MUSCLE *NOE FP6-5077-52*

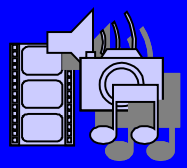
SHOWCASE

Generating and integrating MPEG-7 compliant metadata from images and videos for spatio-temporal, semantic, and feature query processing.

Istituto di Scienza e Tecnologie dell'Informazione

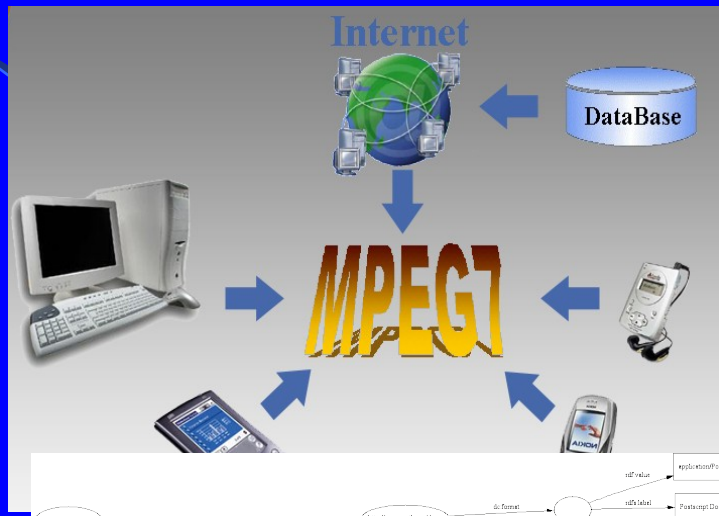
Bilkent University

Multimedia Metadata



Needs:

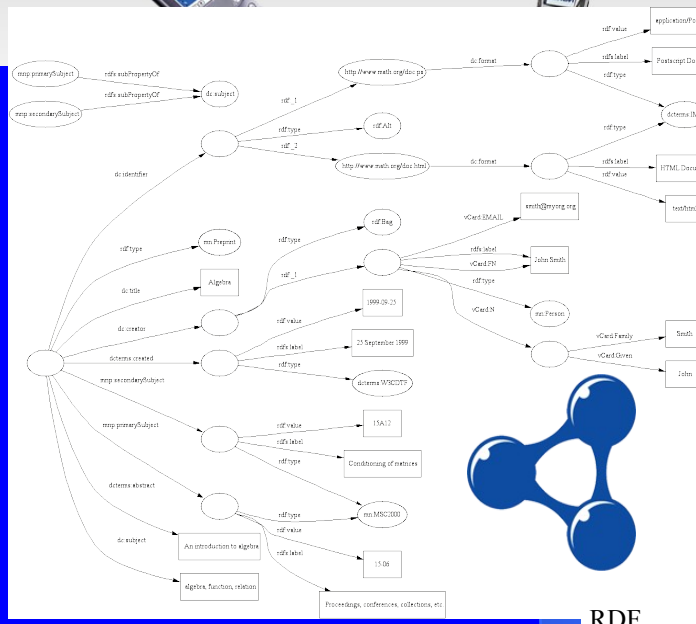
- Multimedia data coming from different fields
- Metadata production, storing, retrieve, elaboration



Basic technologic chosen:

- **MPEG-7** provides detailed and multimedia specific metadata descriptors.

- **Semantic Web technologies (RDF, OWL, etc)**, promoted by the W3C, enable large scale interoperability of structured knowledge repositories.



RDF

Objective

To realize an Infrastructure for the Integration of Multimedia Services.

To demonstrate how standards compliant metadata (MPEG-7) can:

- be extracted from image and video files and
- be used to provide integrated support for querying on spatio-temporal, semantic and low-level features (e.g. color, shape, and texture). .

idea

To build a demonstrator based on an Infrastructure for the Integration of Multimedia Services for analyzing and assimilating image and video data in a Java and web-based implementation.

A set of queries will be used to demonstrate the interoperability and the extended search capabilities.

Main characteristics of this infrastructure concern

- services offered to answer formalized high-level queries able to find data/metadata and their properties on different/several information systems, and
- services which could be queried not only separately but also using a wrapped system to access the networked systems.

