Content-Based Image Retrieval at the End of the Early Years

ARNOLD SMEULDERS
MARCEL WORRING
SIMONE SANTINI
AMARNATH GUPTA
RAMESH JAIN

PRESENTERS

FATIH CAKIR
MELIHCAN TURK

Outline

- Introduction
- Scope
- Description of Content
  - Image Processing
  - Features
- Interaction
- System Overview
- Conclusion

Introduction

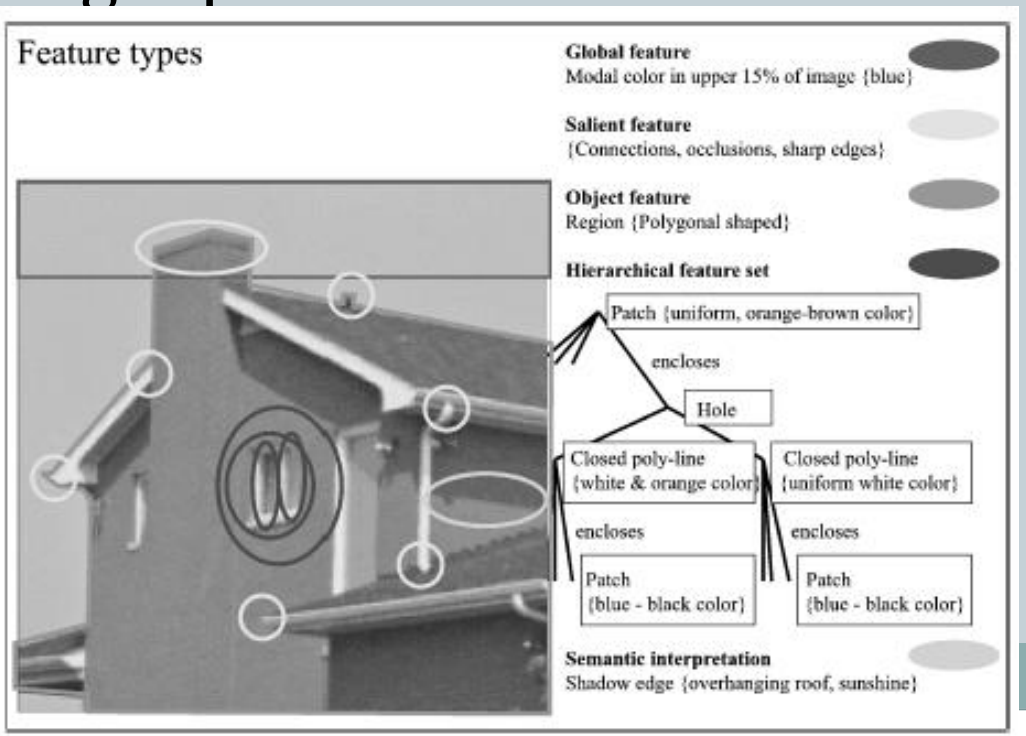
- The paper presents a broad review about content-based image retrieval steps
  - Image processing, user interaction, system architecture…
- A need for visual information management systems for scientific , industrial etc applications.
  - Google Image, IBM's QBIC …

Scope

- The user aims in content-based image retrieval systems
  - Search by association
    - Users have no specific aim other than finding interesting things
    - There is broad class of methods and systems aimed at browsing through a large set of images from unspecified sources
  - Searching at a specific image
    - Searching for a precise copy of query image (e.g. art catalogues)
  - Category search
    - Retrieving an arbitrary image representative of a specific class.

Description of Content

- Analyzing the content of images
- Low-level image processing techniques such as color, local shape and texture processing.
- For extracting representative feature vectors of images

