# Multimedia Retrieval

**1 Introduction**

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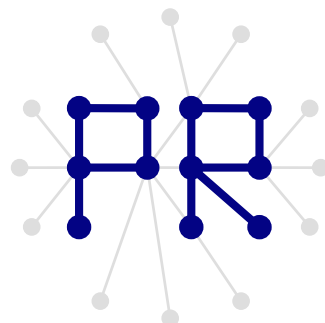
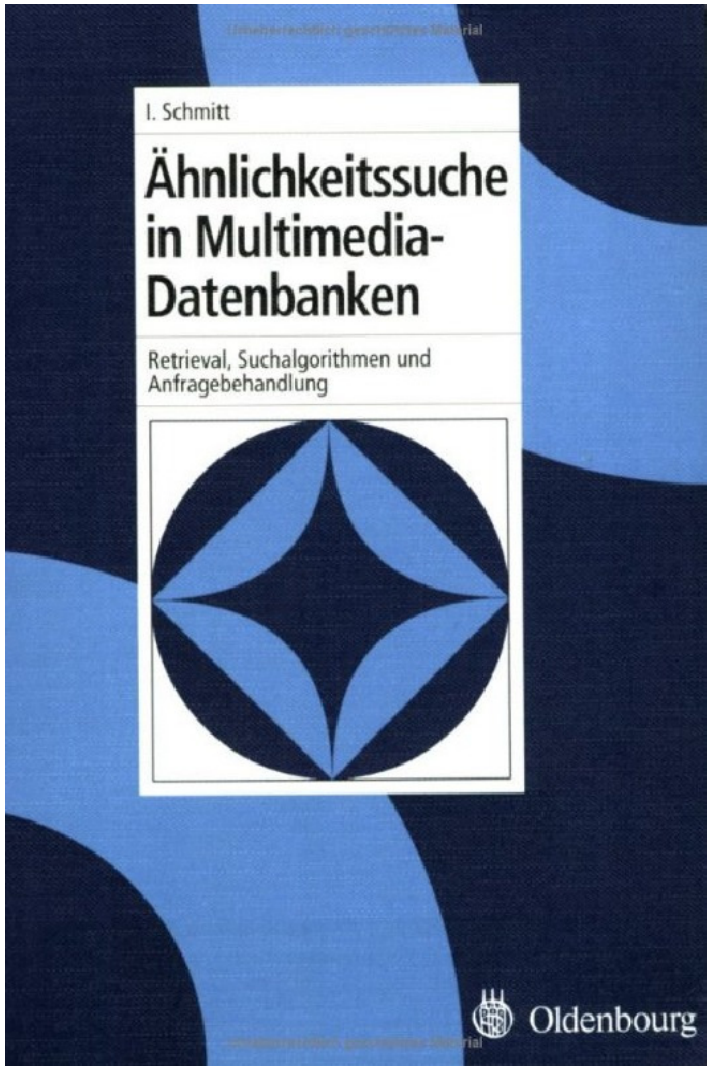


