8   Multimedia Content Description

Literature:

Rosenblatt/Trippe/Mooney, Digital Rights Management, Chapter 6

Troncy/Huet/Schenk, Multimedia Semantics - Metadata, Analysis and Interaction, Wiley 2011

Unlabelled Stuff

- The Unlabeled Video Tape Problem
  - Even worse with digital media:
    Various formats, variants
- Digital media production:
  - Labeling of parts to be composed
    - » Date, time, format, ...
  - Representing the composition
- Digital media on the Internet
  - Identifying digital media
    - » Title, author, genre, ...
  - Searching for specific media, e.g. audio, video c...
  - Fine-grained search within media
    - » e.g. person search within video content
  - Bringing together related media (e.g. text news a...
    - » (Automated) syndication

playitagainvideo.com

Content, Essence, Metadata

- Content
  - consists of *essence* data and *metadata*
- Essence
  - parts of content that directly represent program material such as audio, video, graphic, still-image, text, or sensor-data
- Metadata
  - parts of content that contain data used
    - » to *describe* essence or
    - » to provide information on its *use*
  - metadata objects sometimes called "mobs"
- Metadata may be
  - stored separately from the essence data
  - combined with the essence data ("embedded metadata")

Source: AAF Developer Overview

Types of Multimedia Metadata

- Technical Metadata:
  - Form (data format, representation parameters like resolution, color depth...)
  - For live captured material: Time, date, location of original occurrence
  - Technical parameters of capture (e.g. aperture, exposure etc. for images)
- Content Description Metadata:
  - High level, structured:
    - » Title, author, composer, artist, cast, ...
  - High level, unstructured:
    - » Summary, textual description, thumbnail, ...
  - Low level:
    - » Objects and time positions
    - » Audio and video features: Key, mood, tempo ...
- Additional information:
  - Digital rights, classification, context, further links, ...

Types of Origin for Metadata

- Automatic creation or derivation:
  - All technical metadata
  - Extracted data features
    = mainly low level metadata (e.g. average brightness, musical tempo)
- Retrieval from external databases:
  - High-level metadata
  - Retrieval may be based on identifier or analysis of media content
  - Example: GraceNote database for music
- Manual addition
  - Archival, indexing, annotation, ...

Metadata Problems

- Creation metadata
    - During the creation of media essence, metadata is created but often ignored
    - Example: EXIF data in JPEG

- Manually added metadata
    - Users notoriously ignore the administration of metadata

- Metadata incompatibility
    - Metadata exists in various formats specific for media types, applications, product vendors, ...
    - Exchange of metadata is difficult

- Broad range of metadata
    - Metadata exists on various levels, covering all is expensive

- Metadata economy
    - How much of the metadata will be used?
    - When to create metadata?

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Literature:
   Troncy/Huet/Schenk, Multimedia Semantics -
      Metadata, Analysis and Interaction, Wiley 2011
   Chapter 4 of this book: R. Benmokhtar, B. Huet, G. Richard, S, Essid:
   Feature Extraction for Multimedia Analysis

Features of Multimedia Signals

- Feature: Condensed information from multimedia signal
  - Image, video, audio, text
  - Purpose: Description of content with *high variance* and *high discriminance*
  - Identification of similar content with respect to certain aspects
- Low-level features
  - Derived from signal processing algorithms
  - Selection of low-level features defined in MPEG-7 standard (see below)
- Multi-feature and multi-modal fusion:
  - Combined use of multiple characterictics
- Case study:
  - Automatic identification of violence in video material
  - Specifically scenes containing *punching*

Low-Level Visual Descriptors (Examples) (1)

- Color Descriptors
  - Dominant Color Descriptor (DCD, Cieplinski 2000):
    - » Small set (four to six) of dominant colors, histogram
    - » Taking into account variance, spatial coherence (3x3 masking window)
  - Color Layout Descriptor (CLD, Kasutani and Yamada 2001):
    - » Representing spatial distribution of colors
  - Scalable Color Descriptor (MPEG-7 2001)
    - » HSV color space with fixed quantisation
    - » Using Haar transform to create small histogram

**Figure 4.1** Color layout descriptor extraction.
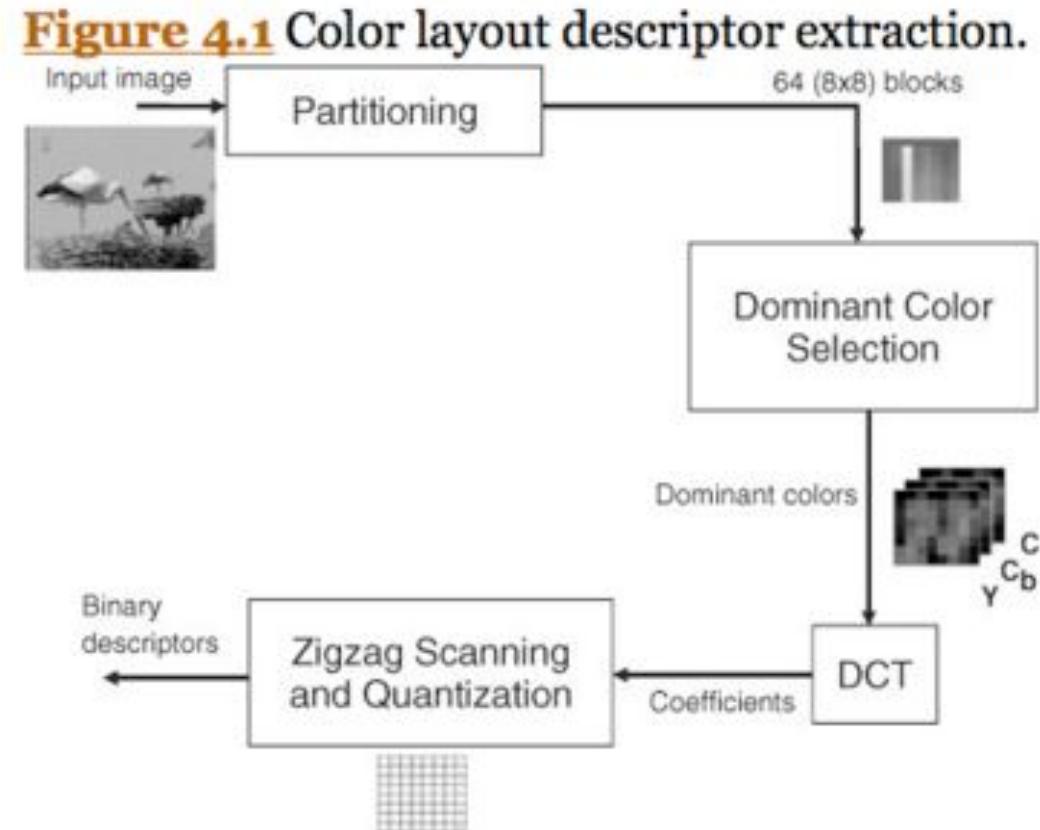
Source: Benmokhtar et al.

Low-Level Visual Descriptors (Examples) (2)

- Texture Descriptors
  - Homogeneous Texture Descripture (HTD, Manjunath et al. 2002)
    - » Statistical analysis on local spatial frequencies
    - » 30 "channels" from 6 frequency times and 5 orientation channels
    - » Energy and energy deviation for each of the channels
  - Edge Histogram Descriptor (EHD, Park et al. 2000)
    - » For 16 subimages (4x4), detects five types of edges
    - » 80-dimensional vector

- Shape Descriptors
  - Region-based Shape Descriptor (R-SD, Manjunath et al. 2002)
    - » Using *Angular-Radial Transformation* (see next slides)
  - Contour-based Shape Descriptor (C-SD, Zhang and Lu 2003)
    - » Using *Curvature Scale Space* (CSS) representation (see next slides)

# Examples for Shape Descriptors

Region shapes:
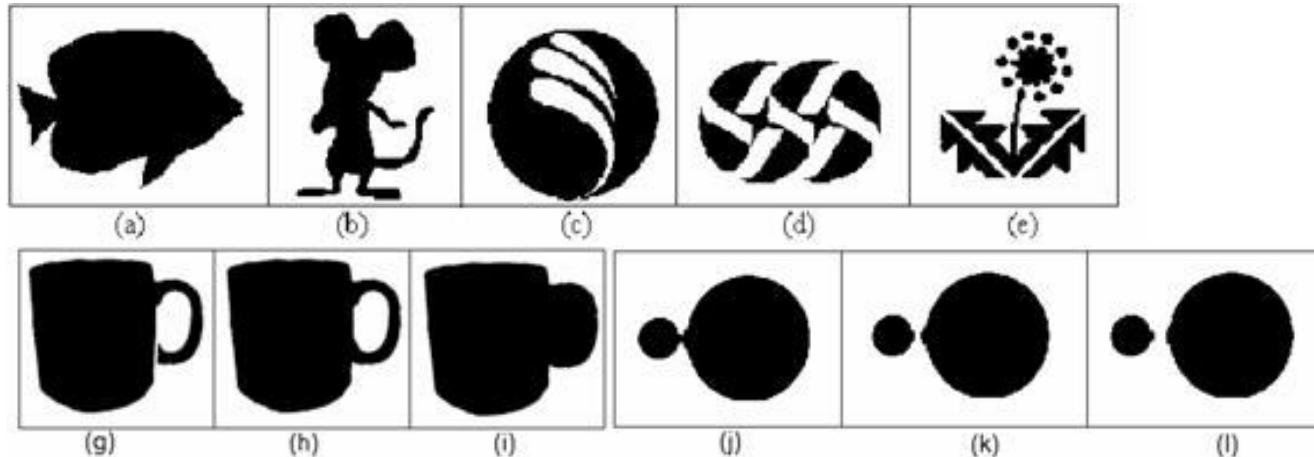
Contour shapes:

Angular Radial Transformation (ART)

