Chapter 14

Semantically Driven Multimedia Querying and Presentation

Isabel F. Cruz, University of Illinois, Chicago, USA
Olga Sayenko, University of Illinois, Chicago, USA

ABSTRACT

Semantics can play an important role in multimedia content retrieval and presentation. Although a complete semantic description of a multimedia object may be difficult to generate, we show that even a limited description can be explored so as to provide significant added functionality in the retrieval and presentation of multimedia. In this chapter we describe the DelaunayView that supports distributed and heterogeneous multimedia sources and proposes a flexible semantically driven approach to the selection and display of multimedia content.

INTRODUCTION

The goal of a semantically driven multimedia retrieval and presentation system is to explore the semantics of the data so as to provide the user with a rich selection criteria and an expressive set of relationships among the data, which will enable the meaningful extraction and display of the multimedia objects. The major obstacle in developing such a system is the lack of an accurate and simple way of extracting the semantic content that is encapsulated in multimedia objects and in their inter-relationships. However, metadata that reflect multimedia semantics may be associated with multimedia content. While
metadata may not be equivalent to an ideal semantic description, we explore and
demonstrate its possibilities in our proposed framework. DelaunayView is envisioned as
a system that allows users to retrieve multimedia content and interactively specify its
presentation using a semantically driven approach.

DelaunayView incorporates several ideas from the earlier systems Delaunay (Cruz &
Leveille, 2000) and DelaunayMM (Cruz & James, 1999). In the DelaunayView framework,
multimedia content is stored in autonomous and heterogeneous sources annotated with
metadata descriptions in resource description framework (RDF) format (Klyne & Carroll,
2004). One such source could be a database storing scientific aerial photographs and
descriptions of where and when the photographs were taken. The framework provides
tools for specifying connections between multimedia items that allow users to create an
integrated virtual multimedia source that can be queried using RQL (Karvounarakis et al.,
2002) and keyword searches. For example, one could specify how a location attribute from
the aerial photo database maps to another location attribute of an infrared satellite image
database so that a user can retrieve images of the same location from both databases.

In DelaunayView, customizable multimedia presentation is enabled by a set of
graphical interfaces that allow users to bind the retrieved content to presentation
templates (such as slide sorters or bipartite graphs), to specify content layout on the
screen, and to describe how the dynamic visual interaction among multimedia objects can
reflect the semantic relationships among them. For example, a user can specify that aerial
photos will be displayed in a slide sorter on the left of the workspace, satellite images
in another slide sorter on the bottom of the workspace, and that when a user selects a
satellite image, the aerial photos will be reordered so that the photos related to the
selected image appear first in the sorter.

In this paper we describe our approach to multimedia querying and presentation and
focus on how multimedia semantics can be used in these activities. In “Background” we
discuss work in multimedia presentation, retrieval, and description; we also introduce
concepts relating to metadata modeling and storage. In “A Pragmatic Approach to
Multimedia Presentation”, we present a case study that illustrates the use of our system
and describe the system architecture. In “Future Work” we describe future research
directions and summarize our findings in “Conclusions.”

BACKGROUND

A multimedia presentation system relies on a number of technologies for describ-
ing, retrieving and presenting multimedia content. XML (Bray et al., 2000) is a widely
accepted standard for interoperable information exchange. MPEG-7 (Martinez, 2003;
Chang et al., 2001) makes use of XML to create rich and flexible descriptions of multimedia
content. DelaunayView relies on multimedia content descriptions for the retrieval and
presentation of content, but it uses RDF (Klyne & Carroll, 2004) rather than XML. We
chose RDF over XML because of its richer modeling capabilities, whereas in other
components of the DelaunayView system we have used XML (Cruz & Huang, 2004).

XML specifies a way to create structured documents that can be easily exchanged
over the Web. An XML document contains elements that encapsulate data. Attributes
may be used to describe certain properties of the elements. Elements participate in
Related Content

A Web-Based Multimedia Retrieval System with MCA-Based Filtering and Subspace-Based Learning Algorithms

A Survey on Localization in Wireless Sensor Networks
[www.igi-global.com/chapter/survey-localization-wireless-sensor-networks/50315?camid=4v1a](www.igi-global.com/chapter/survey-localization-wireless-sensor-networks/50315?camid=4v1a)

Towards Fusion of Textual and Visual Modalities for Describing Audiovisual Documents
[www.igi-global.com/article/towards-fusion-of-textual-and-visual-modalities-for-describing-audiovisual-documents/130339?camid=4v1a](www.igi-global.com/article/towards-fusion-of-textual-and-visual-modalities-for-describing-audiovisual-documents/130339?camid=4v1a)

Digital Competence: A Net of Literacies
[www.igi-global.com/chapter/digital-competence/189491?camid=4v1a](www.igi-global.com/chapter/digital-competence/189491?camid=4v1a)