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PARADIGM SEMANTIC WEB IN THE CONTEXT OF DIGITAL LIBRARY: SERVICES AND INFORMATION INTEGRATION

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Abstract: *This paper presents a several of theoretical ideas and applied technology that can be embodied in the creation of Semantic Digital Library (SDL). In particular, considerable attention paid to how the Semantic Web technology is used in various aspects of DL. A basic level in the DL that may be carriers of semantic description. Described the advantages of this approach. It also highlights issues that arise during the integration of classical electronic libraries and Semantic Web a place in these processes. Made a brief overview of the world's leading projects to create DL using Semantic Web.*

Keywords: *Semantic Web, digital library, WSMO, semantic annotation.*

INTRODUCTION

Electronic Library is understood from position the collective memory and a complex structure. Committee of IEEE Technical Committee on Digital Libraries, interprets this concept as a set of Digital libraries, digital museums, digital archives [1].

Collective memory forms the so-called knowledge portals and content, with a network of distributed resources.

The development of a collective memory requires the development of other areas such as: storage, user interface, classification, information search, management and conservation.

In addition to above discussed areas should also increase the degree of detail descriptive information. [2].

1. SEMANTIC WEB ISSUES IN THE CONTEXT OF DL

Using semantic technologies in digital libraries has been given attention in many projects such as: SWHi [3], eCulture [4], IPISAR [5], EPOCH та AMA [6].

The first problem is that each directory has its own search engine and uses a grammar to describe the metadata and data, including that it will never work on other systems. Out of this situation will be the presentation of information in machine understandable form, using RDF [7].

The second problem concerns directly to information: a huge variety of formats that are used for indexing data, is a major obstacle to integration.

To create a single conceptual layer, semantic information must be taken from the database, HTML-page, descriptive text, and metadata to be presented in a standard format in order to obtain the conceptual content of information created conceptual mapping.

One way to address this problem can be generalized formal model of annotations.

Another problem that arises when handling large amounts of heterogeneous information is to ensure appropriate services.

2. FORMAL MODEL OF ANNOTATIONS

The main two components of the electronic library is its content, and set the software to work with this content. To start, consider the content of EB. Information in libraries is described in terms of electronic facilities (Digital objects DO), which are multimedia content and metadata [8]. Formal model that suggested in [9], identifies two approaches to understanding the annotation: annotations as metadata or annotation as content.

Among the many models, we use a model that suggested in [8], [9] with some changes and refinements, which include the use of ontology. Let LT the set of types of links.

$H(k)$ set of identifiers of digital objects in time k.

Set of segments ST, we indicate that

$\forall st_{sm_i} \in ST,\ i = 1,2,...,n.$

SM defines the set of streams, so that $\forall sm_i \in SM,\ i = 1,2,...,n.$

Annotation can be viewed as the process enlargement of ontology O_i.

Each class of ontology O_i shall designate kl_i, a set of classes KL.

Annotation $a \in A(k)$ is tuple:

$$a = \begin{pmatrix} h_a \in H(k), \\ A_a \subseteq KL(k) \times LT \times ST(k) \times \\ \times SM(k-1) \times H(k-1) \end{pmatrix}$$

where h_a – own unique identifier annotations a, that is $h(h_a) = a$;

A_a set n-arity relations annotation a and is defined as the product sets KL, LT, ST, SM and H.

In the case of annotation of web documents, the formal model of change. Let A set all annotation a, and D set DO, accordingly, $DO = D \cup A$, a subset of the set DO to mark do, that is $do \in DO.$

Annotation Web-document called tagging graph:

$$G := \left(\left(DO, E_{da} \subseteq A \times DO\right)\right),$$

where $DO = D \cup A$ vertex graph;

$$E_{da} = \begin{Bmatrix} (a, do) \in A \times DO \mid \exists \alpha \in A_a, \\ \alpha = \left(kl_i, sm_i, st_{sm_i}, hsm^{-1}, LT\right) \end{Bmatrix}$$

– side of the graph.

3. SERVICE-ORIENTED DIGITAL LIBRARY ARCHITECTURE

We believe that the use of service-oriented architecture is a key element in achieving interoperabelnosti. To build digital libraries, we propose to use the architecture of service-oriented e-Library (Service-Oriented Digital Library architecture – SODL) [10], it provides a convenient way to achieve the construction of collective memory

To ensure a dynamic setting digital library must provide mechanisms that perform this function. This mechanism is the introduction of semantics in the operation environment of web services.

Digital library services can be classified according to various aspects. Services are in the process of change is not content DL, is called sensory services.

As part of the approach Semantic Sensor Web [11] we additionally anotuyemo results of services. Therefore, unlike classical building environment for semantic web services, which result not anotuyetsya, we anticipate the results of the metadata annotation of web services.

Basic services allocated in the [12].

We will consider the composition based on goal-oriented paradigm is based initial conditions and the existing set of services to make the composition. And, because Web services are located in the semantic environment, then choose the plan of composition that may be useful for the end user. That is, unlike the classic statement of the problem of specification aims to find services that can achieve this goal, go with the assumption that the available set of services can reach some pre unknown targets that may be selected by user.

This combination of functional properties has meant that the plans need further study and conduct replanning. That is changing plans during the implementation of these plans.

4. CONCLUSIONS

However, in our opinion the most promising compositions for framework Web-services is WSMT [13] and WSMX [14], which is based on WSMO.

We developed two services for the existing free software management digital libraries Eprints1: service getEprint and searchEprint. Each services the interface that meets the specification WSDL 1.1. What allows these services to connect WSMT.

This paper briefly outlined the theoretical and practical bases of DL using semantic technologies. An overview of European projects to integrate technology in the Semantic Web DL. The article also stated on the application of principles of Semantic Web services to the DL.

However, creating such problems DL needs further study, particularly in the no formal notion of ontology. At the same time also has both types of connections that can be between instances and ontologies. But now we can say that it will be necessary to solve the problem of alignment between ontologies, which arise as a consequence of the integration of two or more semantic DL.

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