Context-Sensitive User Interface Support for Ontology-Based Web Applications

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1. Introduction

The Semantic Web introduces new needs and possibilities for the development of Graphical User Interfaces (GUI's). Interacting with end-users on the Web means getting user input in HTML forms, invoking Web services via HTTP requests, presenting the output in automatically generated web pages, and repeating the interaction cycle to complete higher-level procedures when they consist of several steps. Available technology for GUI (i.e. web page) generation, like XSLT, JSP/ASP, CGI's, and the like, are not specifically suited for the manipulation of ontology-based knowledge. As a consequence, GUI developers of Semantic Web applications must be highly familiar with programming languages and specific software packages like RDF API's, EJB's, XML databases, and so on. GUI solutions are expensive, developed in an ad-hoc fashion, and hard to reuse across applications.

2. Goals

We believe the Semantic Web offers an opportunity to take advantage of the explicitly present semantic information to develop high-quality user interfaces at a low cost. Our research aims at the development of advanced tools for the specification of web user interfaces, supporting the following aspects:

- **Presentation design support:** automatic generation of web pages for knowledge presentation. Allow human designers to configure or specify from scratch all aspects of presentation, including knowledge selection rules, page design, and link generation strategies, to be applied to the generated web documents.
- **Dialog support:** automatic generation of HTML components for user input, automatic sequencing of interaction steps to accomplish composite procedures, based on an explicit description of web services and user tasks.
- **Generality:** make minimum assumptions about how application knowledge is represented. Provide generic GUI specification facilities compatible with arbitrary ontologies defined or used by an application.

- **Suited to the Semantic Web:** provide explicit facilities for manipulating and communicating ontology-based knowledge between users and applications (knowledge presentation and input).
- **Context-sensitivity:** automatic adaptation of interfaces to static and dynamic runtime conditions, like user profile, knowledge and goals, platform characteristics, or type and properties of the data.
- **Interactive authoring:** provide advanced (semi-) WYSIWYG authoring tools to improve ease of use.

3. Approach

Our approach consists of giving developers the freedom of ontology-based knowledge modeling, while at the same time we take advantage of the explicit semantic description required by the Semantic Web for this knowledge.

We have developed a GUI development tool, PEGASUS [Castells and Macías 2001], where the aspects listed in the previous section have been undertaken. PEGASUS uses an explicit presentation model, separate from knowledge contents, to provide designers with extensive control over the generation of all aspects of presentation. A presentation model is associated to each class of the ontology for which the user interface is being developed. The presentation model consists of templates and rules that use a fairly simple syntax, where parts of a semantic network (defined in RDF) can be easily referenced, and conditions over the user, the platform or the knowledge itself can be expressed. Knowledge units are presented to the user at runtime by selecting the appropriate presentation model for the class of the unit, from which a web document is generated that displays the unit contents and links to other ontology instances and parts. After focussing on the presentation module, we are currently extending the system for dialog support.

References

[Castells and Macías, 2001] Castells P. and Macías, J. A. An Adaptive Hypermedia Presentation Modeling System for Custom Knowledge Representations. In *Proceedings of the World Conference on the WWW and Internet (WebNet 2001)*, pages 148-153, Orlando, Florida, 2001.