

Adaptation in Adaptable Personal Information Environment

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In order to support knowledge workers during their tasks of searching, locating and manipulating information, a system that provides information suitable for a particular user's needs, and that is also able to facilitate annotation, sharing and reuse information is essential. This paper presents Adaptable Personal Information Environment (a-PIE); a service-oriented framework using Open Hypermedia and Semantic Web technologies to provide an adaptable web-based system. a-PIE models the information structures (data and links) and context as Fundamental Open Hypermedia Model (FOHM) structures which are manipulated by using the Auld Linky contextual link service. a-PIE provides an information environment that enables users to search an information space based on ontologically defined domain concepts. The users can add and annotate interesting data or parts of information structures into their information space, leaving the original published data or information structures unchanged. a-PIE facilitates the shareability and reusability of knowledge according to users' requirements.

1. Introduction

In a community of practice people are often willing to develop and share knowledge. They could use a repository for this purpose, but often the context and relationship between information chunks will be lost. Knowledge management and the associated tools aim to provide such an environment in which people may create, learn, share, use and reuse knowledge, for the benefit of the organisation, the people who work in it, and the organisation's customers. However, instead of helping users, many systems are just increasing the information overload. Adapting the information chunks and/or the links (associations) to the needs of individual users greatly enhances navigation and comprehension of an information space, and reduces the information overload.

In this paper we propose an adaptable Personal Information Environment system (a-PIE) that brings together knowledge technologies and adaptive hypermedia to facilitate the reuse and sharing of information. a-PIE aims to provide a system in which members of the community or organisation are able to browse information tailored to their needs, store relationships to content of interest in their own information repository, and are able to annotate the relationships for reuse. This

paper briefly presents the technologies and a system overview of a-PIE, focusing on the support for adaptation of information. Finally related work and some conclusions are presented.

2. Motivation and Background

A brief scenario helps explain the motivation behind this research. A user in a virtual community is looking/searching for information from a community or organisation's web site. They find an interesting piece of information and would like to keep it for reference later in a personal repository. On occasions, they would like to add annotation to particular information snippets and would like to record the context before storing it in their personal repository. They would also like to share this information, with others in the community. As this is a diverse community they annotate the information with the level of expertise (e.g., experts, intermediate or beginners) the reader requires in order to understand the information. Then depending on reader's profile (e.g., knowledge background, expertise) only those authorised by the original user will see the information and its annotations.

In Open Hypermedia Systems, links are considered as first-class objects. The Fundamental Open Hypermedia Model (FOHM) [1] is a protocol for open hypermedia with additional context-awareness features. It is a data model for expressing hyperstructure by representing associations between data. Auld Linky [1] is a context based link server which supplies links from specified linkbases by parsing FOHM structures. FOHM also provides a Context modifier object, which can be attached to any part of the FOHM structure. Context objects define conditions for the visibility of particular objects and are used by Auld Linky to distinguish which bindings should be returned to the user.

3. System Overview

The adaptable Personal Information Environment (a-PIE) aims to provide a system in which members of the community are able to browse information suitable to their particular needs, identify and store FOHM structures in their own information repository which users may enhance prior to reuse. a-PIE further enhances these functionalities by using ontologies [2] to define the associations and facilitate interoperate between components.

a-PIE consists of several services. The domain concept service provides the relevant concept. The user model service updates user model. The data item and association service manipulates data and structures, as FOHM objects, from linkbases through the contextual link server (Auld Linky). The user service or adaptive engine provides the facilities for reconciling the data content, FOHM structures, and user model, to present the individualised document to the user through a web browser.

Figure 1 illustrates the system architecture of a-PIE. The functionality of the system is made available to software agents through a Web Service interface (WSDL), and to end-users through a Web browser. The system separates these

components; domain concept, data, structure, user information and context. Each model has an ontology as a means for interoperation.

- *Domain concept*: represents the basic structure of concept schemes.
- *Domain data model*: represents the data in the form of FOHM Data objects.
- *Structure model*: connects FOHM Data objects as a series of FOHM Association structures which can be Navigational Link, Tour, Level of Detail and Concept.
- *User model*: represents user-related information, such as background knowledge.
- *Context model*: represented by FOHM Context objects which can be attached to a Data or Association object for describing the context in which the data item or association is visible (or hidden) from the user.

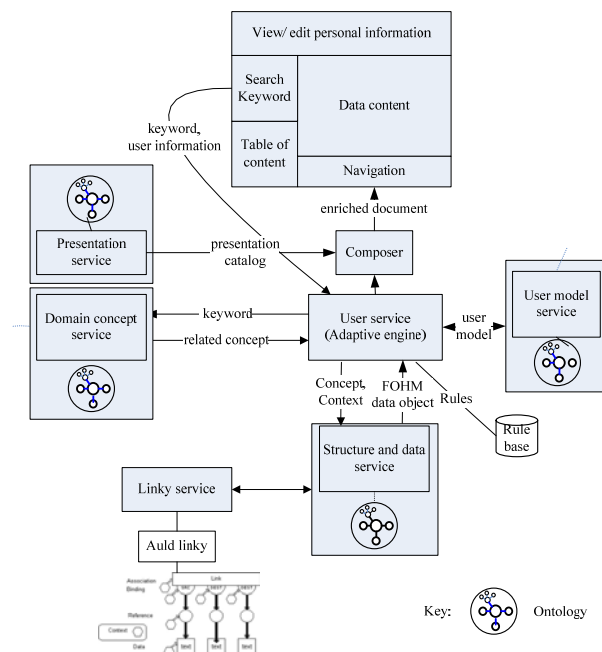


Figure 1 a-PIE System Architecture

a-PIE provides adaptive hypermedia support through the use of Auld Linky as a contextual link server to integrate FOHM structure and data objects according to the context. Context objects define conditions for the visibility of particular objects and are used by Auld Linky to distinguish which bindings should be returned to the user. FOHM structures can be combined to implement a range of adaptive hypermedia techniques [3].

The ontologies are used to enrich links and data content, and to enable other users to share and reuse the content or structure of the FOHM representation. In addition to browsing and searching the site the user can; add data, add additional specialist information, and change the context or behaviour of the FOHM structures.

4. Related work and Discussion

There are several formal models proposed which focus on the mechanisms and structures based on adaptive hypermedia systems such as Adaptive Hypermedia Application Model (AHAM) [4]. Hunter gatherer is a tool that allowed people to browse the web and identify pieces of information and group these as a collection of links [6], while, Piggy Bank is a browser enabled tool that re-constructs Web page content into a Semantic Web format [7]. The tool also allows user to save and share pages as links represented in RDF. Unlike a-Pie, the tool does not use an ontology to organise the pool of pages but a *folksonomies*. COHSE [8] is a non-adaptable ontological hypertext system that allow semantic annotations of webpages.

This paper describes a-PIE as a Web-based system aimed to provide adaptable information and support sharing and reuse of information which are achieved by using FOHM and Auld Linky and Semantic Web technology. The a-PIE system conforms to the generic architecture for an Adaptive Hypermedia System proposed by Ohene-Djan *et al.*[5].

6. Acknowledgement

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7. References

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