information Science.

Database: Social Science Citation Index [Web of Knowledge (ISI)]

Method of Searching: Keyword Searching

Search String: TS=Semantic Web and TS=retrieval and TS=librar*) AND Language=(English) AND Document Types=(Article)

Refined by: Web of Science Categories=(INFORMATION
SCIENCE LIBRARY SCIENCE)
Timespan=2000-2011. Databases=SSCI.
Lemmatization=On

Scholarly/Referred Status: After searching through Web of Science with the above steps, I was assured that Web of Science is an academic /scholarly database that offer true cited reference index. In addition, I search Ulrich as it lists *Online Information Review* as an academic/scholarly journal. Additionally, the journals website also states that "a refereed journal devoted to the broad field of online information".

Entry 7:

Fripp, D. (2010). Using linked data to classify web documents. *Aslib Proceedings, 62*(6), 585-595.

Abstract: "The purpose of this paper is to find a relationship between faceted classification schemes and semantic web document annotators, particularly in the linked data environment."

Annotation: This article discusses the use of linked data or ontologies, using Rangathan's model of colon classification as a basis for classifying data on the semantic web. The author use a high amount of citation based evidence which builds on a past theory that was initially intended as faceted a library classification system and also a good use of diagrams to help back up the evidence presented in the article. This article uses technical language to link together conclusions made. This article reports on a growing field that is bring new insight into the topic of information science.

Search Strategy: When searching using Dialog, I entered keywords limited to semantic wen and information retrieval. After obtaining my results, I searched the library databases in LISA and entered the ISSN of the journal and the author, personal field in the format of last name, first name.

Database: Library Literature and Information Science [Dialog]

Method of Searching: Keyword Searching, Author searching, ISSN searching

Search String: In Dialog:
ss Semantic()web and Information retrieval
S5 25 SEMANTIC () WEB AND RETRIEVAL
T5/7/9
In LISA:

Scholarly/Referred Status: After locating in Dialog, I searched for the article under the peer reviewed tab in LISA. Under Ulrich, *Aslib Proceedings* was listed as an academic/scholarly journal. In addition, the journal website states "is a peer reviewed high-quality journal".

Entry 8:

Giri, K. (2011). Role of ontology in sematic web. *DESIDOC Journal of Library & Information Technology, 31(*2), 116-200.

Abstract: "The present generation of computers is changing from single isolated devices to entry points into a worldwide network of information exchange. Therefore, support in the exchange of data, information, and knowledge is becoming the key issue in computer technology today. The increasing volume of data available on The Web makes information retrieval a tedious and difficult task. Researchers are now exploring the possibility of creating a semantic Web, in which meaning is made explicit, allowing machines to process and integrate Web resources intelligently. The vision of the semantic Web introduces the next generation of the Web by establishing a layer of machine-understandable data. The success of the semantic Web crucially depends on the easy creation, integration and use of semantic data, which will depend on building ontology. This paper states the role of ontology in supporting information exchange process, particularly with semantic Web."

Annotation: This article discusses the use of ontology and its support of information retrieval on the semantic Web. The instructional values of the content give a good overview of the creations of ontologies and the developmental and systematic creation on the semantic web. The author creates an easy to understand model which expanded to a larger body of scholarly research on the subject of ontologies for the semantic web.

Search Strategy: I selected Library Literature and Information Science because of its wealth the peer reviewed journal in the field of library and information science. This search first conducted in Dialog was an initial keyword searches the two terms separately semantic web and information retrieval. To test if I received the same search results as my pervious searching in Dialog. After finding the article, I searched in LISA using an ISSN journal search to retrieve that article.

Database: Library & Information Science Abstract (LISA) [Dialog]

Method of Searching: Keyword Searching, ISSN Searching in LISA

Search String: In Dialog:

? s semantic()web

477 SEMANTIC

17527 WEB

S2   271 SEMANTIC()WEB

? s s2 and Retrieval

271 S2

7990 RETRIEVAL

S4   25 S2 AND RETRIEVAL

? t4/3/1-10

4/3/7

In LISA:

0976-4658 <in> ISSN

Scholarly/Referred Status: When selecting the LISA database I was searching under the Peer-reviewed journal tab and also verified that it was included in Ulrich database for Academic/scholarly journal. It was also verified when searching the DESIDOC Journal of Library and Information Technology journal site which states "invites original research and review papers relating to information technology" and is peer-reviewed.

