

Chapter 10

Visual Ontology Modeling and the Semantic Web

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ABSTRACT

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- The MOT+OWL and MOWL Visual Ontology Editors
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The exponential growth of information available on the Internet makes it increasingly necessary to introduce intelligent agents to facilitate the processing of information and knowledge. A

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few years ago, one of the founders of the Web and current director of the W3 Consortium, Tim Berners-Lee, along with his colleagues (Berners-Lee, Hendler, and Lassila, 2001), proposed to provide the Internet with information whose meaning, beyond its syntax, could be interpreted by a program that would search information in ways that are far more intelligent than now. This new generation of the Internet has been termed “*the Semantic Web*”.

We haven’t reached that level of sophistication yet, but we’re getting closer. Here is an example anyone with an iPhone in 2008 could perform: You know that you will be in Boston next Monday and you will need to go to a computer store to buy some software. You decide to use a voice recognition application such as VLingo and you say to your iPhone, “Boston, Computer Shops, near the airport.” It automatically finds several stores with these properties on the Internet and displays them on a map, together with their address. With this information, you can then ask the device, first to phone some of the stores to check the availability of the software. Next, using the iPhone integrated GPS application, you can have an itinerary that will guide you to travel between the airport and one of the stores.

Though there is some intelligence involved in this example, there are two human interventions required. This is because, currently, though computers can analyze Web pages and find information, they have no way, except in rare situations, to process the meaning or infer relationships between links to other pages or applications.

Let us take a more complex example. You learn that your mother has to undergo a series of weekly physiotherapy sessions recommended by her doctor, and you must accompany her. On the Semantic Web, you instruct the agent that looks after your agenda to organize your schedule accordingly. The agent receives information regarding the *treatment* from the doctor’s agent, then examines a list of *physiotherapists*, selecting those that correspond to your mother’s *insurance*

policy and that are situated within a *radius of 20 kilometers* from her home. Your agent then begins to search *visiting hours* that are compatible with your schedule. Within minutes, it proposes a treatment schedule for your mother.

To accomplish this, the meaning of each page and the terms it contains must be encoded in a web of relationships. In this way, when the agent comes to the page of the physiotherapy clinic, it is able to identify not only keywords such as “treatment,” “doctor,” “physiotherapist,” and “schedule” syntactically, but also that such and such physiotherapist works at the clinic and is available Mondays, Wednesdays, and Fridays during certain times of the year. The page therefore contains a script that can be interpreted by the agent and return a list of possible visiting hours between such and such dates.

10.1 THE SEMANTIC WEB: ONTOLOGIES AND INFERENCES

The Semantic Web is not a new Web but an extension of the actual Internet where an increasing number of pages specify the meaning of the information they contain and are therefore interpretable by a search agent. Given the millions, if not billions, of pages currently available on the Internet, the transition to the Semantic Web will not happen overnight, but it has already begun. It will happen domain by domain by members of a community interested in the same domain and who provide knowledge descriptions (metadata) to the Web pages in their domain.

Figure 1 illustrates the general concept of a semantic Web. Resources available on the Internet, such as data bases, Web sites, texts, images, videos, interactive applications all support elements of knowledge that are described by some metadata listing their properties.

For example, a certain book has an author, has a number of pages, talks about medicine, mainly on heart diseases, has a table of contents that point

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