- Convert image information into angular and radial parts
- Represent image as coefficients of basis functions
- First 36 basis functions:
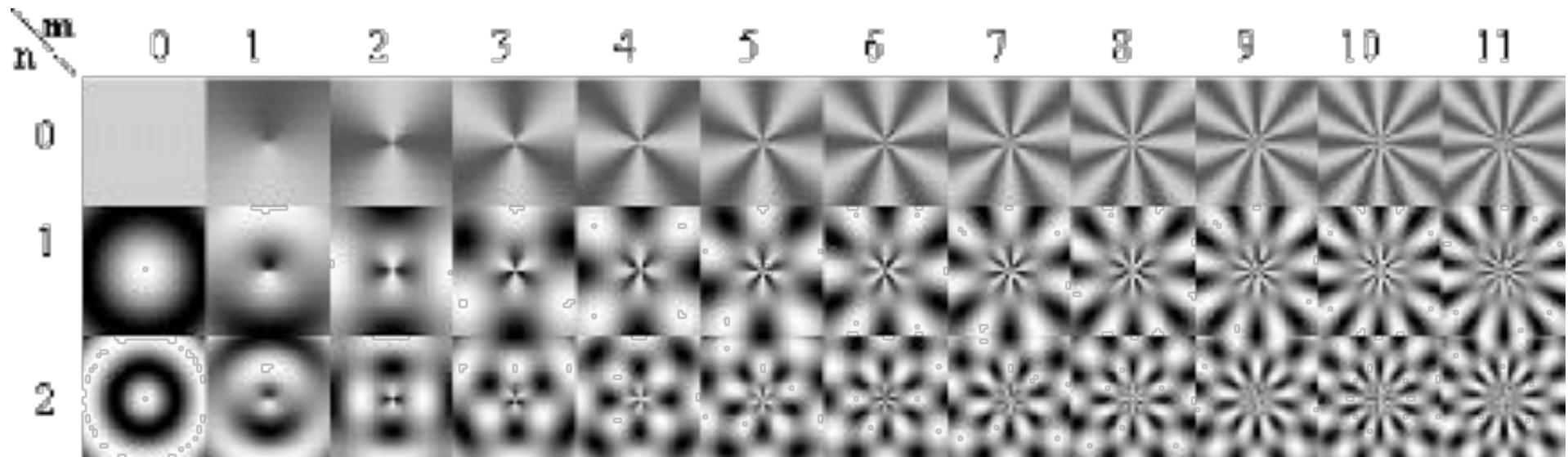
Curvature-Scale Space Computation

- Curvature is a local measure of how fast a curvature is turning
  - Contour is sampled with increasing precision and smoothed stepwise until a convex shape is obtained
  - During the step-wise smoothing, specific points are saved into the descriptor:
    - » Points separating convex and concave parts of contour
    - » Peaks of contour map
  - Additional global values:
    - » Eccentricity
    - » Circularity
    - » Number of CSS peaks

(a) (b)

(c) (d)
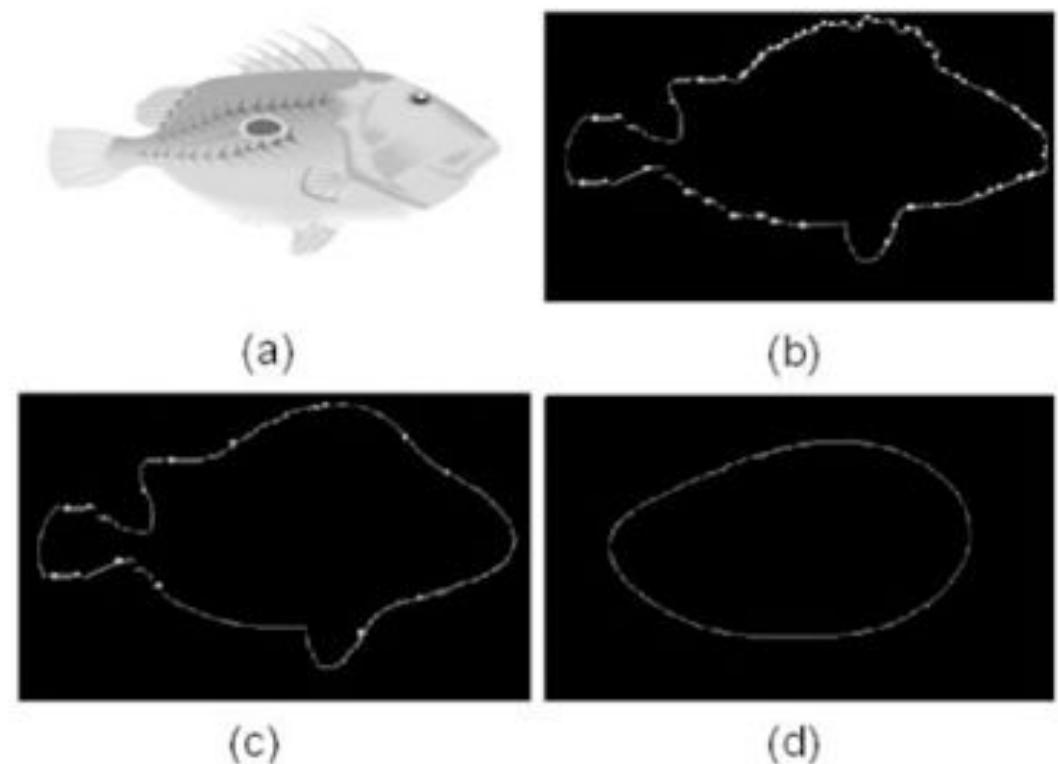
Source: Benmokhtar et al.

Motion Descriptors for Video (Examples)

- Camera Motion Descriptor (CMD, Manjunath et al. 2002)
  - Camera operations:
    panning, tracking, tilting, booming, zooming, dollying, rolling
- Motion Actitivity Descriptor (MAD, Sun et al. 2002)
  - Statistical analysis of motion vectors from differential frames
  - *Intensity* of motion (motion vector magnitude)
  - *Direction* of motion (dominant direction of vectors)
  - *Spatial distribution* of activity
  - *Temporal distribution* of activity
- More complex descriptors describing long-term trajectories of objects

Case Study: Violence Detection in Video

- Only few descriptors are suitable

- Only combination of multiple descriptors can achieve results

- Possible solution:

  – Detection of human bodies using contour and region shapes

  – Detection of rapid and significant movements of persons and objects

  – Detection of bleeding using color descriptors

  – Combination with audio analysis (punch sound, screams)

- Combination of automatic pre-filtering of material with human analysis

- Important information extremely difficult to obtain through analysis

  – e.g. presence of (possibly concealed) weapons

# 8 Multimedia Content Description

Literature:

Communications of the ACM 49(8), August 2006,
Special section on Music Information Retrieval, pp. 28-60

S. Dasiopoulou, E. Giannakidou, G. Litos, P. Malasioti, and Y. Kompatsiaris. 2011. A survey of semantic image and video annotation tools. In *Knowledge-driven multimedia information extraction and ontology evolution*, G. Paliouras, C. D. Spyropoulos, and G. Tsatsaronis (Eds.). Springer, 196-239.

Audio Low-Level Descriptors (MPEG-7 Examples)

- Structures:
  - Single scalar value
  - Series of sampled values
- Features:
  - See figure
- MPEG-7 descriptions may contain features described using different (external) methods and algorithms

Audio Framework

Silence D

Timbral Temporal
LogAttackTime D
TemporalCentroid D

Timbral Spectral
HarmonicSpectralCentroid D
HarmonicSpectralDeviation D
HarmonicSpectralSpread D
HarmonicSpectralVariation D
SpectralCentroid D

Basic Spectral
AudioSpectrumEnvelope D
AudioSpectrumCentroid D
AudioSpectrumSpread D
AudioSpectrumFlatness D

Spectral Basis
AudioSpectrumBasis D
AudioSpectrumProjection D

Basic
AudioWaveform D
AudioPower D

Signal parameters
AudioHarmonicity D
AudioFundamentalFrequency D

Audio High-Level Descriptors (MPEG-7 Examples)

- Audio signature
  - Statistical summary of spectral flatness descriptor
  - Fingerprinting, identification of audio content
- Musical instrument timbre
- Melody description
  - MelodyContour (terse, efficient)
  - MelodySequence
    - » Query by Humming
- General sound recognition and indexing
  - Probabilistic classifiers for sound classes
- Spoken content
  - Output and intermediate results of Automatic Speech Recognition (ASR)

Musipedia music search engine:

Timescales of Musical Information

- Individual music note events

    - Extraction of the music score

    - Identification of instrument playing

- Chords (simultaneous notes)

    - Identification of chords

- Phrase level

    - Tempo extraction

    - Identification of phrases (based on repetition/alternation of segments)
      e.g. identification of chorus

- Piece level

    - Genre identification ("rock", "jazz", "classical")

