

VAMP: Semantic Validation of MPEG-7 Profiles

Martin Höffernig, Michael Hausenblas, Werner Bailer

JOANNEUM RESEARCH Forschungsgesellschaft mbH
Institute of Information Systems and Information Management
Steyrergasse 17, 8010 Graz, Austria
`{firstname.lastname}@joanneum.at`

Raphaël Troncy

CWI Amsterdam, The Netherlands
`raphael.troncy@cwi.nl`

Abstract: This paper describes the VAMP web application for the validation of MPEG-7 descriptions with respect to semantic constraints defined in a profile. The semantic constraints are formalised using an ontology and a set of rules.

Key Words: Metadata, Ontology, Semantic Web, MPEG-7, Validation

Category: H.5.1

1 Introduction

MPEG-7 [MPEG7 2001], formally named Multimedia Content Description Interface, can be used to create complex and comprehensive metadata descriptions of multimedia content. To reduce the syntax variability, MPEG-7 has introduced the notion of *profiles* that constrain the way multimedia descriptions should be represented for particular applications. Since MPEG-7 and profiles are defined in terms of an XML schema, the semantics of its elements has no formal grounding. An approach for expressing this semantics explicitly by formalising the constraints of a profile using ontologies and logical rules is presented in [Troncy et al. 2006]. The use of the MPEG-7 descriptors in a particular context can thus be specified and validated.

VAMP¹ is a Semantic Web Application for validating the conformance of MPEG-7 documents to the semantics of a given profile. The idea and the implementation of VAMP is described in [Troncy et al. 2007].

2 General Workflow

Given a MPEG-7 document, VAMP validates whether it conforms to a selected profile or not. First, the MPEG-7 input document is checked for syntactic validity against the Profile XML Schema. Second, the MPEG-7 description is converted

¹ <http://vamp.joanneum.at>

into RDF with respect to an ontology capturing the semantics of the selected profile. Since not all of the semantic constraints can be described by an (OWL) ontology, logical rules are also used for representing them. Finally, these RDF triples are the input data for the semantic consistency check of the knowledge base containing the ontology and the logical rules.

In contrast to [Garcia and Celma 2005, Tsinaraki et al. 2004, Hunter 2001, Arndt et al. 2007], we do not intend to completely map the MPEG-7 description tools onto an OWL ontology, but rather use Semantic Web technologies to represent those MPEG-7 semantic constraints defined in natural language that cannot be expressed using XML Schema. Our approach is therefore complementary to these other attempts for formalizing MPEG-7.

3 The VAMP Web Application

VAMP is available as a web interface for humans (Figure 1), and as a REST-style² Web service for agents.

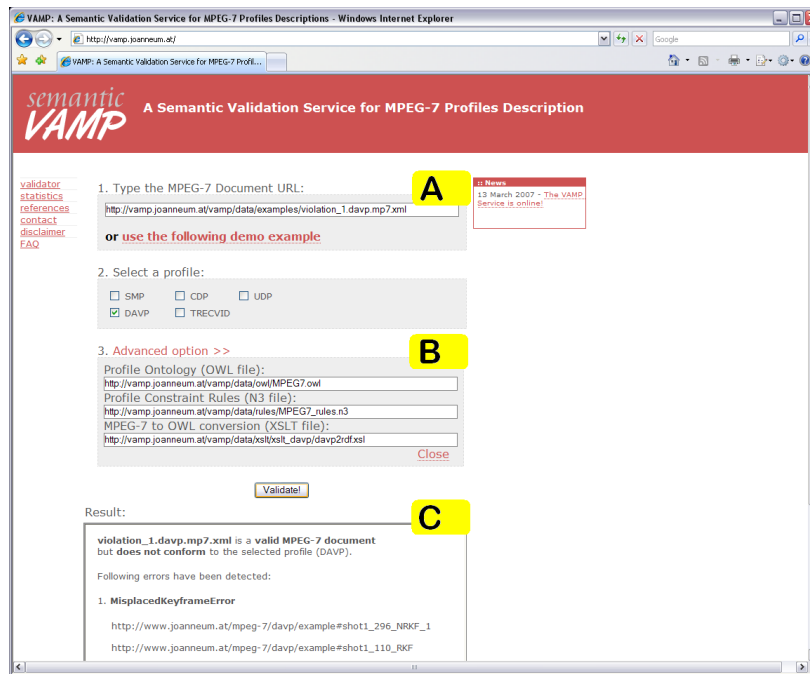


Figure 1: The VAMP Web interface.

² <http://www.ics.uci.edu/~fielding/pubs/dissertation/top.htm>

The user enters the URI of the description to be validated (A). In an advanced mode, optional parameters corresponding to an alternative formalisation of the semantic constraints can be entered (B). The `Validate` button provides a meaningful explanation of the errors detected in the description (C).

At the time of writing parts of the Detailed Audiovisual Profile (DAVP) [Bailer and Schallauer 2006] are formalised and available in VAMP. Formalisations of other profiles (SMP, CDP, UDP) and de-facto profiles (such as the TRECVID format) are planned in the near future.

Acknowledgments

The research leading to this paper was partially supported by the European Commission under the contracts FP6-027026, "Knowledge Space of semantic inference for automatic annotation and retrieval of multimedia content - K-Space" and IST-2-511316, "IP-RACINE: Integrated Project - Research Area CINE".

References

- [Arndt et al. 2007] Richard Arndt, Raphaël Troncy, Steffen Staab, and Lynda Hardman. Adding Formal Semantics to MPEG7: Designing a Well-Founded Multimedia Ontology for the Web. Technical Report KU-N0407, University of Koblenz-Landau, 2007.
- [Bailer and Schallauer 2006] Werner Bailer and Peter Schallauer. The Detailed Audiovisual Profile: Enabling Interoperability between MPEG-7 based Systems. In *12th International MultiMedia Modelling Conference (MMM'06)*, pages 217–224, Beijing, China, 2006.
- [Garcia and Celma 2005] Roberto Garcia and Oscar Celma. Semantic Integration and Retrieval of Multimedia Metadata. In *5th International Workshop on Knowledge Markup and Semantic Annotation (SemAnnot'05)*, Galway, Ireland, 2005.
- [Hunter 2001] Jane Hunter. Adding Multimedia to the Semantic Web - Building an MPEG-7 Ontology. In *First International Semantic Web Working Symposium (SWWS'01)*, Stanford, California, USA, 2001.
- [MPEG7 2001] MPEG-7. Multimedia Content Description Interface. ISO/IEC 15938, 2001.
- [Troncy et al. 2007] Raphaël Troncy, Werner Bailer, Michael Hausenblas, and Martin Höffernig. VAMP: Semantic Validation for MPEG-7 Profile Descriptions. Technical Report INS-E0705, Centrum voor Wiskunde en Informatica (CWI), 2007.
- [Troncy et al. 2006] Raphaël Troncy, Werner Bailer, Michael Hausenblas, Philip Hofmair, and Rudolf Schlatte. Enabling Multimedia Metadata Interoperability by Defining Formal Semantics of MPEG-7 Profiles. In *1st International Conference on Semantics And digital Media Technology*, pages 41–55, Athens, Greece, 2006.
- [Tsinarakis et al. 2004] Chrisa Tsinarakis, Panagiotis Polydoros, and Stavros Christodoulakis. Interoperability support for Ontology-based Video Retrieval Applications. In *3rd International Conference on Image and Video Retrieval (CIVR'04)*, Dublin, Ireland, 2004.