

PRISE : Adaptive environment for consolidated management of digital resources

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Abstract. The increase in production of digital data, these last years, has raised several issues regarding the management of heterogeneous and multiple source data in the user's environment. In this proposal, we focus on user process management in order to assist him in the consolidated management of his digital resources in an interactive and adaptive system. We introduce PRISE (Personal Interactive research Smart Environment) to assist researches for managing their data efficiently. PRISE architecture is based on three essential parts of the system : the user model, the process model and the resource model. Our aim is to maintain a consistency in terms of interaction between the users and the digital resources. Experimental implementation which is carried out in our laboratory, is presented.

Keywords: User modelling, process management, profile management, trace-based system, digital resource consolidation

1 Introduction

In the recent years, the rapid growth in production of digital data raises new problems regarding data management issues [1][2]. Users of information systems face several major challenges in the organization of the data and retrieving quality information from data sources. They want to work in a consistent environment with reliable information despite the increasing number of data sources and their heterogeneities. The use of data must be relevant to their contexts and adapted to their profiles as illustrate in Fig. 1. It is shown that, users with different profiles might have access to multiple data sources. The data contained in these data sources are often heterogeneous. The main question that arises is : Can heterogeneous data from various data sources be adapted with the user? Otherwise, how to adapt these data to their users in a digitals resources management environment? We assume that it is very difficult or impossible for different users with different profiles and evolving in different context (context of use) to have the same usage needs on heterogeneous data. Indeed, we want to provide a digital resources management system that is best suited for each user.

The above questions have raised new requirements in the modelisation of process management. In [2] the authors argued that, it requires automated or

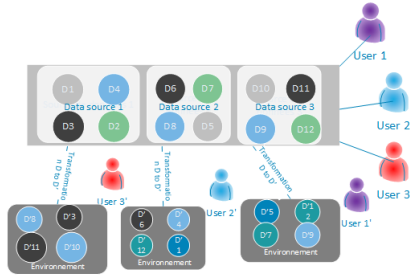


Fig. 1. Heterogenous and multiple data sources

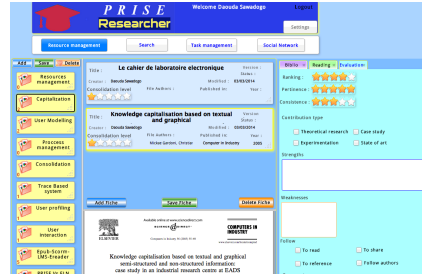


Fig. 2. PRISE digital resources management interface

semi-automated analysis techniques to detect patterns, to identify anomalies, and to extract knowledge from different processes to produce an adaptive process management. This study consists of assisting user in handling digital resources based on a consolidated management of digital resources. The contributions of this proposal are as follows :

1. defining a new model of digital resource that provides the best use experience to users of a specific system (e.g. to meet the user's needs).
2. proposing an intelligent system to assist users in their resources management based on trace-based system, user profile modelling and adaptive process modelling.

2 Our Methods

The user's profile provides relevant information about the user. Therefore, we propose some mechanisms to assist the user in the consolidated management of resources and system environment based on these information. The profile should match the 3 facets of assistance as shown in Table 1.

The resource which is relevant to the profile of the user can be verified through the resource metadata. The proposed methods are related to three elements (the profile, the resources, the processes) that are very important when referring to consolidated management of digital resources. The methods in the proposed system are summarised as follows :

- firstly, we modelised and characterised the user's information and interaction with digital resources using the extension of IMS-LIP (IMS Learner Information Package). The digital resources in the system is also modelised by using LOM(Learning Object Metadata) application profile;
- secondly, each resources which are relevant to the user is characterised. TF-IDF [3] is used to measure the distance between the user profile information and the resource metadata;
- thirdly, the user process in the digital resource management system is characterised to adapt the digital resource manipulation process to the user model and the resource model.

Facets of user assistance	Characteristics to act on this facet
Resources management	Characterises digital resources in order to calculate the relevance of these resources for users in the systems
Process management	Characterises resources management rules and user's process management interaction to adapt the usage
Collaboration management	Criteria for building a user trust community [8], resource sharing and recommendation

Table 1. Facets of assistance in PRISE

The main objective on the relevance, we are interested, concerns the relevance based on the intention of the user[4] [5]. As The intention of the user is dynamic, the information cannot be stored in its profile. Therefore, we need to automatically identify user's intention to calculate the relevance of the digital resource for this user[6][7].

3 Architecture and Implementation

In the experimental work of this proposal, an environment system that allows a researcher to manage their digital resources have been developed. The system offers a set of tools allowing it to be more effective in the production of scientific results. Our research environment PRISE¹ includes several tools which are:

- digital resources management (implement with NoSQL database and JSON API to retrieve data);
- social networks including our model of the researcher's profile;
- events, tasks, teams, and members management.

Fig. 2 present resource management interface. Fig. 3 shows the functionalities that are required for implementation, Fig. 4 presents the system architecture and Fig. 5 shows an adaptive scenario model.

4 Conclusion and future work

The main contribution of the proposal is to be found in user digital resources relevance management, according to the user's profile information and the resource metadata. The first version of our prototype has been developed and we hope to improve it through some related works proposed in [9]. In our future work, we would need :

- to implement a better trace-based system which will be used to assist the user in his consolidated management of his digital resource;
- to build a resource run-time component which will be used to validate our resource model that will be more autonomous and interoperable;
- to implement the user's companion in the system.

¹ PeRsonal Interactive research Smart Environment

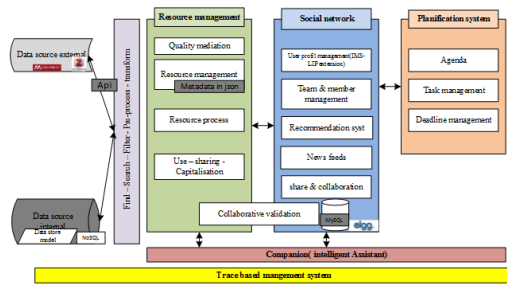


Fig. 3. PRISE system functionalities

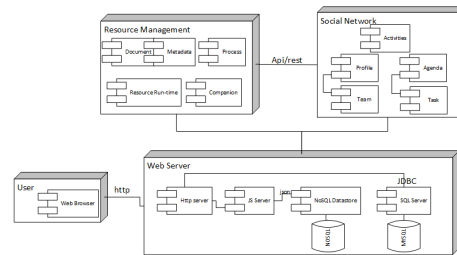


Fig. 4. PRISE system architecture

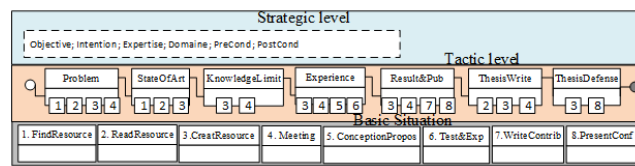


Fig. 5. PRISE Scenario

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