Automatic Score Transcription

- Beats determined by tempo-smoothed event detector
- Melody recognized by general-purpose support-vector classifier
  - Trained to recognize spectral slices to be labelled with pitch values
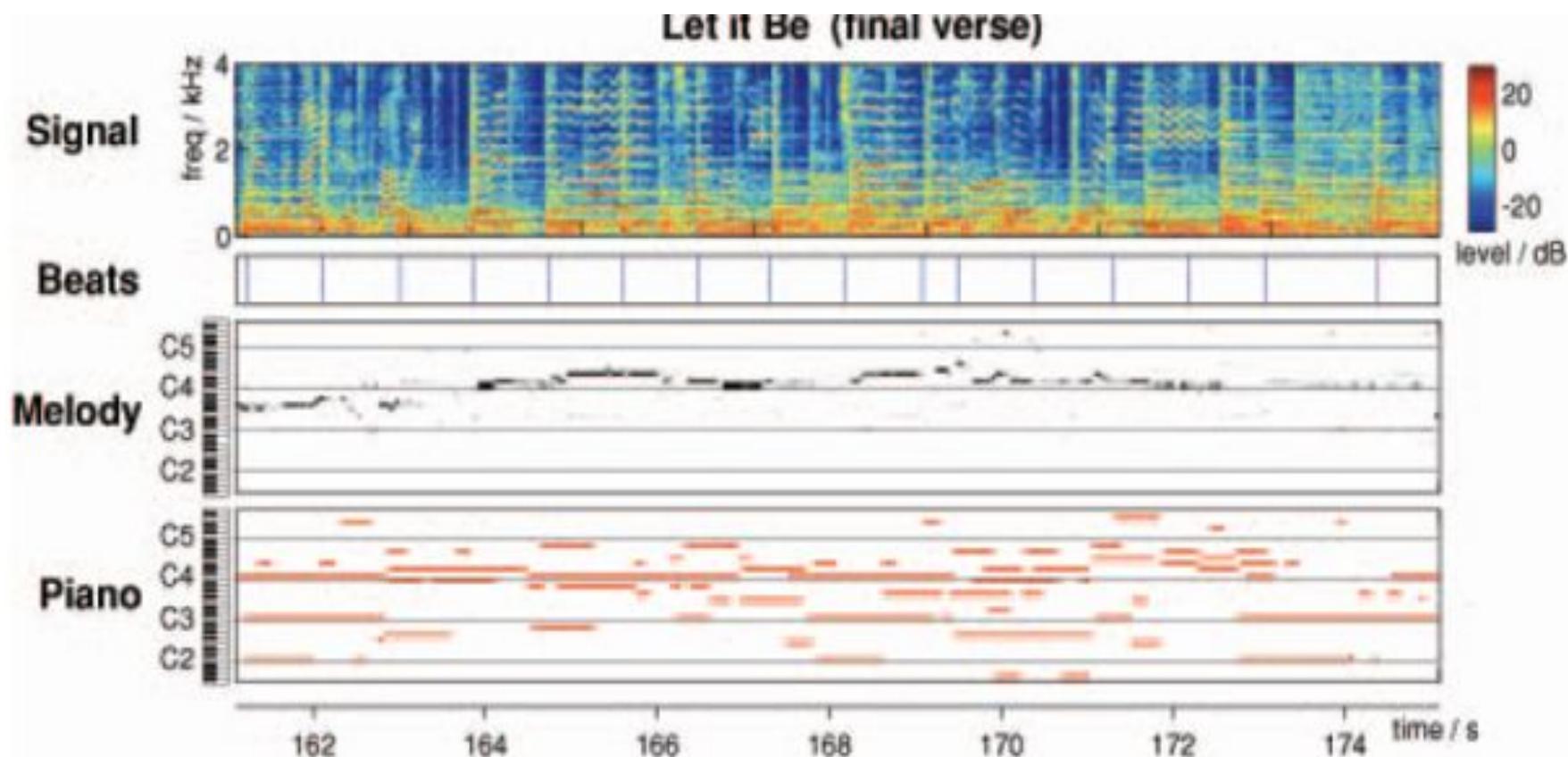
Automatic Phrase Detection

- Self-similarity matrix

  – Values represent acoustic similarity

  – Looking for diagonal ridges off the main diagonal

  – Blue lines are manually inserted for comparison

See also: http://www.fxpal.com/publications/FXPAL-PR-99-093.pdf
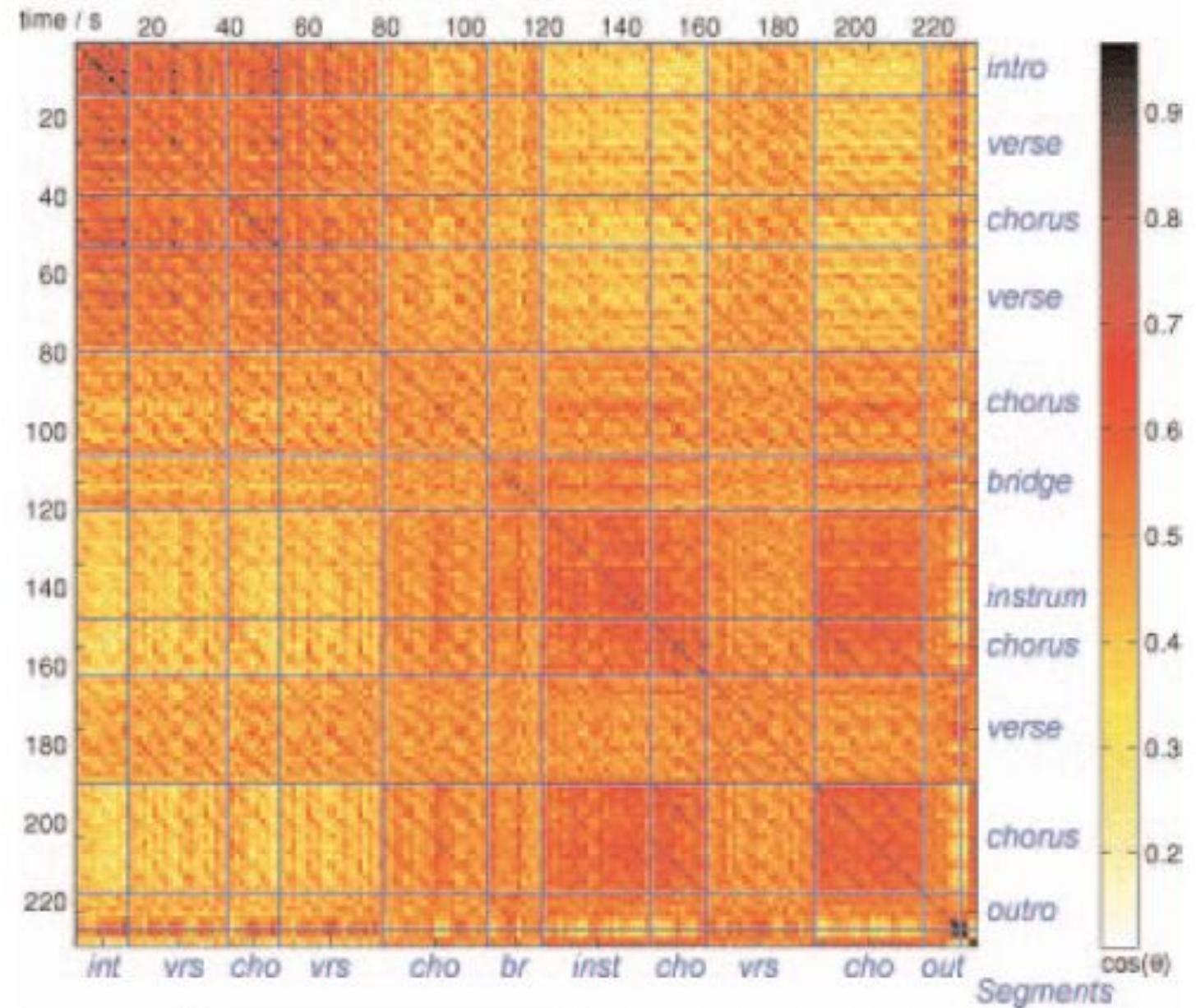
Example: Shazam Music Tagging (1)

- Commercial service for mobile phones:
  Identify music from a short audio sample *(query by example)*
  - See http://www.shazam.com (London, founded 2000)
  - A. Wang: The Shazam Music Recognition Service, *Comm. ACM* Aug. 2006

- Challenges:
  - Distinguishing music from noise
  - Dealing with distortions
  - Keeping fingerprints small (in order to deal with millions of songs)

- Basic idea:
  - Spectrogram peaks (energy distribution in time and frequency)[1]
  - Few "anchor" peaks are combined with peaks in a certain surrounding zone (time and frequency offsets)
    - » Combinatorial hashing creates 32b fingerprint hash token

[1] An overlapping Short-Time Fourier Transform is calculated at regular intervals on the audio data, and a power level is calculated for each resulting time-frequency bin. A bin is a peak if its power level is greater than all the other bins in a bounded region around the bin.

Example: Shazam Music Tagging (2)
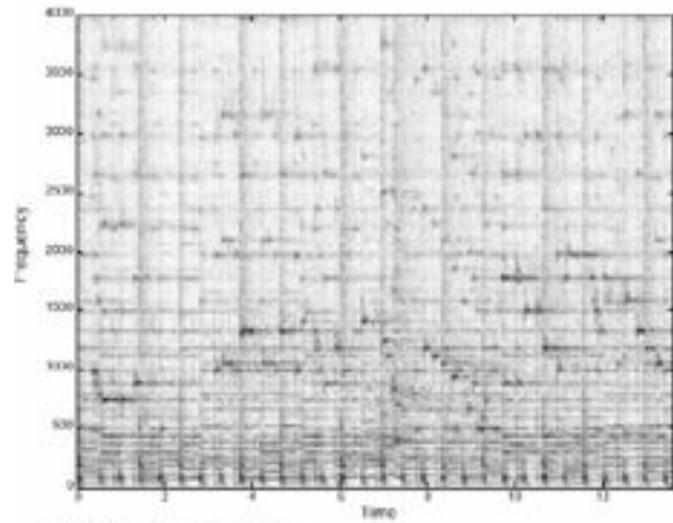

Fig. 1A - Spectrogram

Fig. 1B - Constellation Map

Fig. 1C - Combinatorial Hash Generation

Fig. 1D - Hash details

http://www.ee.columbia.edu/~dpwe/papers/Wang03-shazam.pdf
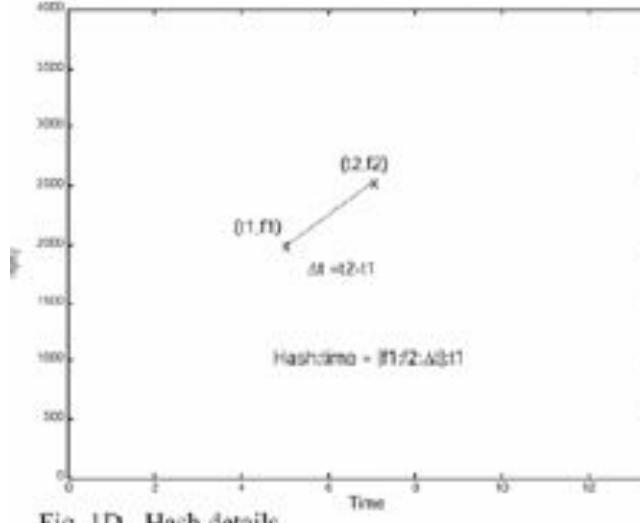
Fingerprint Complexity Tradeoff

- Computing a more complex fingerprint:
  - Increases search time (more tokens to inspect)
  - Improves entropy
    - » Better descriptiveness distinguishes more clearly between items
- Shazam example:
  - Combinatorial expansion increases token number by factor 10 (roughly)
  - Combinatorial expansion accelerates index search by a factor of more than a million!