Entry 9:

Koutsomitropoulos, D., Solomou, G.D., Alexopoulos, A.D., & Papatheodorou, T.S. (2009). Semantic web enable digital repositories. *International Journal on Digital Libraries, 10*(4), 179-199.

Abstract: "Digital repositories and digital libraries are today among the most common tools for managing and disseminating digital object collections of cultural, educational, and other kinds of content over the Web. However, it is often the case that descriptive information about these assets, known as metadata, are usually semi-structured from a semantics point of view; implicit knowledge about this content may exist that cannot always be represented in metadata implementations and thus is not always discoverable. To this end, in this article we propose a method and a practical implementation that could allow traditional metadata-intensive repositories to benefit from Semantic Web ideas and techniques. In particular, we show how, starting with a semi-structured knowledge model (like the one offered by Space), we can end up with inference-based knowledge discovery, retrieval, and navigation among the repository contents. Our methodology and results are applied on the University of Patras institutional repository. The resulting prototype is also available as a plug-in, although it can fit, in principle, any other kind of digital repository."

Annotation: Presented as a technical model on how to integrate semantic web technologies and examines the use of the ontologies for digital repositories for a more advanced look in the field of information science. The authors show much attention to detail and express a great knowledge on the subject for the development of the advanced reader to understand. The use of technical language and good use of graphs and charts give clarity to some of the more complex ideas that coincide with the examples in the text.

Search Strategy:	When logging on to LISTA from the library database I entered my keywords using the Boolean operator 'and' with truncating library to see if there would be any variation to the word. Also I search mode in Find all my search terms mode to obtain all of the keywords in my search results.
Database:	Library, Information Science, & Technology Abstracts
Method of Searching:	Keyword Searching
Search String:	Semantic web and digital library and retrieval
Scholarly/Referred Status:	While searching on LISTA, I selected inside the refine your search terms to scholarly/peer reviewed journal. Then, I searched in Ulrich to verify that it was an academic/ peer reviewed journal. The journal website has a submission procedure of peer reviewers for any article published in the journal.

Entry 10:

Madalli, D.P. (2006). Ontologies as knowledge structures for semantic retrieval. *Information Studies, 12*(4), 205-212.

Abstract: "Internet is today a research tool often accessed to find resources corresponding to information needs. More often than not, in a typical search scenario on Internet, the appropriate resource is only retrieved as an answer to some other query at some other instance. This situation highlights the need for organization of information on the web to facilitate better retrieval. Semantic web techniques promise meaningful retrieval of resources in answer to a query. Ontologies aid mapping of concepts into knowledge structures in specific domains that provide context to the retrieved set. This paper discusses the role of Ontologies in semantic retrieval."

Annotation: This overview of how to structure ontologies for meaningful retrieval is especially helpful in understanding the concept. The author's writings, although lacking in the conceptualization in context of developing technical theories, has brought a solid description of the topic in the field of information science. It is a good introduction to the topic and uses a small amount of charts to help explain the topic better yet it does not expand on the explanations in the text for any further clarity.

Search Strategy: I selected Library Literature and Information Science Full Text because it is has a large amount of article when I keyword searched for the Semantic () Web and retrieval, limited with peer-reviewed selected. I felt this article was particularly effective as one of my choice because I was a solid description of ontologies and was looking for how the semantic web technologies can create a more effective and efficient retrieval.

Database: Library & Information Science

Method of Searching: Keyword Searching

Search String: (Semantic () web and Retrieval) <in> Smart Search AND
Limited to: PEER_REVIEWED

Scholarly/Referred Status: While searching Library and Information Science database on the library catalogs I limited my search further by selecting the peer reviewed tab. It was also verified in Ulrich that *Information Studies* journal was an academic/scholarly journal and also stated in Ulrich under the Key Features tab is was listed as being Refereed / Peer-reviewed.

Entry 11:

Morales-del-Castillo J.M., Pedraza-Jimenez, R., Ruiz A.A., Peis, E., & Herrera-Viedma, E. (2009). A sematic model of selective dissemination of information for digital libraries. *Information Technology and Libraries, 28*(1), 21-30.