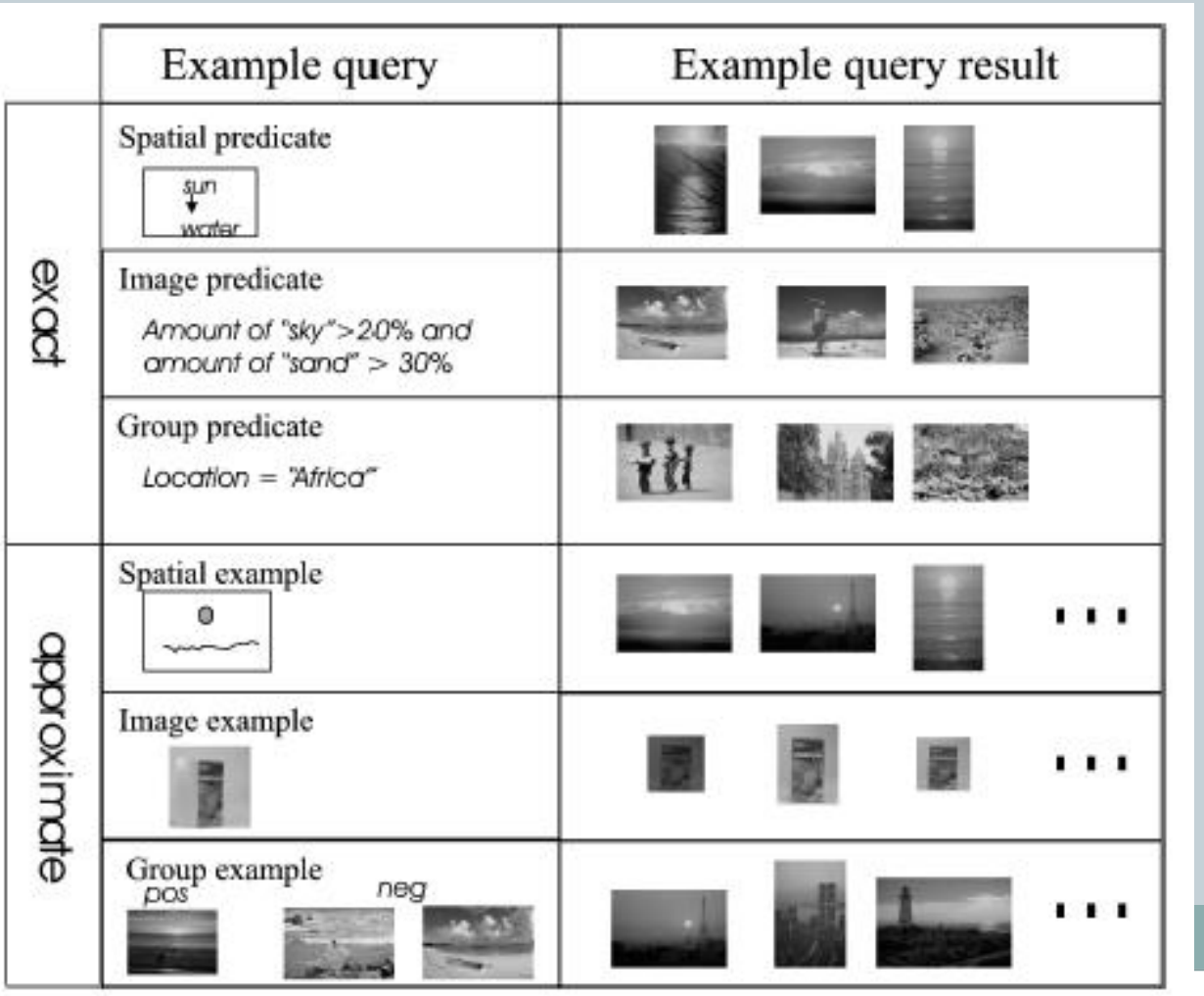


Similarity measures

- Retrieving is based on similarity between feature vectors (query and image collection)
- Several similarity measures exists
  - Euclidean distance
  - Jaccard coefficient
  - Dice coefficient
  - Cosine similarity
- Each similarity measure is effective on different data domains

Interaction

- User interface of content-based image retrieval systems



System

- Must utilize advance storage and indexing methods for efficient and effective retrieval performance
- Evaluation methods
- Precision

$$p = \frac{|A(q) \cap R(q)|}{|A(q)|},$$

- Recall

$$r = \frac{|A(q) \cap R(q)|}{|R(q)|}$$

Conclusion

- Content-Based Image Retrieval systems has gained severe interest among research scientists since multimedia files such as images and videos has dramatically entered our lives throughout the last decade
- Textual analysis is not sufficient for effective retrieval systems
- Comprehensive analysis (image processing etc) is needed for higher precision