Background (1/2)

- WP9 objectives:
  - To define a strategy for the NoE to develop, maintain, and provide access to multimedia meta-data and data sets.
  - To identify an integrated metadata environment able to support different metadata standards, uses (browsing, search, translations, etc.) and management of heterogeneous and distributed data, metadata and interoperability tools.

Study, design and implementation of a Infrastructure for MultiMedia MetaData Management - **4M**

Multimedia Database System - **BilVideo**

Background (2/2)

- **External Liaisons acivity:(**MPEG, W3C (MMSEM XG), DELOS, aceMedia (Multimedia Ontology Group), DSTC Australia (J. Hunter-S. Little), Russian Academy of Sciences, SeMedia Lab, Italy**):**

- **MUSCLE Review Report** 2 on ***WP 9:*** "The work package team has made considerable progress ….. also in developing its own software tools to generate MPEG-7 compliant metadata from image, audio and video files. These tools look extremely useful - it is important that they are widely used within the MUSCLE consortium in future. "

Effects

To continue the work in two directions:

Research line: E-Team"Integration of structural and semantic models for multimedia metadata management" (:BILKENT, CEA, CNR, IBAI)

Applicative line: this proposal for the showcase (BILKENT, CNR)

Plan for the Work

Using expertise from ISTI regarding image processing and understanding and from Bilkent in video data analysis, the media will be processed and combined.

Bilkent and CNR will process images and videos and enter their features into a knowledge-base, will structure their metadata according to standards and define the functionalities of their searches and queries.

This will demonstrate integration of media from multiple sources and formats to promote exchange and interoperability amongst MUSCLE participants.

Showcase Infrastructure

<?xml version="1.0" ?>
<mpeg-7>
. . .
</mpeg-7>

MPEG-7 feature processing

M

XML DB

X

Algorithms Ontology

O

Annotations

A

Integration

I

Wrapper (query service provider)

Network

CNR

- System software
- Database development
- Features extraction from audio/images
- Ontology for image analysis

Showcase Infrastructure

<?xml version="1.0" ?>
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BILKENT

XML metadata (video annotation; salient object extraction from video key frames; spatio-temporal, semantic and low-level features on video data)

•Direct links to local resources (BilVideo)

BilVideo
Multimedia Database System

- BilVideo is a video database system that provides an integrated support for queries on spatio-temporal, semantic and low-level features (color, shape, and texture) on video data.

- BilVideo handles spatio-temporal queries using a knowledge-base, which consists of a fact-base and a comprehensive set of rules.

- The queries on semantic and low-level features are handled by an object-relational database.

BilVideo
Multimedia Database System

- Thus automatically extracting features of videos, such as color, shape, and texture, provides input for BilVideo.

- MPEG-7 Feature extraction is important for standardization of BilVideo.

- We plan to develop an automatic MPEG-7 feature extraction tool for videos.

Bilkent's Contribution to ShowCase

- Our plan is to contribute to Showcase on MPEG-7 Feature Extraction (Color, Shape, and Texture) from videos.

- The output of this tool should also be converted into BilVideo knowledge-base format. This is necessary to make feature-based querying of videos.

- We should also work in cooperation with CNR to use automatic feature extraction tool in their M4 framework.

Use Case

- Specific use case / Application examples?

Main characteristics of this infrastructure concern (i) services offered to answer formalized high-level queries able to find data/metadata and their properties on different/several information systems, and (ii) services which could be queried not only separately but also using a wrapped system to access the networked systems.

Finance

- Labour: 36K€ (18K€ per team);
- Travel: 9K€ (4.5K€ per team) It is foreseen that the teams meets 4 times (kick-off meeting, 2 midterms meeting,concluding meeting)
- Consumable: 3K€ (1.5K€ per team)
- Total: 48K€ (24K€ per team)

Concluding Remarks

……Main characteristics of this infrastructure concern (i) services offered to answer formalized high-level queries able to find data/metadata and their properties on different/several information systems, and (ii) services which could be queried not only separately but also using a wrapped system to access the networked systems……

…..Bilkent and CNR will process images and videos and enter their features into a knowledge-base, will structure their metadata according to standards and define the functionalities of their searches and queries….

Many thanks for your attention !

ISTI-CNR !

Patrizia Asirelli
Suzanne Little
Massimo Martinelli
Ovidio Salvetti

BILKENT !

Ugur Gudukbay