# Literature

Concept

Search

Applications



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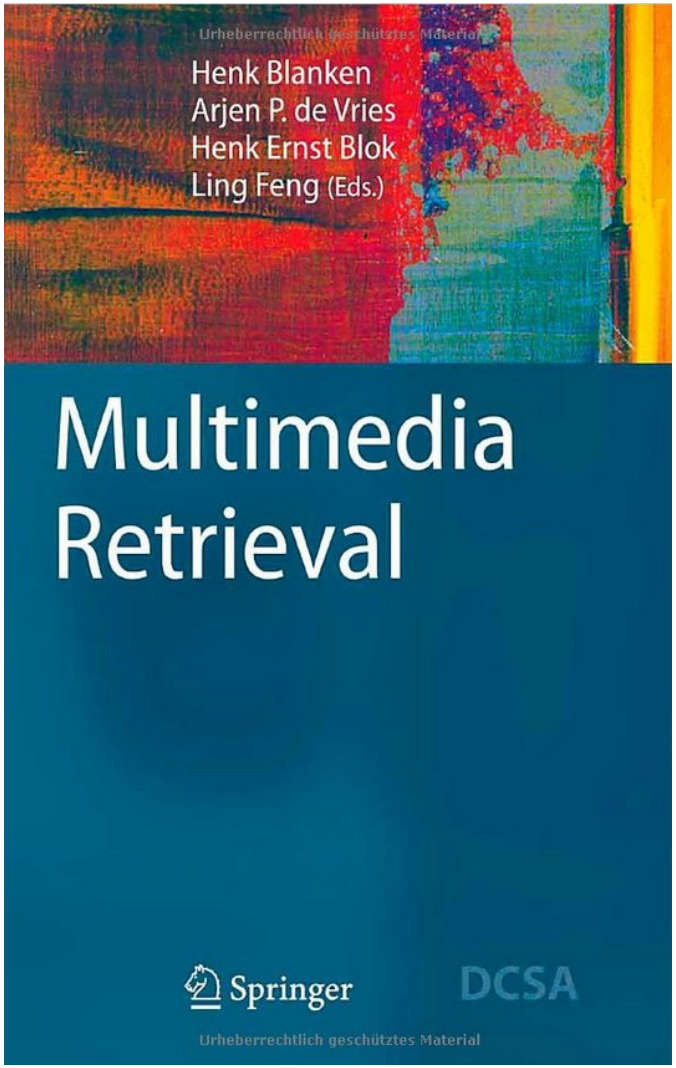

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# Overview

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# MMDB Systems versus DB Systems



Why are conventional database systems not sufficient?

- Nowadays there is a huge amount of media data: text documents, images, audio and video files, etc.
- Conventional database systems have not been developed for this kind of data.
- Media data need to be processed differently from relationally structured data.
- Similarity search in MMDB must be much more flexible (e.g., "Search for all images illustrating houses").

# MMDB Systems versus IR Systems



Why are conventional information retrieval systems not sufficient?

- Such systems have been developed for content-based search in text documents.
- For content-based search in other media data extended functionality is necessary.

# MMDB Systems = DB Systems + IR Systems

Concept
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- In many multimedia applications a combination of media data and relationally structured data has to be processed.
- Therefore, in the development process of multimedia database systems mechanisms of DB and IR systems have to be combined.

# Interdisciplinarity

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Search
Applications

The processing of media and multimedia data is manifold:

- Operating Systems
- Computer Networks
- Graphics
- Image Processing
- Signal Processing
- Information Technology
- Psychology
- Document Management

# Medium (1)

Concept
Search
Applications

- A *Medium* is an intervening substance through which something else is transmitted or carried on.

- If the information is transmitted to a human, medium can be classified based on the type of perception
  - *Vision*
  - *Hearing*
  - *Haptics*
  - *Tasting*
  - *Smelling*

# Medium (2)



- Media classification in time context:
  - *Static medium*: e.g., written text, photos
  - *Dynamic medium*: e.g., video and audio

- Media classification in computer context:
  - Text
  - Graphics
  - Image
  - Audio
  - Video

# Multimedia

Concept
Search
Applications

- The term *Multimedia* extends the term *medium*.
- Multimedia denotes integration of different digital media types

# Documents and Objects (1)

Concept
Search
Applications

- A *Document* is a logically coherent and digitally coded Text (*Text Document*)
- A *Multimedia Document* may include, apart from text data, also data of other types like video, image, audio, etc.
- A *Media Object* comprises data of any media type.
- A *Multimedia Object* can combine data of different media types, whereas at least one media type must be non-alphanumeric.