Example: Shazam Music Tagging (3)

- Comparing tokens from sample and database:
  - Only tokens having peaks from target signal are relevant
  - Even presence of a few well matching tokens is significant
- Temporal alignment of fingerprint features:
  - Matching set of features must have identical relative positions in time
  - Find linear time correspondence
    - » By searching a histogram of relative time differences for peaks

Scatterplot of matching hash locations: Diagonal Present

Fig. 3A — Database soundfile time / Sample soundfile time

Histogram of differences of time offsets: signals match

Fig. 3B — Offset $t_{database} - t_{sample}$
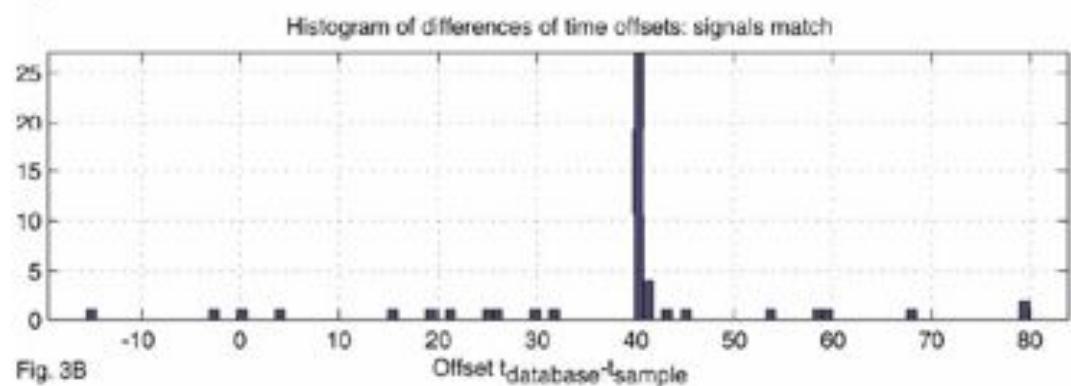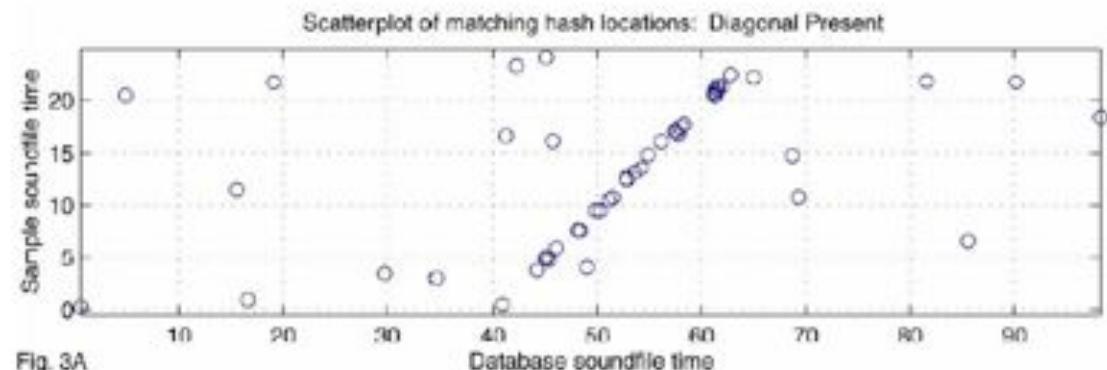
Example: Shazam Music Tagging (4)

- Commercial situation:
  - 2012: Shazam app used 10 million times per day
  - More than 11 million tracks in database
- Without Internet connectivity (1999/2000):
  - Query via speech channel, result via text message
- Smartphone apps (Shazam/Encore)
  - Require Internet connectivity
  - Query and result via Internet
- Steady changes
  in business model:
  - Secondary content for TV
  - Music retail
  - Social music network

"2580" service

shazam.org

8 Multimedia Content Description

Literature:
> Troncy/Huet/Schenk, Multimedia Semantics - Metadata, Analysis
> > and Interaction, Wiley 2011
> B. S. Manjunath, Philippe Salembier, Thomas Sikora:
> > Introduction to MPEG-7, Wiley 2002
> www.chiariglione.org, mpeg-7.joanneum.at,
> www.multimedia-metadata.info

MPEG-7

- Moving Picture Experts Group (MPEG)
  - = ISO/IEC JTC1/SC29/WG11 "Moving Pictures and Audio"
  - Main Web presence now: www.chiariglione.org/mpeg
- MPEG-7 "Multimedia Content Description Interface" (since 1996)
  - " ... a standard for describing the multimedia content data that supports some degree of interpretation of the information's meaning, which can be passed onto, or accessed by, a device or a computer code. MPEG-7 is not aimed at any one application in particular; rather, the elements that MPEG-7 standardizes support as broad a range of applications as possible."
- ISO/IEC 15938 standard since 2002, parts still being added
  - MPEG 7 Audiovisual Description Profile (AVDP): 2012
- Industrial uptake very slow
  - Ambitious standard
- Some research and open source prototypes available
  - See e.g.
    http://mpeg7.joanneum.at,
    http://www.multimedia-metadata.info

Parts of the MPEG-7 Standard

- MPEG-7 Systems
- MPEG-7 Description Definition Language (DDL)
  - Descriptors (D) and description schemes (DS) specify the syntax and semantics of each *feature* (metadata element)
  - DDL allows the creation of Ds and DSs
    - » XML-based language with some small extensions to XML Schema
- MPEG-7 Visual
- MPEG-7 Audio
- MPEG-7 Multimedia Description Schemes
- MPEG-7 Reference Software
  - eXperimentation Model XM
- MPEG-7 Conformance (rules for conformance checking)
- Extraction and use of MPEG-7 descriptors
- MPEG-7 Profiles and Levels (Profile Schemas, Schema Definition)
- MPEG-7 Query Format

MPEG-7 Profiles

Part 9 of MPEG-7 (2005):

- Simple Metadata Profile (SMP)
  - Single document or simple collection, similar to EXIF or ID3

- User Description Profile
  - Tools for describing personal preferences and usage patterns
  - Adopted by TV-Anytime standard

- Core Description Profile
  - Collections of multimedia content, description of relationships

Later profiles:

- Audiovisual Description Profile (AVDP)
  - Targeted at requirements of audiovisual media production
  - Mainly driven by European Broadcasting Union (EBU)

Application Areas of MPEG-7

- Architecture, real estate, and interior design (e.g., searching for ideas).
- Broadcast media selection (e.g., radio channel, TV channel).
- Cultural services (e.g., virtual museums).
- Digital libraries (e.g., image catalogue, musical dictionary).
- Education (e.g., repositories of multimedia courses).
- Home Entertainment (e.g., home video management).
- Investigation services (e.g., human characteristics recognition, forensics).
- Journalism (e.g. searching for video footage of political event).
- Multimedia directory services (e.g. yellow pages, tourist information).
- Multimedia editing (e.g., personalized electronic news service, media authoring).
- Remote sensing (e.g., cartography, ecology, natural resources management).
- Shopping (e.g., searching for clothes that you like).
- Surveillance (e.g., traffic control, surface transportation).
- ...

Structural Content Description: Segments

- A segment represents a section of an audio-visual content item.

- The Segment Description Scheme (DS) is an abstract class (in the sense of object-oriented programming).

- It has nine major subclasses:
  - Still Region DS (spatial)
  - Video Segment DS (temporal)
  - Moving Region DS (spatiotemporal)
  - Audio Segment DS (temporal)
  - AudioVisual Segment DS (temporal)
  - AudioVisual Region DS (spatiotemporal)
  - Still Region 3D DS (3D spatial)
  - Ink Segment DS (electronic ink from pen, smartboard etc.)
  - Multimedia Segment DS (composite of segments)

Examples of Segments

Temporal segment (Video, audio, audio-visual and ink segment)	Spatial segment (Still region)
(a) Segment composed of one connected component	(b) Segment composed of one connected component
(c) Segment composed of three connected components	(d) Segment composed of three connected components
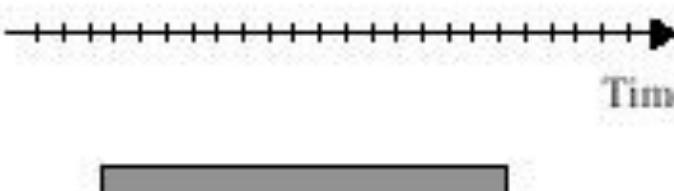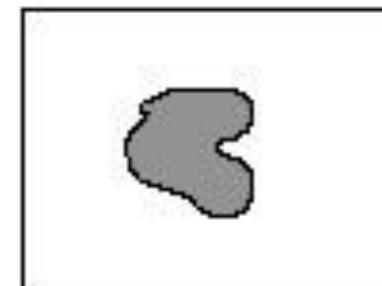
Structural Relations of Segments

- Content structure:
    - Either hierarchical segment decomposition
    - Or general segment relationship graph
- Predefined structural relations in MPEG-7 (can be extended):
    - Generic:
        » Identical, union, disjoint
    - Spatial:
        » South, north, west, east, northwest, northeast, southwest, southeast, left, right, below, above, over, under
    - Temporal:
        » Precedes, follows, meets, metBy, overlaps, overlappedBy, contains, during, strictContains, strictDuring, starts, startedBy, finishes, finishedBy, coOccurs, contiguous, sequential, coBegin, coEnd, parallel, overlapping
- For each relation, the inverse relation is implicitly defined.

