Flexible Authoring of Metadata for Learning

Assembling forms from a declarative data and view model

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Abstract

With the vast amount of information in various formats that is produced today it becomes necessary for consumers of this information to be able to judge if it is relevant for them. One way to enable that is to provide information about each piece of information, i.e. provide metadata. When metadata is to be edited by a human being, a metadata editor needs to be provided. This thesis describes the design and practical use of a configuration mechanism for metadata editors called annotation profiles, that is intended to enable a flexible metadata editing environment. An annotation profile is an instance of an Annotation Profile Model (APM), which is an information model that can gather information from many sources. This model has been developed by the author together with colleagues at the Royal Institute of Technology and Uppsala University in Sweden. It is designed so that an annotation profile can hold enough information for an application to generate a customized metadata editor from it. The APM works with metadata expressed in a format called RDF (Resource Description Framework), which forms the technical basis for the Semantic Web. It also works with metadata that is expressed using a model similar to RDF. The RDF model provides a simple way of combining metadata standards and this makes it possible for the resulting metadata editor to combine different metadata standards into one metadata description. Resources that are meant to be used in a learning situation can be of various media types (audio- or video-files, documents, etc.), which gives rise to a situation where different metadata standards have to be used in combination. Such a resource would typically contain educational metadata from one standard, but for each media type a different metadata standard might be used for the technical description. To combine all the metadata into a single metadata record is desirable and made possible when using RDF. The focus in this thesis is on metadata for resources that can be used in such learning contexts. One of the major advantages of using annotation profiles is that they enable change of metadata editor without having to modify the code of an application. In contrast, the annotation profile is updated to fit the required changes. In this way, the programmer of an application can avoid the responsibility of deciding which metadata that can be edited as well as the structure of it. Instead, such decisions can be left to the metadata specialist that creates the annotation profiles to be used. The Annotation Profile Model can be divided into two models, the Graph Pattern Model that holds information on what parts of the metadata that can be edited, and the Form Template Model that provides information about how the different parts of the metadata editor should be structured. An instance of the Graph Pattern Model is called a graph pattern, and it defines which parts of the metadata that the annotation profile will be editable. The author has developed an approach to how this information can be used when the RDF metadata to edit
is stored on a remotesystem, e.g. a system that can only be accessed over a network. In such cases the graph pattern cannot be used directly, even though it defines the structures that can be affected in the editing process. The method developed describes how the specific parts of metadata are extracted for editing and updating when the metadata author has finished editing. A situation where annotation profiles have proven valuable is presented in chapter 6. Here the author have taken part in developing a portfolio system for learning resources in the area of blood diseases, hematology. A set of annotation profiles was developed in order to adapt the portfolio system for this particular community. The annotation profiles made use of an existing curriculum for hematology that provides a competence profile of this field. The annotation profile makes use this curriculum in two ways: 1. As a part of the personal profile for each user, i.e. metadata about a person. Through the editor, created from an annotation profile, the user can express his/her skill/knowledge/competence in the field of hematology. 2. The metadata can associate a learning resource can with certain parts of the competence description, thus expressing that the learning resource deals with a specific part of the competence profile. This provides a mechanism for matching learning need with available learning resources. As the field of hematology is evolving, the competence profile will need to be updated. Because of the use of annotation profiles, the metadata editors in question can be updated simply by changing the corresponding annotation profiles. This is an example of the benefits of annotation profiles within an installed application. Annotation Profiles can also be used for applications that aim to support different metadata expressions, since the set of metadata editors can be easily changed. The system of portfolios mentioned above provides this flexibility in metadata expression, and it has successfully been configured to work with resources from other domain areas, notably organic farming, by using another set of annotation profiles. Hence, to use annotation profiles has proven useful in these settings due to the flexibility that the Annotation Profile Model enables. Plans for the future include developing an editor for annotation profiles in order to provide a simple way to create such profiles.

**Key Words**

Metadata, RDF, Semantic Web, metadata editors, metadata authoring