# Documents and Objects (2)



| **Begriff** | **Text** | **Video/Bild/Audio** |
|---|---|---|
| Dokument | + | – |
| Multimedia-Dokument | + | optional (kombiniert) |
| Medien-Objekt | + (ein Typ) | |
| Multimedia-Objekt | + (kombiniert) | |

# Multimedia Database Management System (1)

Concept
Search
Applications

Definition by Christodoulakis from 1985:

- A *MMDBMS* is a Database Management System that provides, apart from conventional functionality of database systems, solutions for following two aspects:

  1. Management of unformatted data

  2. Consideration of special storing and presentation devices.

# Multimedia Database Management System (2)

Concept
Search
Applications

Definition by Meyer-Wegener:

- A *MMDBMS* is a Database Management System that considers following aspects:
  - Multimedia database model
  - Information retrieval
  - Data independence
  - Storage, input and output devices
  - Time aspects
  - User interfaces

# Overview



1 Fundamental Concept

2 Search in a MMDBS

3 Applications of a MMDBMS

# Search Process

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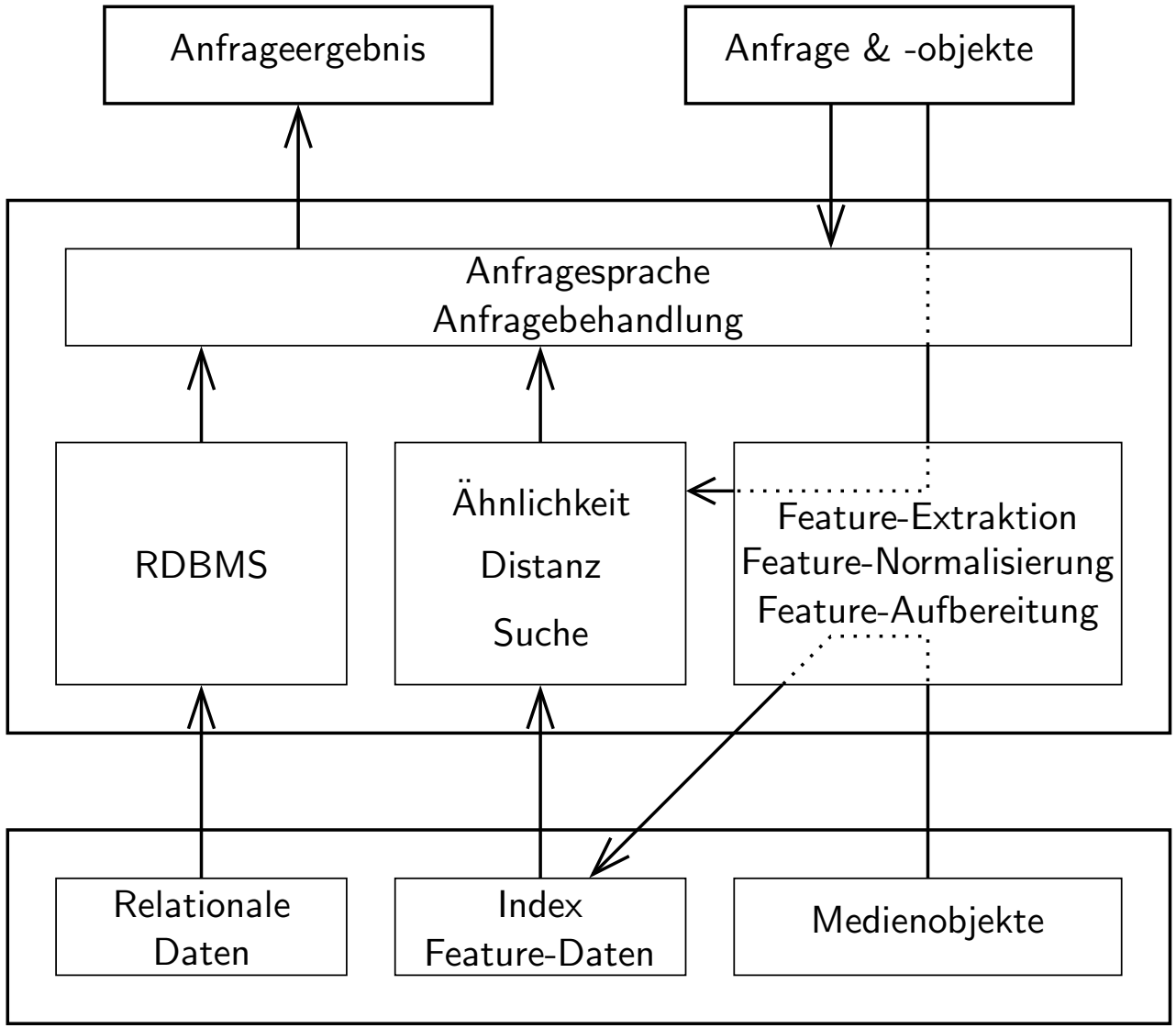