Semantic Segmentation/Annotation of Images
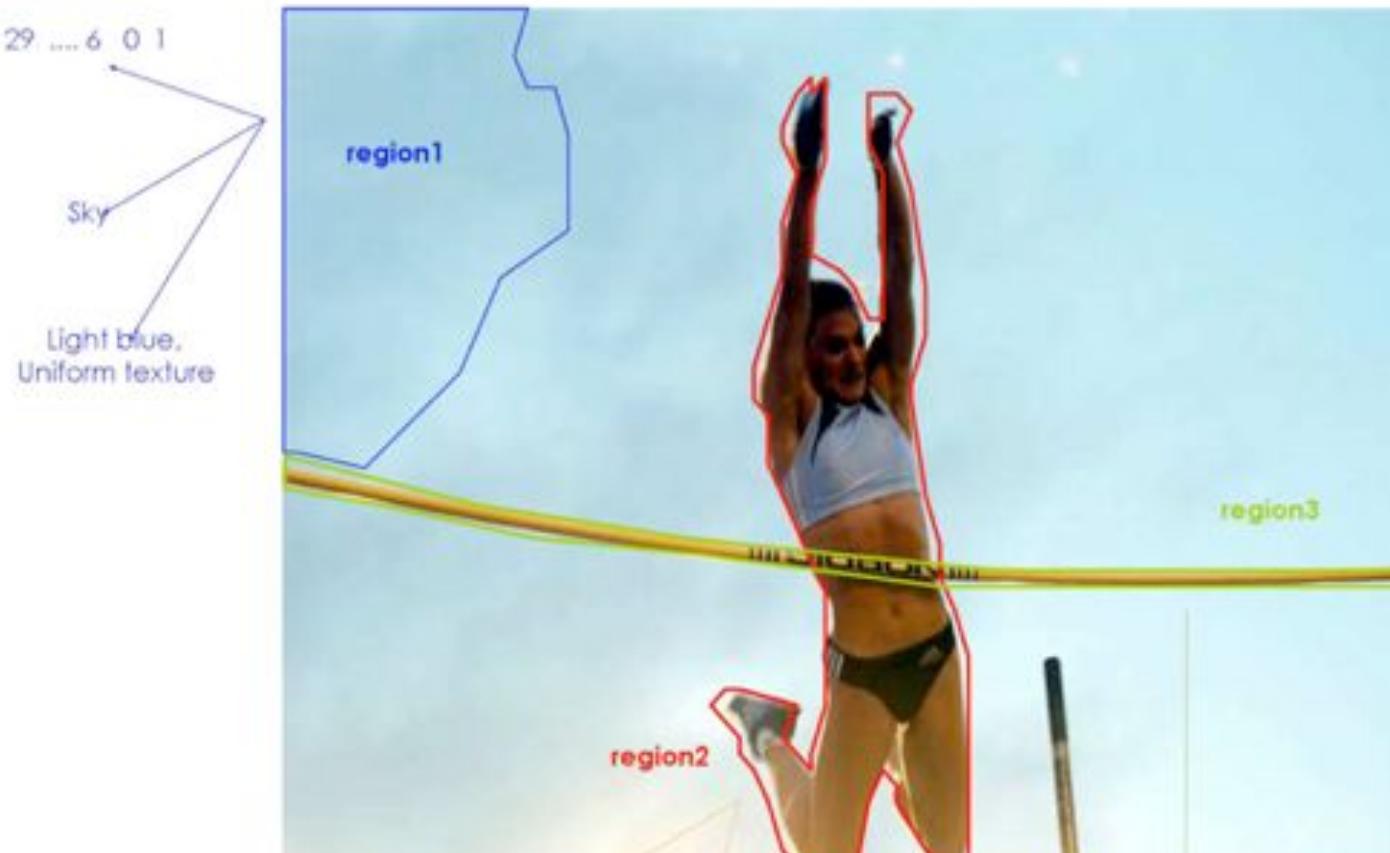
Dasiopoulou et al.

Example of Visual Annotation Tool
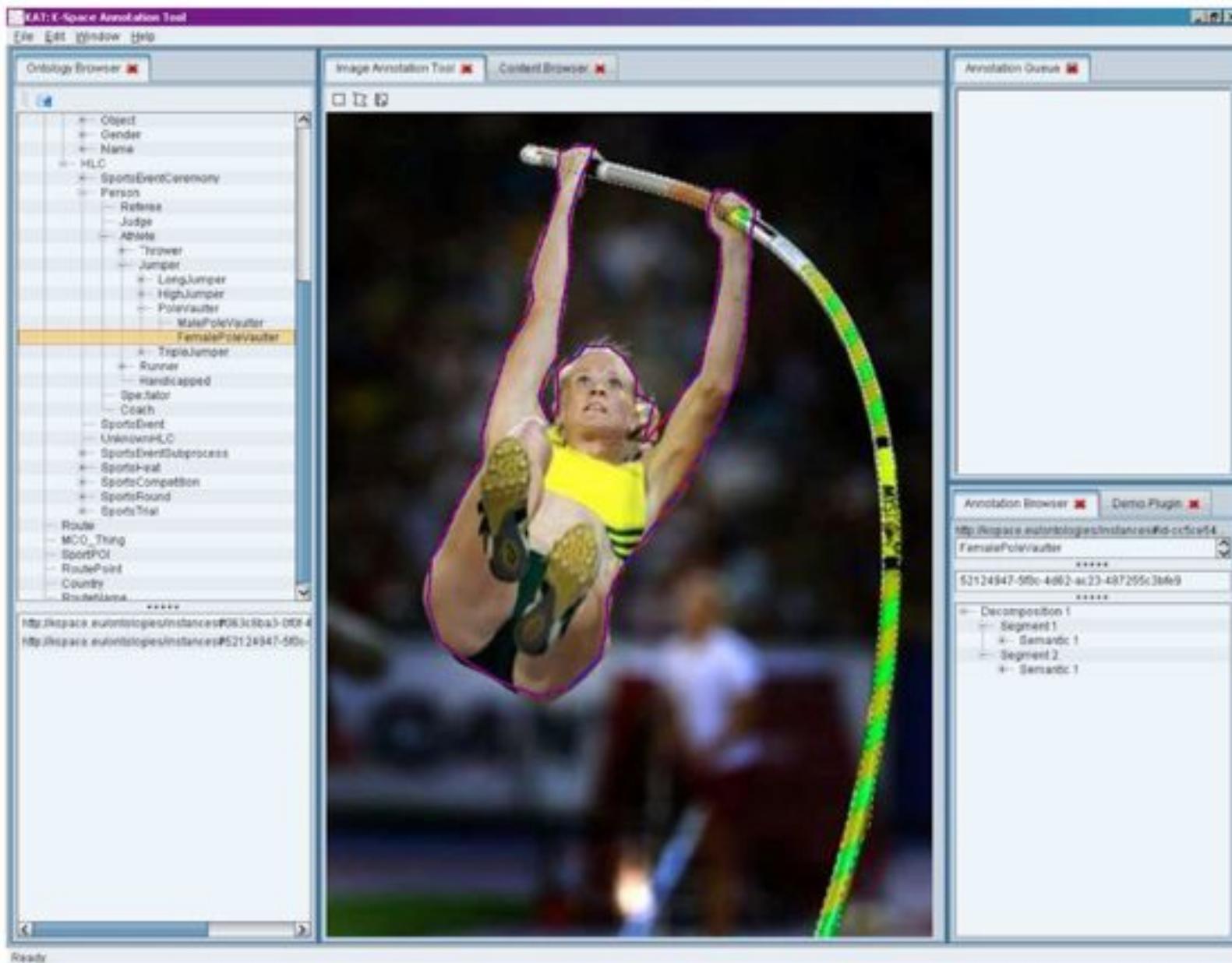
KAT tool
K-Space EU project