Abstract: "In this paper we present the theoretical and methodological foundations for the development of a multi-agent Selective Dissemination of Information (SDI) service model that applies Semantic Web technologies for specialized digital libraries. These technologies make possible achieving more efficient information management, improving agent-user communication processes, and facilitating accurate access to relevant resources. Other tools used are fuzzy linguistic modeling techniques (which make possible easing the interaction between users and system) and natural language processing (NLP) techniques for semiautomatic thesaurus generation. Also, RSS feeds are used as "current awareness bulletins" to generate personalized bibliographic alerts."

Annotation: This article presents a model of work which examines the use of SDI service used in a new body of work for digital libraries. The bulk of the work is used to describing the purpose of the model in a theoretical manner and successfully aim to prove the conclusive data presented in the article. It presents a theoretical and methodological foundation to the study of semantic web technologies for specialized libraries with a large amount of citations included in the work quoting many advanced professional in the field.

Search Strategy:	When selecting Web of Science I was searching for Sematic Web, digital libraries with Boolean 'and', additionally, using keywords and selected topic in the drop down box where I know I could find many reliable and refereed sources. The search was limited by selecting all three different databases within Web of Science with a topic search using keywords semantic web and digital libraries with all years selected as well.
Database:	Web of Science
Method of Searching:	Keyword Searching
Search String:	Topic=(Semantic Web and (digital library)) Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI. Lemmatization=On
Scholarly/Referred Status:	After using the above steps to obtain the article, I was assured that Web of Science is an academic /scholarly database that offer true cited reference index. In addition, I search Ulrich as it lists *Information Technology and Libraries* as an academic/scholarly journal that is produced by the American Library Association, an authority in the field of Information and Library Science.

Entry 12:

Ning, X., Jun, H., Jia, W., & Yuan, P. (2009). Practical and effective IR-style keyword search over semantic web. *Information Processing and Management, 45*(2), 263-271.

Abstract: "This paper presents a novel IR-style keyword search model for semantic web data retrieval, distinguished from current retrieval methods. In this model, an answer to a keyword query is a connected subgraph that contains all the query keywords. In addition, the answer is minimal because any proper subgraph cannot be an answer to the query. We provide an approximation algorithm to retrieve these answers efficiently. A special ranking strategy is also proposed so that answers can be appropriately ordered. The experimental results over real datasets show that our model outperforms existing possible solutions with respect to effectiveness and efficiency."

Annotation: This article studies the effect on searching, unlike any of its kind, which is a growing theory of keyword searching using algorisms for the semantic searching. The authors present a very detailed model of how to create a unique search that builds on a small body of work in the field from semantic search techniques. The highly clarified content of algorithmic structure builds on a need for advanced knowledge base on keyword searching for semantic models in order for an understanding of the content and its effects. Although this article argues against the

ideas presented in the remaining articles found, it was included because of the effective reporting on the information retrieval keyword style and its conflicting views themselves for a literature comparison.

Search Strategy: I selected Library Literature and Information Science Full Text because of the databases large amount of topics in the field. Using Dialog as a model for the bibliographic information and when I keyword searched for the Semantic Web and information retrieval I searched through all of the results until I found the exact title and author. I felt this search was particularly effective as one of my choice because I was looking for how the semantic web technologies can be applied to query searching for a more affect search results different from my other articles.

Database: Library Literature and Information Science [Dialog]

Method of Searching: Keyword searching

Search String: ? ss semantic()web and information retrieval

S1   7904 SEMANTIC

S2   44620 WEB

S3   353 SEMANTIC(W)WEB

S4   13076 INFORMATION RETRIEVAL

S5   30 SEMANTIC()WEB AND INFORMATION RETRIEVAL

Scholarly/Referred Status: Using the steps above, while searching I chose to use Library Literature & Information Science Full text under a Peer-reviewed tab. Also, it was listed in Ulrich as an academic/scholarly journal. In addition, the *Information Processing & Management* is" devoted to refereed reporting".

Entry 13:

Tho, Q.T., Fong, A.C.M., & Hui, S.C. (2006). A scholarly semantic web system for advanced search functions. *Online Information Review, 31*(3), 353-364.

