Introducing MPEG-7 & MPEG-7 Audio

AES Amsterdam Workshop on MPEG-7
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MPEG-7 Goals

- Multimedia Content Description Interface
- Many applications
- Media agnostic
- Extensible
- Compatible with existing technologies
- A large, encompassing standard
Some Terms

- DDL
  - Description Definition Language
- DS
  - Description Scheme
- D
  - Descriptor
MPEG-7 Descriptions

Annotative

Architectural

Medium Physical Perceptual Transcript

Data
MPEG-7 Architecture

MMDS

Video

Audio

MMDS foundation

DDL

Systems

High-level and structural document description

Basic media-specific capabilities and coding

Constructs not fundamental to language

Subtlety of description

Bedrock for transmission, streaming, coding...
How Audio fits in the Standard

- What you need to know:
- DDL
  - Based on XML-Schema
  - Determines “what goes where”
<complexType name="AudioLLDScalarType" abstract="true">
  <complexContent>
    <extension base="mpeg7:AudioDType">
      <choice>
        <element name="SegmentSummary">
          <complexType>
            <complexContent>
              <restriction base=" Geschäftsbericht "
              <extension base="integer">
                <attribute name="label" type="string" use="required"/>
              </extension>
            </complexContent>
          </complexType>
        </element>
      </choice>
    </extension>
  </complexContent>
</complexType>
How Audio fits in the Standard

What you need to know:

- DDL

- MDS constructs
  - Basic data types
    - e.g. vectors, time, refs, links
  - Segment
  - Controlled term
MPEG-7 Description Schemes

- Content organization
- Collection & Classification
- Model
- User interaction

- Creation & production
- Media
- Content management
- Usage

- Content description
- Structural aspects
- Semantic aspects

- Navigation & Access
- Summary
- Variation

- Basic elements
  - Schema tools
  - Datatype & structures
  - Link & media localization
  - Basic DSs

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MPEG-7 Description constructs

- Documents (key/values)
  - Title:
  - Composer:
  - Media Format:
  - Genre:
  - Rights owner:
MPEG-7 Description constructs

- Documents
- Segments

Audio Program

Segment

Spectral Envelope:

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MPEG-7 Description constructs

- Documents
- Segments
- Scalable Series

Frequency, too! →
MPEG-7 Audio

- High-level application tools:
  - Spoken Content
  - Sound Recognition framework
  - Musical Instrument Timbre Similarity
  - Melody and Melodic Contour
  - Robust Audio Matching
MPEG-7 Audio

- High-level application tools
- Low-level audio description framework
  - Structures
    - Segments and Scalable series
  - Descriptors...
Low-level descriptors

- **Basic**
  - Instantaneous Waveform & Power

- **Basic Spectral**
  - Log-frequency power spectrum, Spectral envelope, centroid, spread, flatness

- **Signal Parameters**
  - Fundamental freq, Harmonicity

- **Timbral Temporal**
  - Log attack time, Temporal Centroid

- **Timbral Spectral** (lin-freq)
  - Harmonic Spectral Centroid, deviation, spread, variation

- **Spectral Basis representations**
  - Projections into T/F basis functions
Put it all together: a typical partial description
Conclusion

- Large standard
  - Pick & choose elements as desired
  - Building block approach
- MPEG-7 Audio provides low-level tools
  - Basis for compatibility across applications
- Standard shows good integration
  - Complements other parts of standard
  - Conceived as a whole
- High-level applications are where it shows the power of content-based representation
The End

➢ Questions?

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www.mpeg-7.com
www.cselt.it/mpeg/
www.darmstadt.gmd.de/mobile/MPEG7/