



Chapter I

From World Wide Web to Semantic Web

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Abstract

This chapter introduces the incentives for the creation of the Semantic Web, the methodology for its development, and the current status of this development. In contrast to the human function of understanding, the author summarizes four major steps in creating the ability for machines to understand Web content and generate responses. The semantics in the Semantic Web should be explicitly declared in a form that can be operated by a machine, knowledge organization should be provided to support semantic interpretation, software agents must rely on automatic reasoning ability to obtain implied knowledge, and procedural knowledge should be accessed in a community to generate response behavior. Through illustration of the anticipated research efforts in this technology, the author hopes to provide a clear picture of the current status of emergent Semantic Web technology and a suitable direction for its future development.

Introduction

The World Wide Web is an information universe, in which countless nodes of Web content that provide links to online and off-line resources are connected together. Although this information universe tends to be unbounded, the technology that supports it is simple. The World Wide Web is constructed using just three fundamental standards: the uniform resources identifier (URI), the hyper text transfer protocol (HTTP), and the hyper text markup language (HTML). These three standards perform different functions individually, but serve collaboratively to enable information consumer to access remote resources by retrieving Web content from remote nodes and presenting them on local machines.

The URI that is given to each document is a unique address on the World Wide Web, and is the universal identification of the node that is sought. HTTP is one of the communication protocols for information transmission between two participating applications, with which the requesting application can send enquiries to remote applications to retrieve Web content. The requested application then responds with Web content, which is usually packaged as documents in a message body, to the requesting applications.

Upon receiving the requested Web content, the receiving application launches a corresponding display device on the local machine to present the Web content. To be expressible, the Web content must be specified with some demonstrating properties that configure the expected presentation effects for the respective video or audio devices on which the content will be displayed. Content designers use HTML to annotate their configuration of content, which works like a markup that highlights elements of the content with explanatory notion. Thus, two different kinds of information, the main content and the annotated configuration, are synchronized in the same HTML document. Generally, an application that is specifically for remote resource access and Web content display is called a Web browser. When a Web browser receives a document, it knows which part of the document is the main content and how to display the main content with the expected effects using the configuring information that is provided by the other parts of the document. General presentation effects include control of the size, the color effect of the textual content, and the invoking of the configuration for specific devices to display images, videos, or audio files. The annotations that are marked in HTML allow the Web content to be presented in a flexible way by various media, as long as the host machine is properly installed with the necessary devices for presentation. Often the annotation may also include links to other relevant information that allows information consumers to “navigate” the information universe among relevant pages. Through years of effort, the World Wide Web can now be considered as the most influential technology of the late 20th century. Its widespread use among the general public has changed modern life in the developed world in many ways.

Changes in the channels of messages exchange. One of the most significant changes that have been caused by the World Wide Web is that people now increasingly rely on this new message exchange channel to discover and disseminate information. For example, academic scholars rely on the World Wide Web to search for literature. They can complete a comprehensive search for the digital images of journal papers, which cover almost all of the results of research that has been carried out in the last few decades

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