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# Classification and Applications (1)

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Applications can be classified based on the ratio of change operations to search operations:

- Static applications
- Dynamic applications

# Classification of Applications (2)



Applications can also be classified based on the interaction mode between the application and the MMDBS:

- Passive applications
- Active applications

# Classification of Applications (3)



Applications can also be classified depending on the search type (content-based or not):

- Retrieval applications
- Standard database applications

# Classification of Applications (4)

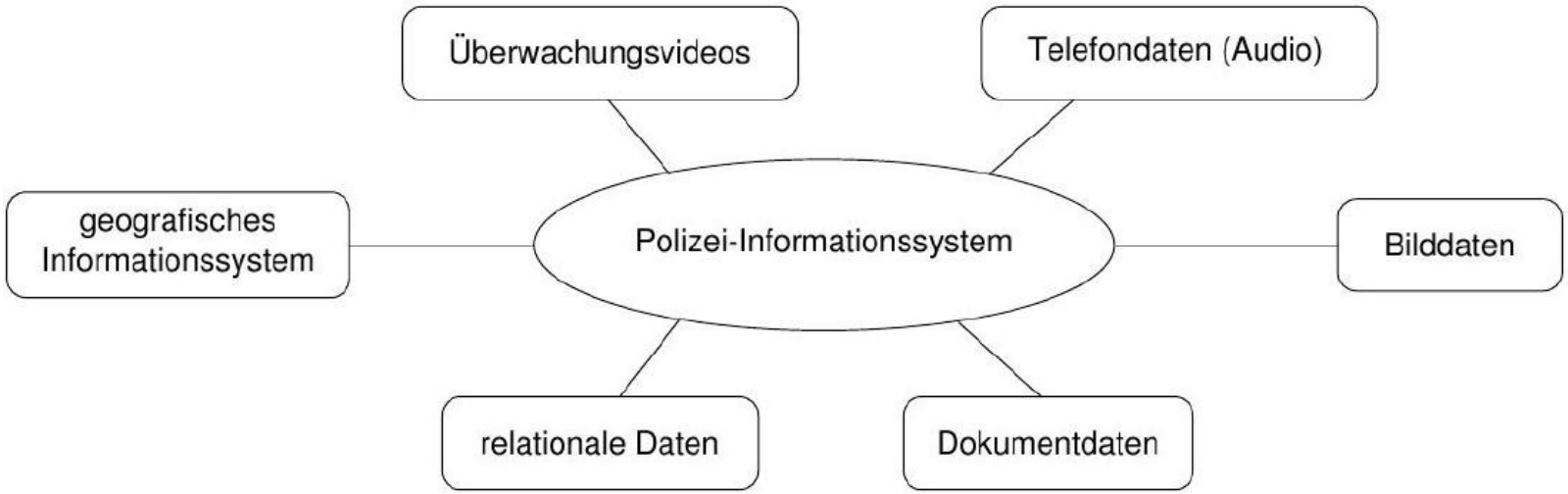


Classification based on media types:

