

Chapter 8.7

Enhancing E-Business on the Semantic Web through Automatic Multimedia Representation

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ABSTRACT

With the evolution of the next generation Web—the Semantic Web—e-business can be expected to grow into a more collaborative effort in which businesses compete with each other by collaborating to provide the best product to a customer. Electronic collaboration involves data interchange with multimedia data being one of them. Digital multimedia data in various formats have increased tremendously in recent years on the Internet. An automated process that can represent multimedia

data in a meaningful way for the Semantic Web is highly desired. In this chapter, we propose an automatic multimedia representation system for the Semantic Web. The proposed system learns a statistical model based on the domain specific training data and performs automatic semantic annotation of multimedia data using eXtensible Markup Language (XML) techniques. We demonstrate the advantage of annotating multimedia data using XML over the traditional keyword based approaches and discuss how it can help e-business.

INTRODUCTION

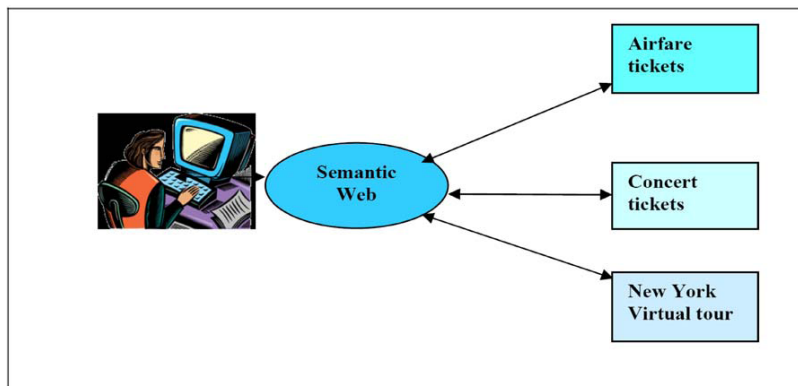
An Internet user typically conducts separate individual e-business transactions to accomplish a certain task. A tourist visiting New York might purchase airfare tickets and tickets to a concert in New York separately. With the evolution of the Semantic Web, as shown in Figure 1, the user can conduct one collaborative e-business transaction for the two purchases. Moreover, he/she can also take a virtual tour of New York city online, which actually might be a collection of all videos, images, and songs on New York appearing anywhere on the World Wide Web. With the continuing growth and reach of the Web, the multimedia data available on it continue to grow on a daily basis. For a successful collaborative e-business, in addition to other kinds of data, it is important to be able to organize and search the multimedia data for the Semantic Web.

With the Semantic Web being the future of the World Wide Web of today, there has to be an efficient way to represent the multimedia data automatically for it. Multimedia data impose a great challenge to document indexing and retrieval as it is highly unstructured and the semantics are implicit in the content of it. Moreover, most of the multimedia contents appearing on the Web have no description available with it in terms of

keywords or captions. From the Semantic Web point of view, this information is crucial because it describes the content of multimedia data and would help represent it in a semantically meaningful way. Manual annotation is feasible on a small set of multimedia documents but is not scalable as the number of multimedia documents increases. Hence, performing manual annotation of all Web multimedia data while “moving” them to the Semantic Web domain is an impossible task. This we believe is a major challenge in transforming today’s Web multimedia data into tomorrow’s Semantic Web data.

In this chapter, we propose a generic automatic multimedia representation solution for the Semantic Web—an XML-based (Bray, Paoli, & Sperberg-McQueen, 1998) automatic multimedia representation system. The proposed system is implemented using images as an example and performs domain-specific annotation using XML. Specifically, our system “learns” from a set of domain-specific training images made available to it a priori. Upon receiving a new image from the Web that belongs to one of the semantic categories the system has learned, the system generates appropriate XML-based annotation for the new image, making it “ready” for the Semantic Web. Although the proposed system has been described from the perspective of images, in general it is

Figure 1. Collaborative e-business scenario on the Semantic Web



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