Research Paper Education

Functional Role of Semantic Web in Cognitive Studies

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ABSTRACT

Semantic web is to enhance the web which computers can receive and process the informations provided on World Wide Web is a collaborative effort led by the community of World Wide Web Consortium (W3C). The amount of knowledge published on the Semantic Web i.e, the number of ontologies and semantic documents available online is rapidly increasing, reaching the critical mass required to enable the vision of a truly large scale, distributed and heterogeneous web of knowledge. The semantic web evolved as advanced one by crossing various stages over period of time and advancements. The widespread use of web based technology in education offers new opportunities for teachers and students in higher education to improve their cognitiveskills.Therefore, this paper describes the growth and availability of web and how this can be achieved in an e-learning environment.

KEYWORDS Semantic web, Cognitive skills, web based technology.

Introduction

World Wide Web (WWW) is a huge library of interlinked documents that are transferred by computers and presented to people. It has grown from hypertext systems, but the difference is that anyone can contribute to it by updating the comprehensive informations. WWW contains a lot of information and knowledge, but machines usually serve only to deliver and present the content of documents describing the knowledge. People have to connect all the sources of relevant information and interpret themselves as per the need. That interpretation differs case to case by the views and thoughts. Semantic Web is an effort to enhance the web which is available nowadays which computers can receive and process the informations provided on World Wide Web. In the same way as WWW is a huge distributed hypertext system, semantic web is intended to form a huge distributed knowledge based system. The focus of semantic web is to share data of any kind instead of documents. It is a collaborative effort led by the community of World Wide Web Consortium (W3C). Engaging students themselves as researcher and designer allows the development of technologies where the curriculum becomes a 'first-hand experience', rather than mediated solely by teachers.

The effective use of semantic web technologies is dependent on easy-to-use software for authoring, archiving and publishing. For example, tools developed through the Ensemble project improved the ability to store, combine and share digital resources. These tools also enabled students and teachers to acquire a more sophisticated understanding of key issues in their subjects, of how problems could be answered in different ways in turn suggesting further directions for enquiry. The amount of knowledge published on the Semantic Web i.e, the number of ontologies and semantic documents available online is rapidly increasing distributed and heterogeneous web of knowledge.

The underwent pathway of Semantic Web

Computers will be able to make use of data residing inside the web pages, so when searching for something, a person, a restaurant, a hotel, the machine goes into its vast network of meaningful linked data, creates connections, and suggests useful links that human mind could never have come up with. The semantic web evolved as advanced one to review, interpret and discuss with others, this stage is attained through various modulations over course of time and scientific advancements.

a) Web1.0 (the "Information Web"): Web 1.0 was the first generation web and during this phase the focus was primarily on building the web, making it accessible and commercializing it for the first time. In the first web browser ISPS and followed by the internet, Http, languages HTML and XML are the key features. In addition to that web-centric software languages such as Java and Javascript, the creation of Web sites, the commercialization of the Web and Web business models, and the growth of key portals on the Web are available.

Web 1.0 was characterized by several features; i) The development of HTTP and HTML by Tim Berners-Leee in 1990, ii) E-mail iii) Web directories and search engines (notably Yahoo and Google) iv) The rapid proliferation of websites. Web 1.0 was having many readers, but relatively few authors or content creators.

b) Web 2.0 (the "Social Web"): This was coined by O'Reilly Media in 2004 refers to a supposed to second generation of internet based services like networking sites, Wikipedia, communication tools which builds online collaboration and sharing among the people. The other important factor is emergence of mobile and internet services as a important platform driving the growth and advancement of the web, particularly with foreign nations.

Web 2.0 Characteristic features: i) Privately owned social networking websites such as Facebook (launched in 2004) and Twitter (launched in 2006), ii) Web services, which allow developers to combine content from various web sources (eg. Historypin : a site where users can upload photos from the past and pin them on Google Maps, you tube, etc.) iii) Cloud computing which virtualizes computing resources making them affordable and ubiquitous. iv) Browser-based applications, which eliminate the need for managing desktop applications. v) Web syndication, which enables content to be subscribed to and reused by having it identified, collected and combined (aggregated) using RSS, and more recently the Atom publishing protocol. Web 2.0 inspired collaborative learning approaches for learners. Such a collaborative, grassroots Semantic Web requires a new model of structured information representation and management: first and foremost, it must handle inconsistency, ambiguity, uncertainty, data provenance, and implicit knowledge in a uniform way (Auer et al 2007).

c) Web 3.0 (the "Semantic Web"): Web 3.0, a phrase coined by John Markoff of the New York Times in 2006, re-

fers to a supposed third generation of Internet-based services that collectively comprise what might be called 'the intelligent Web' such as those using semantic web, microformats, natural language search, data mining, machine learning, recommendation agents, and artificial intelligence technologies which emphasize machine facilitated understanding of information in order to provide a more productive user experience.