Video Segmentation with Moving Regions
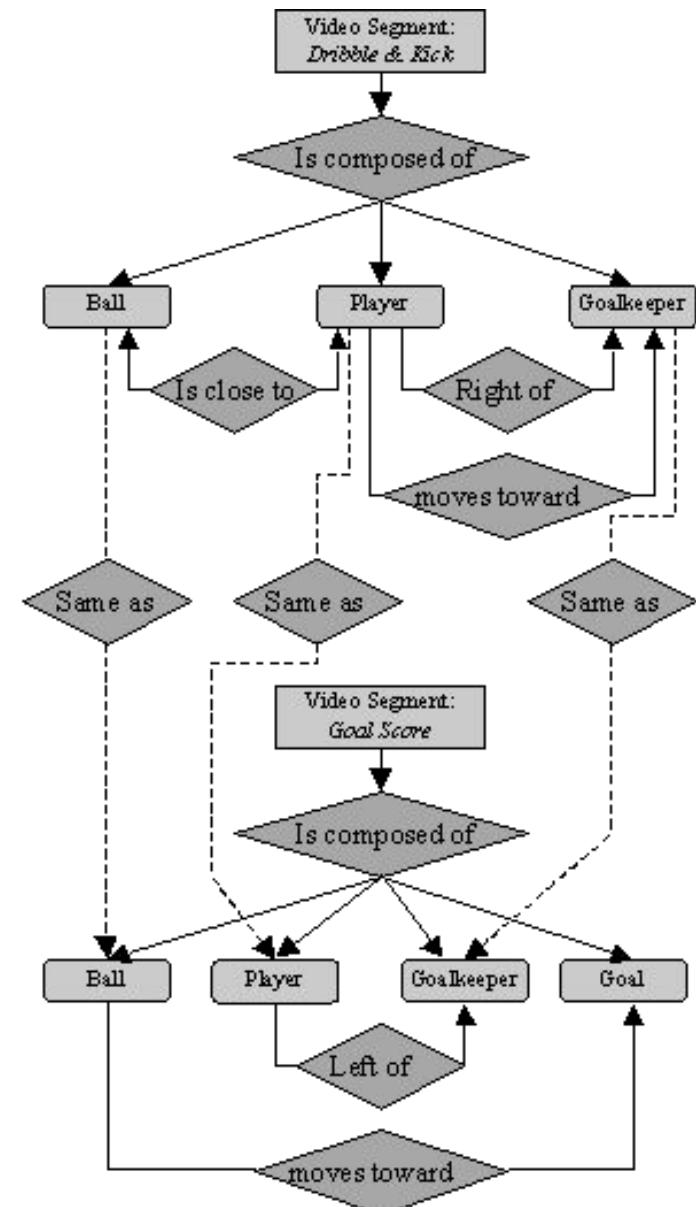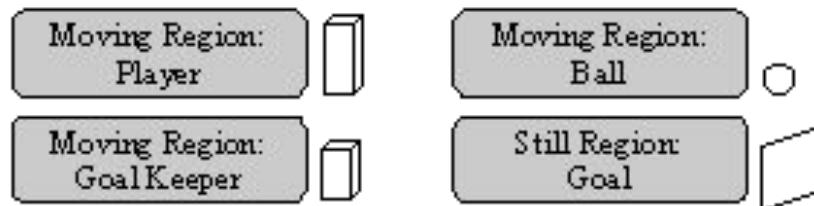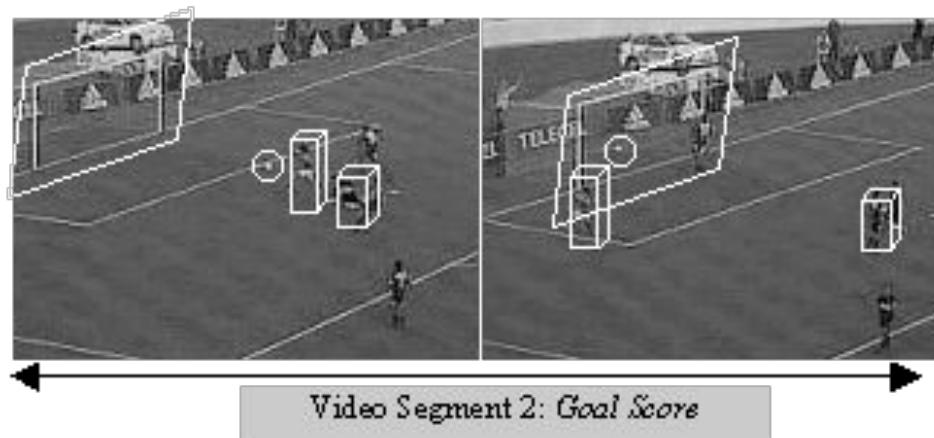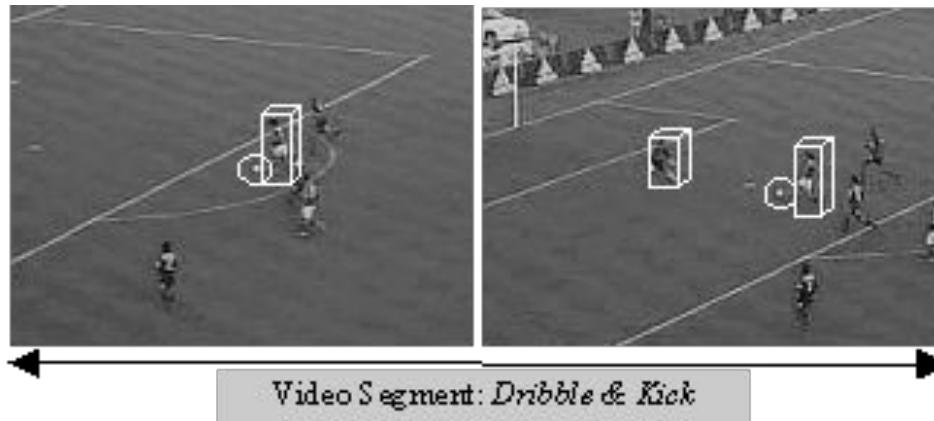
Example of Video Annotation Tool
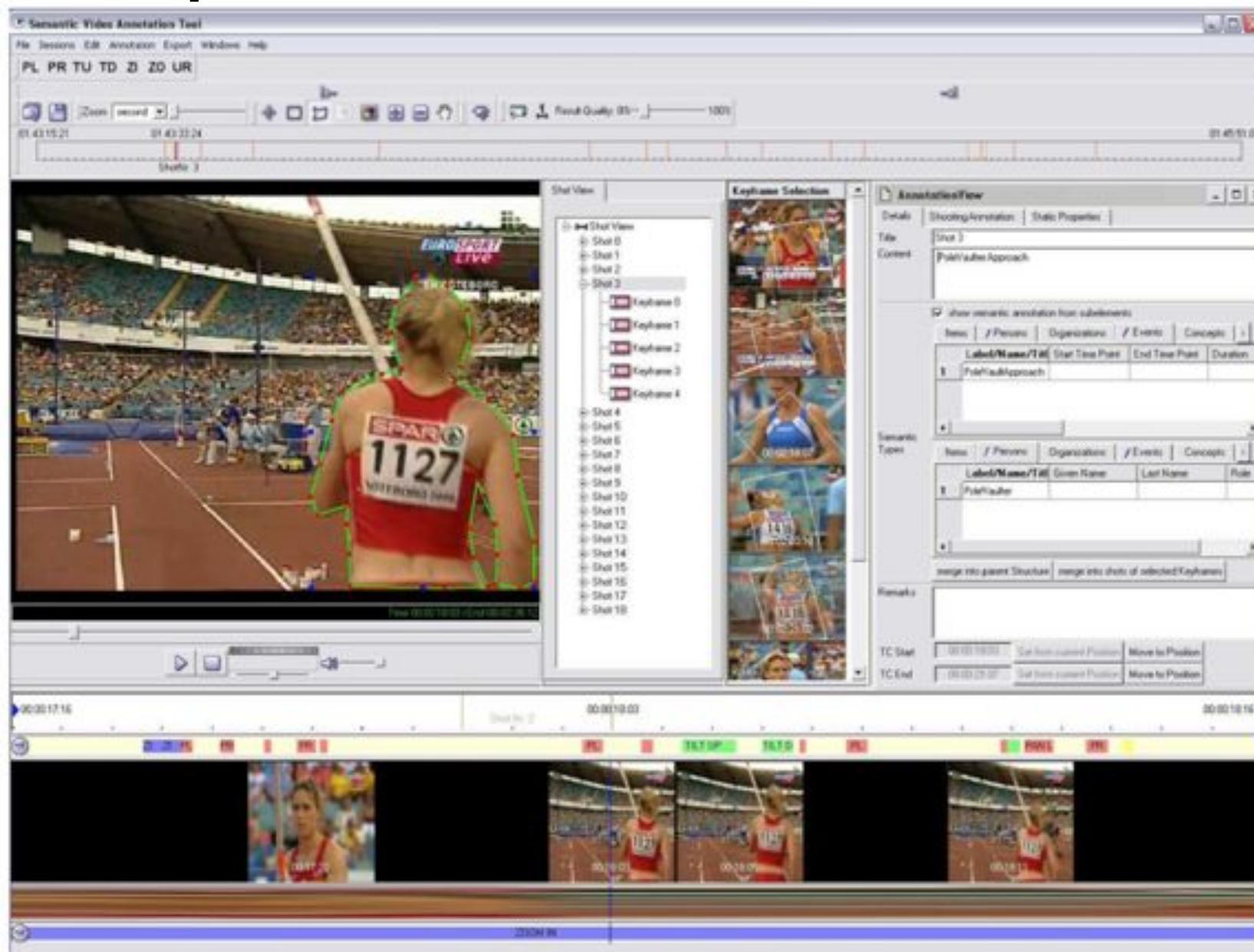
Semantic Video
Annotation Suite
(joanneum.at)

