XRVAT: An RDF/XTM Integrated Authoring Tool for Resource Generation with a Topic Maps-based Interface

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Abstract

To construct the foundation of the Semantic Web, RDF (Resource Description Framework) and XTM (XML Topic Maps) have been separately investigated. Although they are designed with good machine-understandability, a visual authoring tool is highly demanded for people to efficiently construct the Semantic Web resources. From the past research, it shows that an authoring tool with an XTM interface is more favorable for users. In this paper, we describe an integrated authoring tool called XRVAT which has an XTM interface and is able to generate RDF resources.

1 Introduction

The introduction of the Semantic Web gives a giant breakthrough to the Web technology with its machine-understandability on the semantic issue. In the past, two standards RDF (Resource Description Framework) [Beckett and McBride, 2004] and XTM (XML Topic Maps) [ISO, 2000; Pepper and Moore, 2001] have been separately investigated. Since both standards are based on eXtensible Markup Language (XML), their text descriptions cannot be intuitively understood. In the past, several visual authoring tools, such as IsaViz [Pietriga, 2002], Protege [Noy *et al.*, 2001], and TM4L [Dicheva *et al.*, 2005], have been proposed to facilitate the authoring work for users. However, to the best of our knowledge, these authoring tools consider only one standard, either RDF or XTM. That is, there is no authoring tool which can generate both RDF and XTM resources. Users thus need to make extra effort to integrate different Semantic Web resources.

In this paper, we describe a visual authoring tool called XRVAT (XTM-to-RDF Visual Authoring Tool) which can generate both RDF/XTM resources with a Topic Maps-based visual authoring environment. Users thus can efficiently construct the Semantic Web resources in RDF or XTM format with a uniform interface.

2 Related Work

In the past studies of Semantic Web visual authoring environments, most RDF-based tools emphasizes on visualizing the entire relationships and resource descriptions. In [Pietriga, 2002], IsaViz provides high interoperability for RDF. In [Noy *et al.*, 2001], Protege further provides OWL authoring functionalities. Although these visualization authoring tools facilitate the manipulation of RDF and ontologies with interactive interfacing, their interfaces are not topic-oriented. Users cannot easily catch the relationship concept from these RDF-based representations.

On the contrary, the interface based on Topic Maps has the benefits of featuring the overview of the Semantic Web. In [Dicheva *et al.*, 2005], TM4J is proposed to provide a Topic Maps-based visual authoring environment for e-learning. TM4J not only provides an interactive visualization interface, but also presents a bird's eye view of the topic-based Semantic Web resources. Users can thus browse and edit the topic hierarchy at different levels to facilitate the utilization of XTM resources. However, it does not consider the RDF resource generation. Manually performing XTM-to-RDF translation is very time consuming and error-prone, and is thus not practicable.

3 Design of XRVAT

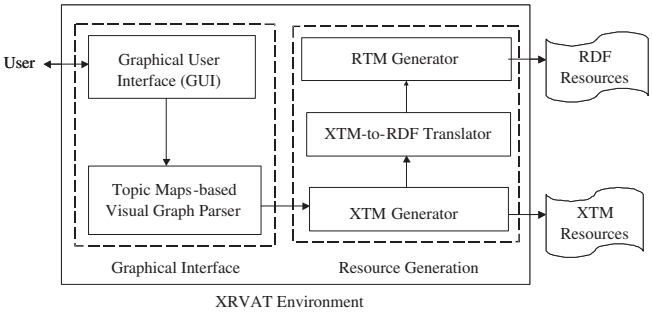

Figure 1: The architecture overview.

In Figure 1, the architecture consists of two major modules, the graphical interface module and the resource-generating module. The graphical interface presents a Topic Maps-based graphical user interface (GUI) to facilitate the authoring work. There is a graph parser to analyze the Topic Maps-based relationships among the visual components. In the resource-generating module, an XTM generator is the core to

generate resources in well-formed XTM format. If the user wants resources to be in RDF format rather than in XTM format, the XTM generator feeds the XTM-to-RDF translator with the internal XTM resources to translate XTM syntax into RDF syntax, and then the RTM generator generates RDF resources.

In the Topic Maps-based visual authoring interface, six visual components, namely, Topic, Association, Occurrence, Member, Scope, and Basename, are designed to describe the semantic relationships within the Topic Maps according to the XTM syntax [Pepper and Moore, 2001]. In the XRVAT interface design, each visual component provides an interactive functionality accompanied with a pop-up form. Users can fill in the form to complete the description of Topic Maps. With such an interactive design, XRVAT helps users generate well-formed XTM and RDF documents.

To generate well-formed XTM documents, the visual components are designed in accordance with the specification of XTM 1.0 [Pepper and Moore, 2001]. To further translate the semantics, XRVAT adopts an XTM-to-RDF integration scheme proposed by Ogievetsky [Nikita, 2001a; 2001b], and has some supplements to reduce the complexity of translation.

Figure 2 (a) shows an example in which a well-formed XTM resource file is automatically generated. In Figure 2 (b), the XTM resources are automatically translated into RTM format with the uniform XRVAT interface.

4 Concluding Remarks

We have implemented a prototype in Java to demonstrate a Topic Maps-based visual authoring environment. With the uniform Topic Maps-based interface, XRVAT can help users efficiently generate the Semantic Web resources in RDF/XTM format to meet different requirements. We believe that it can be used for rapid construction of the Semantic Web.

Acknowledgments

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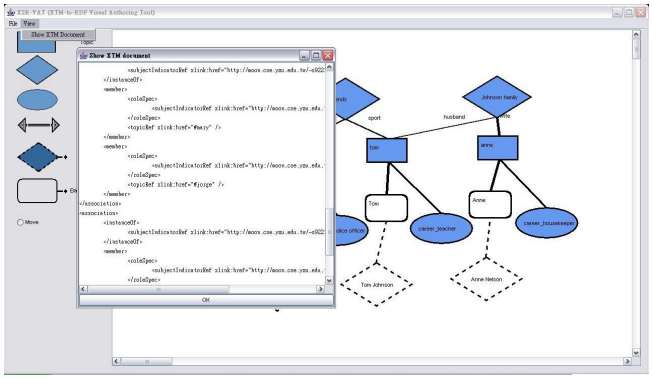
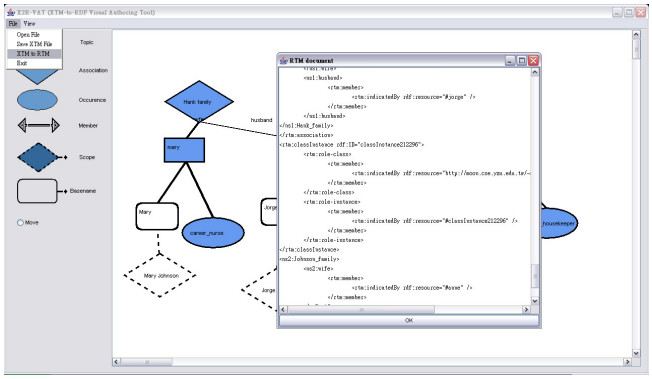


(a)



(b)

Figure 2: Generation of RDF/XTM resources with the uniform XRVAT interface.

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