MPEG-7

Metadata: data about data

Metadata types:
- Low-level: content-based metadata
- High-level: semantic metadata

MPEG-7 feature:
- Well organized XML structure that is instantiated by the values of the features extracted from the multimedia data
- XML structure is easy to search, especially if it has been standardized

MPEG-7 application:
Browsing and retrieval of audiovisual databases
Surveillance: traffic control, product chains
Intelligent multimedia presentation
E-commerce and Tele-shopping (search for cloth)
Journalism (search for events, people)
…

XML
XML: a way to structure data using a simple grammar, it structures data based upon meaning
Components (2): data, tags used to mark the structure of the data

MPEG-7: the objective
Standardized a content-based description of various types of multimedia information
- Allow quick and efficient search
- Address a large range of multimedia applications

MPEG7: elements
- Descriptors (D): represent features
- Description Schemes (DS): specify the structure and semantics of the relationships between components
- Description Definition Language (DDL): allow creation and modification of DS
- System tools: support multiplexing of descriptions, transmission mechanisms, …

Normative in MPEG-7
- Descriptors (Ds) & Description Schemes (DSs) — Data structures
- DDL — XML schema, XML
- Binary coding formats
- Profiles

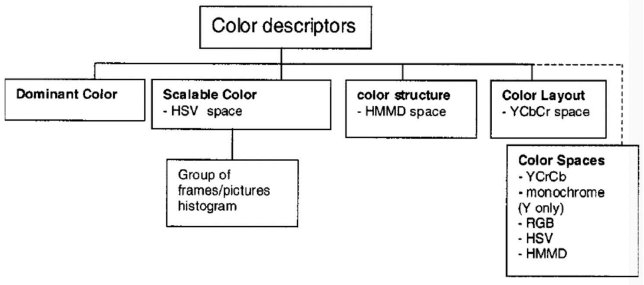
Non-normative in MPEG-7
- Extraction of descriptions
- Usage of descriptions

Information levels
Low-level information
- Automatic extraction of descriptions

- Quality of descriptor can be measured by the retrieval rate
- Application independent descriptor database

High-level information
- Manual annotation of descriptions

Color descriptors



Scalable color
A color histogram in HSV color space, encode by Haar Transform

Dominant color
Clustering colors into a small number of representative colors

Color layout
Clustering the image into (8x8) blocks, derive average color of each block

Color structure
Count the number of blocks contains each color, generate a color histogram

GoF/GoP color descriptor
Generates the color histogram for a video segment or a group of pictures

Summary: MPEG-7

Metadata: data about data (low-level, high-level)

MPEG-7: objective
Represent information about the content, standardized a content-based description of various types of multimedia information

MPEG-7 features:
1. Well structured XML that is instantiated by the value of features extracted from the data
2. XML structure is easy to search, especially if it is standardized

MPEG-7 application:
- Browse and retrieval
- Surveillance
- Intelligent multimedia presentation
- E-commerce, tele-shopping
- Journalism
- Personalized television services

XML: structures data based upon meaning

MPEG-7: element — D, DS, DDL, system tools

MPEG-7 normative: DS&D, DDL, binary coding formats, profiles
MPEG-7 non-normative: extraction of descriptions, usage of descriptions

Information level
Low-level: automatic extraction, quality of descriptor—retrieval rate, application independent
High-level: manual extraction, powerful for search & retrieval

Color descriptors
- Scalable Color — color histogram in HSV color model
- Dominant Color — cluster color into a small number of representative colors
- Color Layout — average color of each block
- Color Structure — each color in how many blocks —> color histogram
- GoF/GoP — histogram for a video segment or a group of picture

Multimedia analysis for content indexing
Automatic content annotation (manual —> automatic)
Universal multimedia access (different devices)
Advanced video surveillance (automation of tasks)

MPEG-7 camera: describes a scene in terms of semantic objects and of their properties
- Image analysis block
- MPEG-7 coder: scene description represented using MPEG-7 (XML)
- MPEG-7 decoder: extract information

Privacy-preserving surveillance

Practice

ii) Describe the features of MPEG 7.

(2 marks)

The features of MPEG 7:
1. It uses the well structured XML which is instantiated by the values of features extracted from the multimedia data
2. The XML structure is easy to search, especially if it is standardized

MPEG 7 represents information about the data, it standardizes a content-based descriptor for the multimedia information. It allows retrieve and search to be easy, it also addresses a large range of multimedia applications

Color descriptor: scalable color, dominant color, color layout, color structure, GoP/GoF

MPEG-7 application:
- Browse, retrieve
- Surveillance
- Intelligent multimedia presentation
- E-commerce, tele-shopping
- Journalism
- Personalize television services