Audiovisual Description Profile Structure

joanneum.at
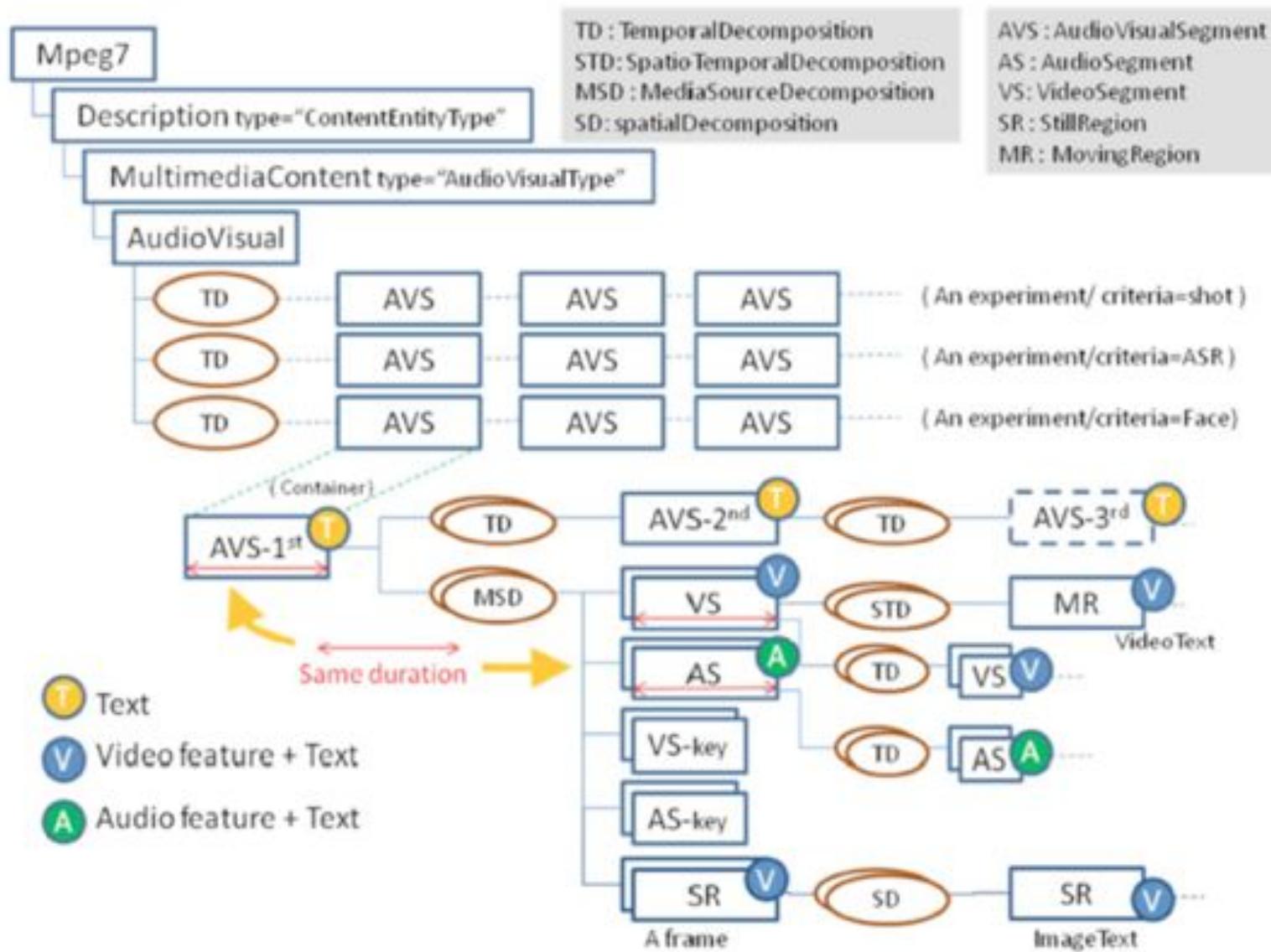
Metadata in Classic Multimedia Formats

- EXIF (Exchangeable Image File Format)
  - EXIF header for captured image or sound
  - Massively used in still-picture cameras
- ID3 for MP3
  - ID3 tag: association of information frames (each for specific metadata)
  - Predefined frames: identification, technical metadata, rights, lyrics, …
  - Extensible by new frames
- News/G2
  - Developed by IPTC (International Press Telecommunications Council)
  - XML-based specific languages: NewsML-G2, SportsML-G2, EventsML-G2, ProgramGuideML-G2, WeatherML
  - Controlled vocabularies, e.g. IPTC News Codes

Selected Media Metadata Standards

- Dublin Core Metadata Initiative (DCMI) &
  PRISM (Publishing Requirements for Industry Standard Metadata)
  - Oriented towards books, magazines, journals etc.
  - Uses XML, RDF, Dublin Core
  - dublincore.org, www.prismstandard.org
- TV Anytime (tech.ebu.ch/tvanytime)
  - Devoted to audio-visual services making use of local mass-storage
  - Focus on Electronic Program Guide and user profiles
- EBU P/Meta
  - Devoted to material exchange between broadcasting stations
  - Vocabulary for program structure and metadata
- SMPTE Metadata Dictionary
  - Structured list of 1500 metadata elements, used e.e. in MXF format
- Commercial solutions e.g. by Rovi (www.rovicorp.com), *ex* Macrovision

METADATA
Dublin Core®Metadata Initiative
INNOVATION

Index of Terms

Properties in the /terms/ namespace	abstract , accessRights , accrualMethod , accrualPeriodicity , accrualPolicy , alternative , audience , available , bibliographicCitation , conformsTo , contributor , coverage , created , creator , date , dateAccepted , dateCopyrighted , dateSubmitted , description , educationLevel , extent , format , hasFormat , hasPart , hasVersion , identifier , instructionalMethod , isFormatOf , isPartOf , isReferencedBy , isReplacedBy , isRequiredBy , issued , isVersionOf , language , license , mediator , medium , modified , provenance , publisher , references , relation , replaces , requires , rights , rightsHolder , source , spatial , subject , tableOfContents , temporal , title , type , valid
Properties in the /elements/1.1/ namespace	contributor , coverage , creator , date , description , format , identifier , language , publisher , relation , rights , source , subject , title , type

Term Name: creator	
URI:	http://purl.org/dc/terms/creator
Label:	Creator
Definition:	An entity primarily responsible for making the resource.
Comment:	Examples of a Creator include a person, an organization, or a service.
Type of Term:	Property
Refines:	http://purl.org/dc/elements/1.1/creator
Refines:	http://purl.org/dc/terms/contributor
Has Range:	http://purl.org/dc/terms/Agent
Version:	http://dublincore.org/usage/terms/history/#creatorT-002
EquivalentProperty:	http://xmlns.com/foaf/0.1/maker

Integration of Digital Media in Video Production

- Example: Putting together all audio elements for a film soundtrack
  - Music tracks, ambient sound tracks, performer's synchronized sound, ...
  - Metadata related to creation process need homogeneous treatment
- Standards in the broadcasting industry
  - SMPTE (Society of Motion Picture and Television Engineers)
  - EBU (European Broadcasting Union)
  - Working on hardware-based standards for a long time
- EBU/SMPTE Task Force for Harmonized Standards for the Exchange of Program Material as Bit Streams (1996-1999)
  - Results further developed into Advanced Authoring Format (AAF)
  - AAF: Industry-driven, cross-platform, multimedia file format
  - "Advanced Media Workflow Association" (AMWA)
    - » see http://www.amwa.tv/

Interchanging Compositions with AAF
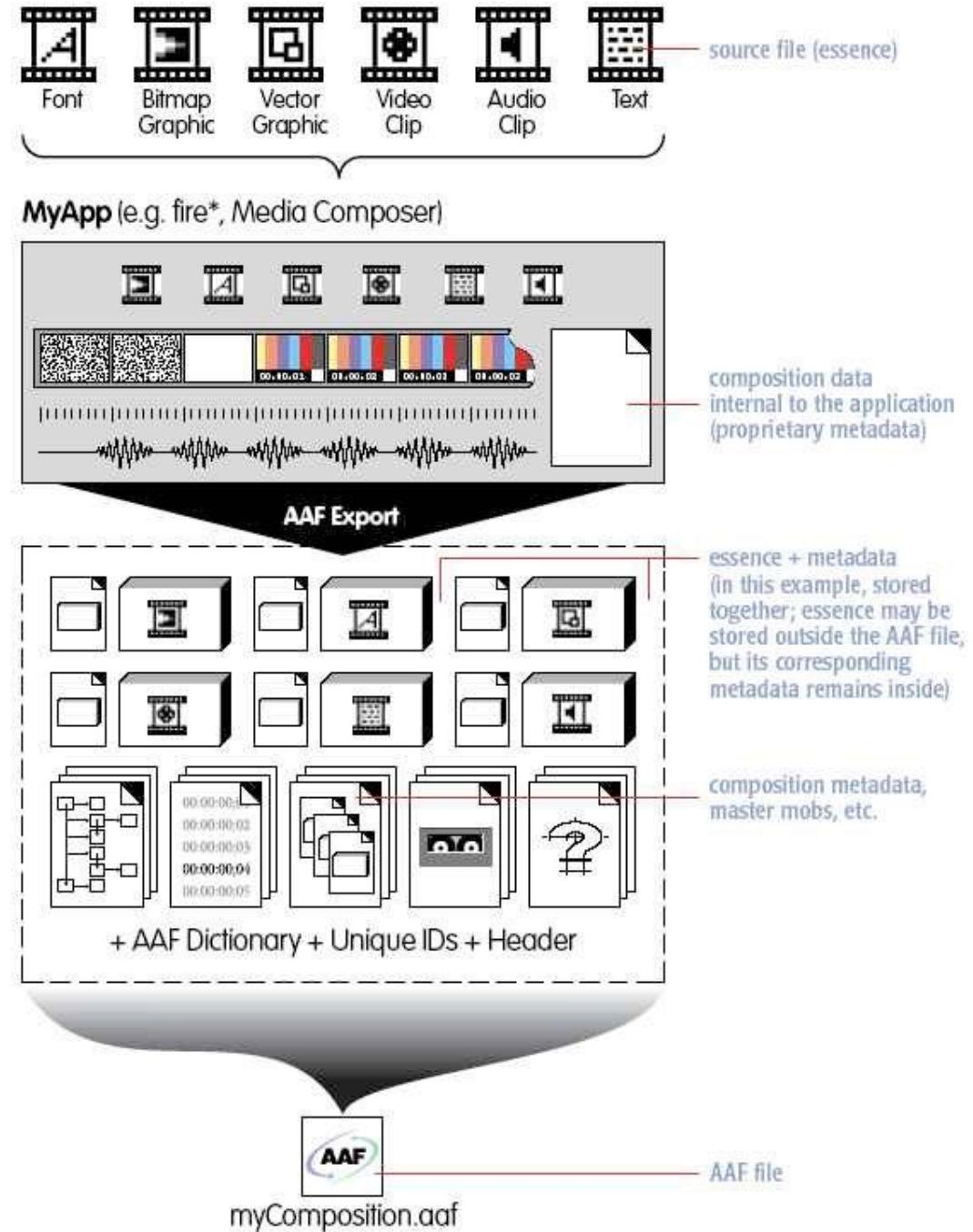
Adobe XMP