Abstract: "Purpose – The semantic web gives meaning to information so that humans and computers can work together better. Ontology is used to represent knowledge on the semantic web. Web services have been introduced to make the knowledge conveyed by the ontology on the semantic web accessible across different applications. This paper seeks to present the use of these latest advances in the context of a scholarly semantic web (or SSWeb)

system, which can support advanced search functions such as expert finding and trend detection in addition to basic functions such as document and author search as well as document and author clustering search."

Annotation: The authors create a form of developing a conceptualized model used for testing to measure the effectiveness of the scholarly semantic web. The work is adapted as scholarly document but can also be used in other forms of research such as manuals and experimental research because the basic principle of the theory is the same across other forms of researching and evaluation. The content is helpful in explaining the advances search techniques yet one must use an advanced understanding of graphs and charts to help illustrate points in the text.

Search Strategy: I selected Library Literature and Information Science because it has many scholarly journals related to the field of library and information science. My initial search in Dialog was a simple search of keywords Semantic () Web and information retrieval. In Library Literature and Information Science I used the same keywords and searched through the results until I found the title of the journal and the author. The reasoning behind this particular article was that it fits my terms of semantic web technologies for advance searching.

Database: Library Literature and Information Science [Dialog]

Method of Searching: Keyword Searching

Search String: ? ss semantic()web and information retrieval

          S1 7904 SEMANTIC

          S2 44620 WEB

          S3 353 SEMANTIC(W)WEB

          S4 13076 INFORMATION RETRIEVAL

          S5 30 SEMANTIC()WEB AND INFORMATION RETRIEVAL

Scholarly/Referred Status: In completing this search with the above search string, it was searched for in Library Literature & Information Science Full text under a Peer-reviewed tab. Also, it was listed in Ulrich as academic/scholarly journal and has a refereed date on the article of July 1, 2006. Also, *Online Information Review* is "refereed journal devoted to the broad field of online information in the academic".

_____

18

Conclusion and Personal Statement

I found the Semantic Web to be an intriguing topic. Although I had little knowledge about it before my research for this annotated bibliography I now have a new found insight on the advances semantic technologies can have for searching the web. Initially, I was under the impression the Semantic Web was a program that created meaning of words on the web that helped to create better searching. I now understand it is paradigm that will shift the traditional way people have searched the web using new metadata schemas, ontologies, and linguistic connections between systems. It will assist with the evolution of knowledge management on the web as a whole, therefore, benefiting the retrieval of information for more accurate results. I found a new understanding related to the goals of semantic web technologies and the importance of effective information retrieval because while I was searching I wished I could use a less structured way of entering terms and the ability to use my own vocabulary.

I have to say out of the 30 or so articles I reviewed I was frustrated because many of them were not quite what I was looking for . While performing many of the searches I found it beneficial to try to find a commonality between my search strings. It was also helpful to consistently stay with the same databases because they were specific to the field I was searching in. I was often frustrated with the amount of results I was getting that did not match many of the keyword searches yet was pleased when I found something of value. It was useful to do a browse search using single keywords and then moving onto more advanced search strings, including Boolean operators and truncation which helped to refine my searches when I was comfortable with what I was looking for. I now understand the amount of precision that I must put into my searches and remember for future researching to be as precise as possible and consistent with my terms. I was able to verify my choices of journals using *Ulrich International Periodicals Directory* which also gave me a level of confidence that I was finding credible sources. I will remember all of these tools when conducting future researching.

It is important to have structured bibliographic information when researching databases. With this level of authority it helped me to build on my current aspects for retrieval. Using controlled vocabularies can be complex and often requires a lot of patience. Technical writing is a skill that I know I will need to practice more on. It does help to make connections to shared environments, designing organizational methods, and labeling information for formal comparisons. This assignment helped me to understand how to perform a complete search and how to compile a list of resources to share with others. I have educated myself to recognize that annotated bibliographies are useful for organizing information on topics in fields of studies which require advanced research for preparation with scholarly writings in the academic world.

_____

I certify that:

- This paper/project/exam is entirely my own work.

- I have not quoted the words of any other person from a printed source or a website without indicating what has been quoted and providing an appropriate citation.

- I have not submitted this paper / project to satisfy the requirements of any other course.

Signature   Janeen Schiff
Date   December 4, 2011

_____