

Module II: Multimedia Data Mining

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Motivations

Home page: <http://www-db.disi.unibo.it/courses/DM/>
Electronic version: 0.02.Motivations.pdf
Electronic version: 0.02.Motivations-2p.pdf

Let's go back to the course presentation...

- The Module II - “Multimedia Data Mining” - provides a demonstration of how traditional data mining techniques can be profitably applied for the efficient management of multimedia collections in term of localization of data of interest and for purposes of visualization and browsing”

Objectives

- Module II aims at providing fundamental skills in MM data (data representation, retrieval, browsing, and presentation) and MM DBMS (Data Base Management Systems), together with efficient and effective MM data management techniques able to provide users with information of interest in a real-time manner
- Several use cases will be presented in order to show how such MM solutions can be profitably applied in a number of real applications, supporting the significance of the topic

Main goal

- Facilitate and improve the “access” to multimedia data for general users, conjunctively exploiting:

- low level features (e.g., color distribution of a key frame)
- “dedicated users” manually provided metadata
- semi-automatically provided **annotations**



**Models,
Algorithms,
Interfaces**

Archivio Storico Fiat



- Trimotore Fiat G212
- Data: 1947
- Collezione: Tema di cultura industriale
- Tipologia: Immagine
- **Aereo, Motore, Ali**



Cineteca



- Das Cabinet des Dr. Caligari
- Data: 1920
- Nazione: Germania
- Regista: Robert Wiene
- Genere: Horror
- **Espressionismo, Ipnosi, Sonnambulismo**



Archivio Artistico



- La Gioconda
- Sito: Museo Louvre, Parigi
- Secolo: XVI
- Autore: Leonardo da Vinci
- Periodo: Rinascimento
- Data: 1503
- **Dipinto, Ritratto, Sorriso**



Topics at a glance

- MM data and applications
- MM data content representations and comparison
- MM data retrieval and MM DBMS
- Efficient algorithms for MM queries
- Semantic annotation techniques for MM data
- User interaction: browsing, visualization and relevance feedback
- Results accuracy, use cases, and real applications

Detailed topics

- Multimedia data and content representations
 - MM data and applications
 - MM data coding
 - MM data content representation
- How to find MM data of interest
 - Description models for MM data content
 - Similarity measures for MM data content
 - MM Data Base Management Systems
- Efficient algorithms for MM information retrieval
 - MM query formulation paradigms
 - Sequential retrieval of MM data
 - Index-based retrieval of MM data
- Automatic techniques for MM data semantic annotations
- Browsing MM data collections
- MM data presentation
 - User interfaces
 - Visualization paradigms
 - Dimensionality reduction techniques
- Result accuracy, use cases and real applications
 - Quality of the results and relevance feedback techniques
 - Use cases and demos of some applications

Motivations (1)

- Multimedia is a much more powerful communication tool than traditional data in our daily life
 - Image showcase, graphic design, TV commercial, speech, movie, hand phone multimedia message, etc
- There is a urgent need for more advanced systems organizing and managing these multimedia data types
 - Traditional relational databases are 'no longer' suitable for complex multimedia data
 - Automatic and robust systems which produce, transmit, analyze, manage, and search multimedia data in an efficient and effective way are required

Motivations (2)

- Text-based Information Retrieval
 - Too many MM objects to annotate
 - High cost of human interpretation
 - Subjectivity of visual content, e.g., “A picture is worth a thousand words”
- Content-based Retrieval
 - automatically retrieves images, video, graphics, animations, and audio based on the visual and audio content