- Text
- Image
- Audio
- Video

# Police Information System

Concept
Search
Applications



# Video Management and Retrieval System

Concept

Search

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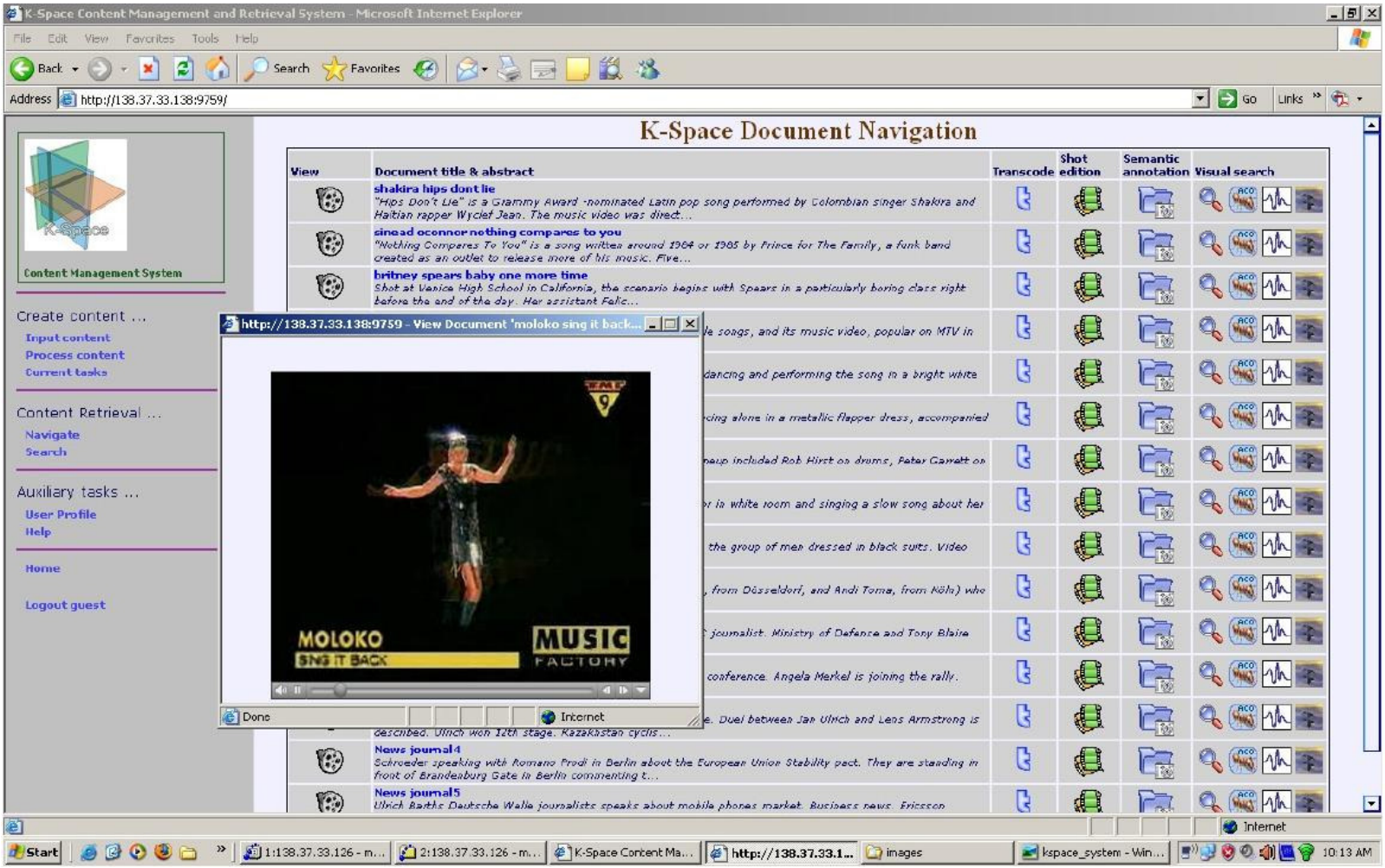

# Image Retrieval based on Sketched Lines

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http://www.youtube.com/watch?v=IC7Q0khzc_M