- Defined by Adobe 2001, since 2007 under BSD license

- Embedding of metadata into distributed files

  - In particular into PDF

- Data model and XML-Based storage model

  - Following the RDF description principle

- Formal schema definitions for metadata properties

- Application:

  - Adobe products (e.g. Photoshop, In-Design)

  - International Press and Telecommunications Council (IPTC) has integrated XMP into its Image Metadata specifications

8   Multimedia Content Description

Literature:
  Troncy/Huet/Schenk, Multimedia Semantics - Metadata, Analysis
   and Interaction, Wiley 2011
  W3C: RDF Primer, http://www.w3.org/TR/rdf-primer/

Resource Description Framework RDF

- Language for representing information about resources in the WWW
  - W3C's Semantic Web activity

- *Resource:* Anything that can be identified by a URI (e.g. all Web pages)
- *Property:* An attribute of a described thing which can take on specific values
- *Statement:* A triple consisting of
  - *Subject:* Some resource to be described
  - *Predicate:* A property of the subject
  - *Object:* A specified value
- Properties, values and statements are resources themselves,
  - i.e. can be identified by a URI
  - i.e. can be subject to further description
- RDF documents are collections of (triple) statements
  - written either in XML or in specialized notations (e.g. "Turtle")

RDF Example

- **http://www.example.org/index.html** has a **creator** whose value is **John Smith**

- **http://www.example.org/index.html** has a **creation-date** whose value is **August 16, 1999**

- **http://www.example.org/index.html** has a **language** whose value is **English**
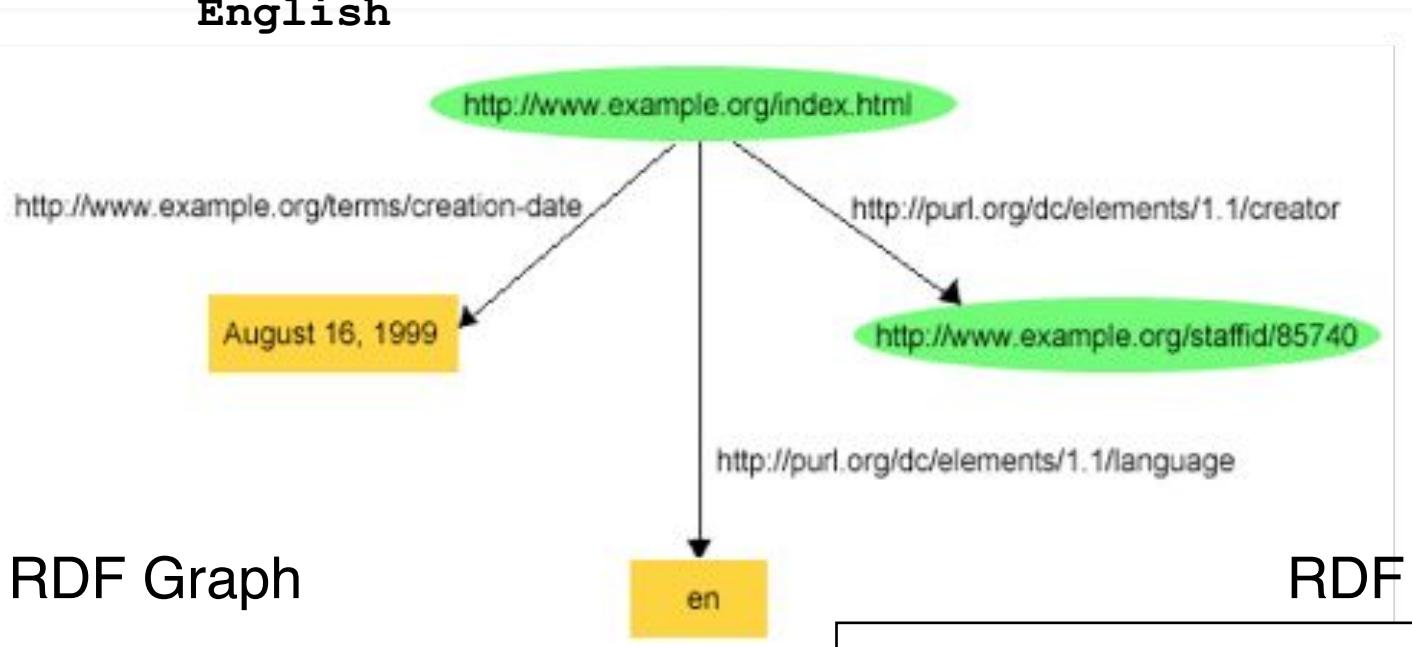
RDF Graph

RDF Triples (using namespaces)

```
ex:index.html  dc:creator                exstaff:85740 .

ex:index.html  exterms:creation-date  "August 16, 1999" .

ex:index.html  dc:language               "en" .
```

RDF/XML: XML Notation for RDF

```xml
<?xml version="1.0"?>
    <rdf:RDF
        xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:exterms="http://www.example.org/terms/">

        <rdf:Description
            rdf:about="http://www.example.org/index.html">
            <exterms:creation-date>August 16, 1999
            </exterms:creation-date>
        </rdf:Description>

    </rdf:RDF>
```
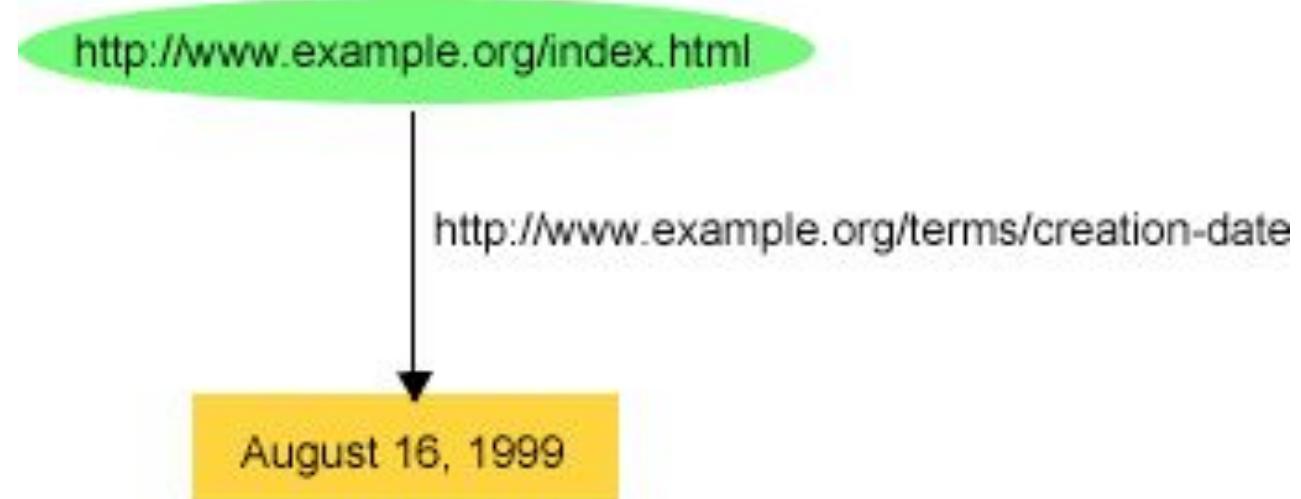
Example: Audio Metadata in DC-based RDF/XML

Multiple statements within one RDF description element

```
<rdf:RDF
   xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
   xmlns:dc="http://purl.org/dc/elements/1.1/">

   <rdf:Description
       rdf:about="http:www.medien.ifi.lmu.de/team/
       heinrich.hussmann/files/mmn7.mov">
     <dc:creator>Heinrich Hussmann</dc:creator>
     <dc:title>Multimedia Content Description I</dc:title>
     <dc:description>Discusses multimedia metadata
       standards.</dc:description>
     <dc:date>2012-12-20</dc:date>
     <dc:format>audio/mp4</dc:format>
   </rdf:Description>

</rdf:RDF>
```

The Need for Ontologies

- Fixed schemata for text-based annotation are insufficient for practical purposes (or are often misused).

- Fine-grained and flexible semantic schemata are needed.

- Example from GraceNote/iTunes:

Defining Ontologies

- *Ontology*: Controlled vocabulary to express semantic information
  - Knowledge representation through concepts in terms of:
    types, properties, interrelationships

- RDF Schema
  - Simple set-theoretic ontologies, defines vocabularies for RDF

- OWL, Web Ontology Language by W3C
  - Extension of *RDF Schema*
  - Based on *Description Logics,* powerful mathematical semantics
  - Ontologies can be denoted in RDF syntax itself

- *W3C Ontology for Media Resources*
  - http://www.w3.org/TR/mediaont-10 (Recommendation Feb 2012)
  - Defines a standard terminology for multimedia segmenting and annotation
  - Gives detailed mappings for most commonly used metadata standards
    (incl. DC, EXIF, ID3, MPEG-7, QuickTime, YouTube, …)
  - Fully defined in OWL/RDF

Embedding Semantic Metadata into the Web

- RDFa: "RDF in Attributes"
  - Structured Data Markup for Web Documents
  - W3C WG Note August 2013, see http://www.w3.org/TR/xhtml-rdfa-primer/
  - Idea: Add information to Web documents on the meaning of its contents in machine-readable form
  - Applicable to all XML languages and HTML5

- Example:

```
<html>
  <head>...</head>
  <body> ...
        <h2 property="http://purl.org/dc/terms/title">
        The Trouble with Bob</h2>
        <p>Date:
        <span property="http://purl.org/dc/terms/created">
        2011-09-10</span>
    </p>...
  </body>
```

- Can be used, for instance, to add license conditions to links!