**Abstract**

The semantic web is one of the important developing technologies that is reshaping the web by changing how information is represented. In earlier, and even recent implementations of web content are organized through links and the content is labeled by metatags that are accessed by web crawlers and search engines. Implementation of the semantic web hopes to improve the organization of content by replicating how information is represented in semantic memory where knowledge is represented relationally in a semantic net. In a semantic net, the link between objects provides additional information about the relation of content so that all content is related by information. When implementing a semantic web, the additional information of how content is related provides for more precise access to desired content in a query to produce inferences. However, the implementation of the semantic web has not been standardized across platforms. The following proposal examines and implements one of the means of organizing content in a semantic web, Protégé, and compares this to another means of organizing content in a semantic web, the triple-store.

**Introduction**

Though commonly used, the world wide web has not remained largely static in its structure since its conception. The worldwide web has developed in stages that relate to how users interact with content. During the first version of the web, Web 1.0, content was created by the content provider and read by the user. The next version, Web 2.0, changed the relationship between the provider and the user. Here, the user was also able to both read content written by a provider and write their own content on a platform. This change allowed for the creation of blogging sites, social networking platforms, and product reviews. Currently, the internet is transitioning to Web 3.0, where there is a new feature there is a new feature added to Web 2.0. Here, data can be read and understand not only by human users, but by software agents that can interpret the relationship between data. Web 3.0 is implemented through creating a semantic web that employs data interchange formats to share data between platforms in order to produce better search results for the user [cite below]. The following will explore one aspect of the implementation of Web 3.0, ontology, to describe its evolution, its potential, and its problems of implementation.

The semantic web developed from research into semantic nets that attempted to replicate how knowledge is likely represented in the mind and has been investigated to represent semantic memory (Collins & Quillian, 1969). In semantic memory each object is represented by a set of nodes that define the objects features. These nodes are linked to form a semantic net. In semantic nets objects are not just related to each other, as is common on the internet, but the nature of these relationships is important by determining how objects are related. This distinction can be illustrated in an example. When trying to represent the concept of cat in a cat would have many features such as tail, legs, and mammal. However, in a semantic net the nature of these links are defined. For example, a cat is a mammal and has a tail and has legs and a cat is the combination of these features. This additional information allows for the use of relational logic to retrieve content from a semantic net leads to the ability to represent inheritance (Sowa, 1987) and spreading activation of information (Collins & Loftus, 1975).

The semantic web is an implementation of a semantic network to organize web data. To facilitate the implementation of a semantic web, the W3C has produced standards (W3C). The first of these standards characterizes linked data that like with metatags that classified content in the “Web of documents,” content in linked data is tagged by machine readable data that specifies both data relating to the content but also links that specify the relationship and is known as RDF. This allows for the automated agents to access the data. The next standard is that of ontologies. These are shared vocabularies that provide common descriptions of data and relationship and are known as OWL. This allows for linked data to be more easily combined with other linked data to increase the amount of accessible data. The next established standard is a means of querying the linked data for answers to questions. SPARQL provides a common query language that can be used to access multiple stores of linked data. The final standard established is for inference. Inference is used to manage different stores of linked data. Combining linked data stores provides the ability to increase the data that is linked to a piece of content by merging unique information from each of the linked data stores. When widely implemented these standards will help to increase personalization on the internet and develop human knowledge.

Implementing a semantic web increases personalization by changing how users access information. This difference can be illustrated by comparing basic web searches to searches in a semantic web. Basic web searches rely on keywords or simple tags. In these searches web pages have previously been accessed by a web crawler that catalogued their contents. A search returns information that shares the tags or keywords without how these are related. A search query of “Hitler” and “Trump” would return content that would contain both search terms such as these memes (e.g. <http://www.cracked.com/blog/why-comparing-donald-trump-to-hitler-makes-perfect-sense/)>. While related because they both have the same keyword so there is nothing in this search that explains why there are related. They only appear close to each other. A search in a semantic web has additional ways to determine how items are related through their classifiers.

There have been multiple useful applications of the semantic web of which there are three pertinent examples. The first is in research databases. [Article I cannot seem to find again. Search terms include protein, brain, maybe Alzheimer’s, dementia, or other similar neurodegenerative brain disorders. It is a really great article because it shows the power of the semantic web as their initial search through a database had an unusuable 320k and after organizing through a semantic web there were less than 50]. The second is commercial where it can be used to organize product suggestions. The third is social networks.

However, the semantic web has not been widely implemented. Only xx% of major websites currently utilize semantic web markup (needs citation or removal). One of the reasons for this is that there are problems in implementing a universal semantic web. These stem from uncertainty in exchanging information between linked-stores of data (WS3, 2008). A few examples of these include the first source of uncertainty is vagueness, where some of the relationships in linked-data are imprecise, such as “young” or “knowledgeable” that could be interpreted differently depending on the context. A second source of uncertainty is logical inconsistency, where different classifiers can create logically inconsistent states that could not exist within a database of linked-data. This is an example of the logical fallacy of ‘affirming a disjunct’ where in an OR argument confirming that one of the propositions is true means that the other is false. [Should I include an example?] This problem increases when attempting to merge different databases of linked-data as each database has its own set of classifiers and relations. Finally, there is the problem of the quantity of information that can be included in a semantic web.

[Closing paragraph about what this is doing. It should also describe more about ontology unless it was described in a different paragraph]

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