MPEG-7 MDS Upper Ontology

Introduction

The MPEG-7 MDS Ontology has been developed in TUC/MUSIC in the context of the DS-MIRF Framework, partially funded by the DELOS II Network of Excellence in Digital Libraries (IST – Project Record Number 507618). It is an OWL DL ontology that fully captures the MPEG-7 MDS (including all the classification schemes) and partially the MPEG-7 Visual and Audio Parts. The ontology is currently used for annotation, retrieval and personalized filtering (the later in conjunction with the Semantic User Preference Ontology described in the next section); it is also planned to be used for summarization and, in conjunction with an MPEG 21 DIA Ontology, for content adaptation.

Documentation for the MPEG-7 MDS ontology is available at: http://astral.ced.tuc.gr/delos/cls_resource_description.jsp?id=10401. The ontology is available at: http://astral.ced.tuc.gr/delos/content/testbeds/MPEG703.zip. Relevant publications:

[TsPoCh04b] Tsinaraki C., Polydoros P., Christodoulakis S.: "Interoperability support for Ontology-based Video Retrieval Applications". In the Proceedings of the Conference on Image and Video Retrieval (CIVR) 2004, pp. 582-591, July 2004, Dublin,Ireland

[TsPoCh04a] Tsinaraki C., Polydoros P., Christodoulakis S.: "Integration of OWL ontologies in MPEG-7 and TV-Anytime compliant Semantic Indexing". In the proceedings of the 16th International Conference on Advanced Information Systems Engineering (CAISE), pp. 398-413, June 2004, Riga, Latvia

[TsPoMoCh04] Tsinaraki C., Polydoros P., Moumoutzis N., Christodoulakis S.: "Coupling OWL with MPEG-7 and TV-Anytime for Domain-specific Multimedia Information Integration and Retrieval". In the Proceedings of RIAO 2004, April 2004, Avignon, France

Requirements

The requirements we had to satisfy during the development of the MPEG-7 MDS Ontology are listed below and are distinguished into:

1. Scope and usage requirements:
   1.1. We aimed to develop a multimedia ontology that captures all the MPEG-7 MDS conventions regarding multimedia content and service description. Thus, the MPEG-7 MDS Ontology can be used during annotation, analysis and reasoning of multimedia content.
2. Harmonization requirements:
   2.1. We aimed to develop a multimedia ontology that could be used in conjunction with domain ontologies, in order to allow domain knowledge utilization.
3. Language/standards requirements:
   3.1. We aimed to develop a multimedia ontology that would allow coupling the well accepted MPEG-7 standard for multimedia content and service description with ontologies expressed in the dominant ontology definition language, OWL.
4. User preference requirements:
   4.1. We aimed to support all the user preference conventions provided by MPEG-7. As the MPEG-7 user preference model was somewhat limiting, we decided to use the MPEG-7 MDS Ontology in conjunction with the Semantic User Preference Ontology described in the next section.

Characteristics

The characteristics that had to be represented in the ontology were all the types, elements and attributes defined in the MPEG-7 MDS.

Harmonization approaches

MPEG-7 provides only general-purpose structures, and in order to be able to utilize domain knowledge we have defined a methodology for the definition and integration of OWL domain ontologies with the MPEG-7 MDS ontology. In order to test our methodology, we have developed a soccer ontology (available at http://elikonas.ced.tuc.gr/ontologies/soccer.zip) and a formula 1 ontology (available at http://elikonas.ced.tuc.gr/ontologies/F1.zip).

In order to overcome the MPEG-7 limitations regarding user preference description, we use the MPEG-7 MDS Ontology in conjunction with the Semantic User Preference Ontology described in the next section.

We foresee the harmonization of the MPEG-7 MDS ontology with well-accepted core ontologies like SUMO and DOLCE.

Semantic User Preference Ontology

Introduction

The Semantic User Preference Ontology is an OWL-DL Ontology, developed in TUC/MUSIC in the context of the DS-MIRF Framework, partially funded by the DELOS II Network of Excellence in Digital Libraries (IST – Project Record Number 507618). It extends the MPEG-7 MDS Ontology with Semantic User Preference description capabilities, according to the Semantic User Preference model described in [TsCh06]. It is used for retrieval and filtering, in conjunction with the MPEG-7 MDS Ontology, and it is planned to be used for summarization.

The ontology is available at: http://elikonas.ced.tuc.gr/ontologies/AppOntos/SUPAO/SUserPreferences. Relevant publications:

[TsCh06] Tsinaraki C., Christodoulakis S.: "A Multimedia User Preference Model that Supports Semantics and its Application to MPEG 7/21". In the proceedings of the Multimedia Modeling 2006 Conference (MMM 2006), January 2006, Beijing, China

Requirements

The requirements we had to satisfy during the development of the Semantic User Preference Ontology are listed below and are distinguished into:

1. Scope and usage requirements:
   1.1. We aimed to develop a multimedia ontology that captures the Semantic User Preference model described in [TsCh06] and use it together with the MPEG-7 MDS Ontology during multimedia content retrieval, filtering and summarization.
2. Harmonization requirements:
   2.1. We aimed to develop an ontology that could be used in conjunction the MPEG-7 MDS Ontology and with domain ontologies, in order to interoperate with MPEG-7 and allow domain knowledge utilization.
3. User preference requirements:
   3.1. We aimed to extend the user preference conventions provided by MPEG-7 with semantic user preference capabilities.

Characteristics

The characteristics specified in the Semantic User Preference model described in [TsCh06] had to be represented in the ontology.

Harmonization Approaches

The Semantic User Preference Ontology is used in conjunction the MPEG-7 MDS Ontology and with domain ontologies, in order to interoperate with MPEG-7 and allow domain knowledge utilization.

OntologyX3D: 3D Graphics Ontology

Introduction

The OntologyX3D is an OWL Ontology, developed in TUC/MUSIC in the context of the DS-MIRF Framework, partially funded by the DELOS II Network of Excellence in Digital Libraries (IST – Project Record Number 507618). It is based on VRML and X3D. It is used for semantic-driven 3D visualization.

Documentation for OntologyX3D is available at: http://astral.ced.tuc.gr/delos/cls_resource_description.jsp?id=10398. The ontology is available http://astral.ced.tuc.gr/delos/content/testbeds/OntologyX3D.zip. Relevant publications:

[KaMoCh06] Kalogerakis V., Moumoutzis N., Christodoulakis S.: "Coupling Ontologies with Graphics Content for Knowledge Driven Visualization". In the proceedings of the IEEE VR 2006 (to appear)

Requirements

1. Scope and usage requirements:
   1.1. We aimed to develop a multimedia ontology that supports semantic content visualization.
2. Harmonization requirements:
   2.1. We aimed to develop a multimedia ontology that could be used in conjunction with domain ontologies, in order to allow domain knowledge utilization.
3. Language/standards requirements:
   3.1. We aimed to develop a multimedia ontology that would allow coupling the well accepted X3D (successor of VRML) standard for 3D content description with ontologies expressed in the dominant ontology definition language, OWL.
4. User preference requirements:
   4.1. We aimed to support allow the utilization of user preferences during semantic content visualization.

Characteristics

The characteristics that had to be represented in the ontology were the X3D elements representing graphics and virtual reality concepts.

Harmonization Approaches

We foresee the harmonization of OntologyX3D with well-accepted core ontologies like SUMO and DOLCE as well as its interoperation with domain ontologies.