Characterization of web 3.0: This advanced browser has the unique features to analyse, interpret the large datasets in various disciplines. In addition web 3.0 possess the following features; i) Linked data or hyperdata, where data objects are linked to other data objects, ii) Large hyper data datasets such as DB pedia , iii) A query language for hyperdata capable of treating the entire web as a single data store called SPARQL, iv) The so called "Internet of Things" where billions of non human entities (including houses, cars and appliances) generate and publish their own hyper datasets.

Features with Semantic Web

To get to know about the semantic web we need to know how web content is marked up. To mark up web content, the following technologies are used; i) **Hypertext-Markup Language (HTML) -** structure web content (i.e. hypertext documents) by denoting structural elements such as headings, tables, links and so on**,** ii) **Cascading Style Sheets (CSS)-** add style to web content with visual characteristics such as font type and size, text color, margins and so on. iii) **JavaScript-** adds behavior to web content, ranging from functions that perform simple client side validation all the way to browser based applications. iv**) Resource Description Framework (RDF)-** add meaning to web content, so that the data inside can be identified and reasoned about using computers.

Semantic Web in Education

Resources on the semantic web are described using the Resource Description Framework (RDF). RDF is a W3C standard for describing web resources. It helps to ensure that the meaning of a web resource is interpreted as the author/publisher intended. Web Resources: A web resource is simply any identifiable information on the web. The resource itself is conceptual, while its representation is actual. When a web resource is requested, an appropriate representation of its current state is provided. This approach to software architecture (known as REST) provides many benefits. For example, it helps to prevent broken links on the web, by eliminating the need to change a link every time a representation of the resource is changed. Uniform Resource Identifiers (URIs) uniquely identify resources of any kind not just information resources that exist on the web. When URIs are used on the web however, they are also known as Uniform Resource Locaters (URLs).

Using semantic web tools in higher education

The widespread use of web based technology in education offers new opportunities for teachers and students. In particular, the availability of large datasets and real life cases has the potential to enhance higher education teaching. The Ensemble project, part of the joint ESRC/EPSRC funded Technology Enhanced Learning (TEL) programme, explored the role of 'semantic web' technologies to support undergraduate and postgraduate teaching in complex and rapidly evolving fields where case based learning is common. These digital archives can support teaching and learning in subjects dealing with complex qualitative and quantitative data. Ensemble looked at how semantic web technologies can support teachers and learners across a range of disciplines such as plant sciences, education, environmental education, dance and maritime operations. The project focused on complex, fast-moving subject areas where traditional curricula quickly become outdated.

Semantic web and Cognitive skills

Cognition Skill Net ontology has been proposed to address two major needs, the ontology design in an expectation based education context includes concept space and skills space. The elements in an expectation represent a conceptual model, which formally constraints the semantics of the concept taxonomy based on explanations formulated in natural language. Skills are dynamic in nature. Therefore, such dynamic relations are needed to be included in an ontology in order to show the execution of a skill within a cognitive process. Therefore, there is a need to define skills and their relational axioms in a dynamic approach. In this paper, we discuss the advantages of modeling the cognitive skills through ontology. Further once the cognitive skills ontology is defined, it is also necessary to relate the defined ontology with concepts embedded in educational expectations within a learning space.

Conclusion

The semantic web refers to a set of international standards which are used to structure online data in terms of content, creating a vast resource of structured and linked data. These digital archives can support teaching and learning in subjects dealing with complex qualitative and quantitative data. The Semantic Web is an extension of the current web in which information is given well defined meaning, better enabling computers and people to work in cooperation. Semantic web is a very convenient platform for implementing Blended learning systems to enchance cognitive skills. This new generation web offers learners the opportunity of obtaining information which are related to each other. So the learners can utilize this rich content of information thereby enhancing their learning experience. Learners will obtain a better experience of searching the materials by utilizing the potential of Semantic Web thereby can understand better about the world where they live in.

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