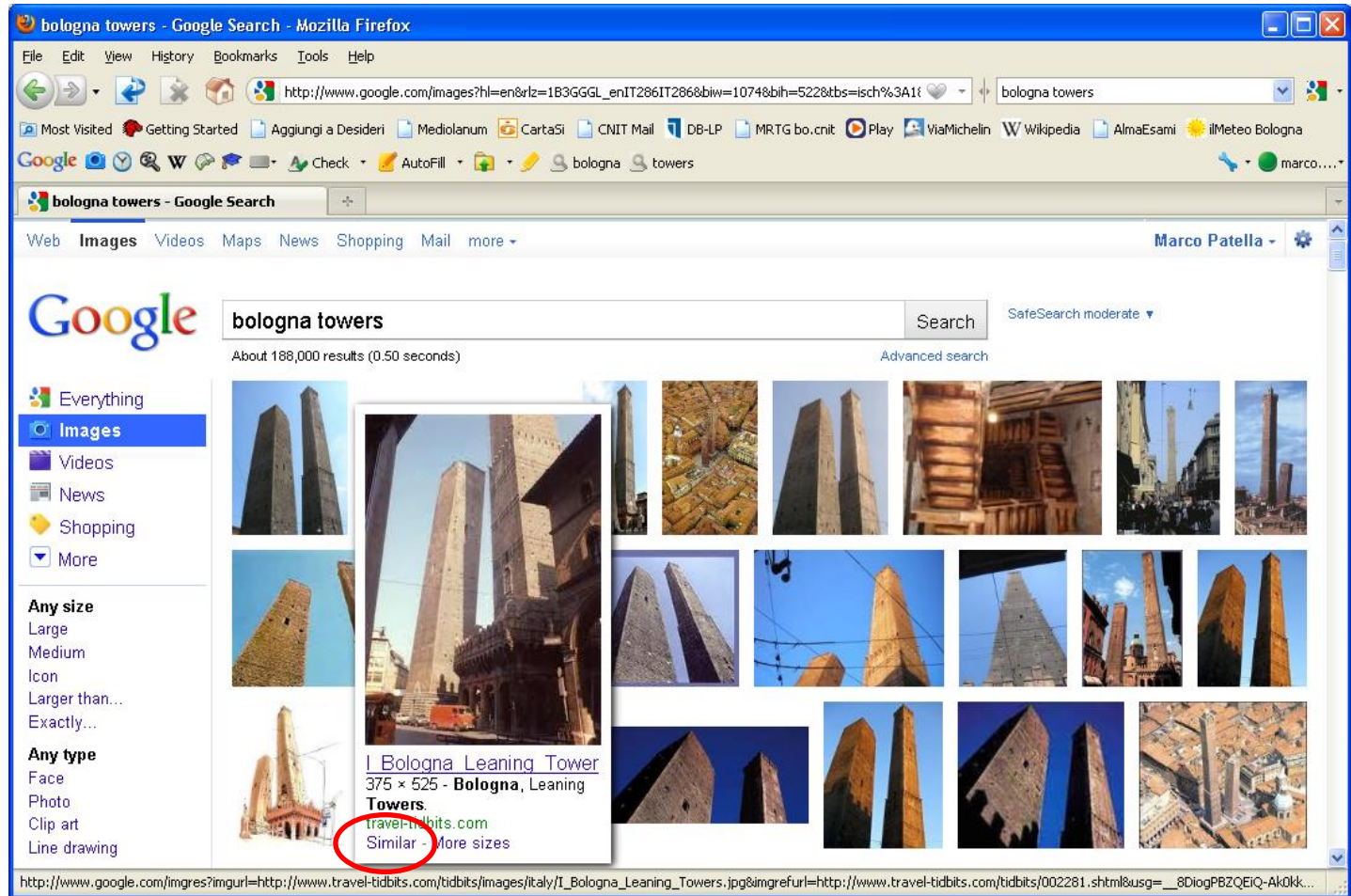
- History
 - Conference on Database Applications of Pictorial Applications in 1979
 - NSF workshop in 1992
 - More active field since 1997 when Internet and web browsing became popular

Motivations (3)

- A very diversified field!!
 - Data Types
 - Text, hypertext, image, audio, graphics, animation, paintings, video/movie, rich text, spread sheet, slides, combinations of these and user interaction
 - Research Problems
 - Systems, content, services, user, evaluation, implementation, social/business, applications
 - Methodologies
 - Database, information retrieval, signal and image processing, graphics, vision, human-computer interaction, machine learning, statistical modeling, data mining, pattern analysis, data fusion, social sciences, and domain knowledge for applications

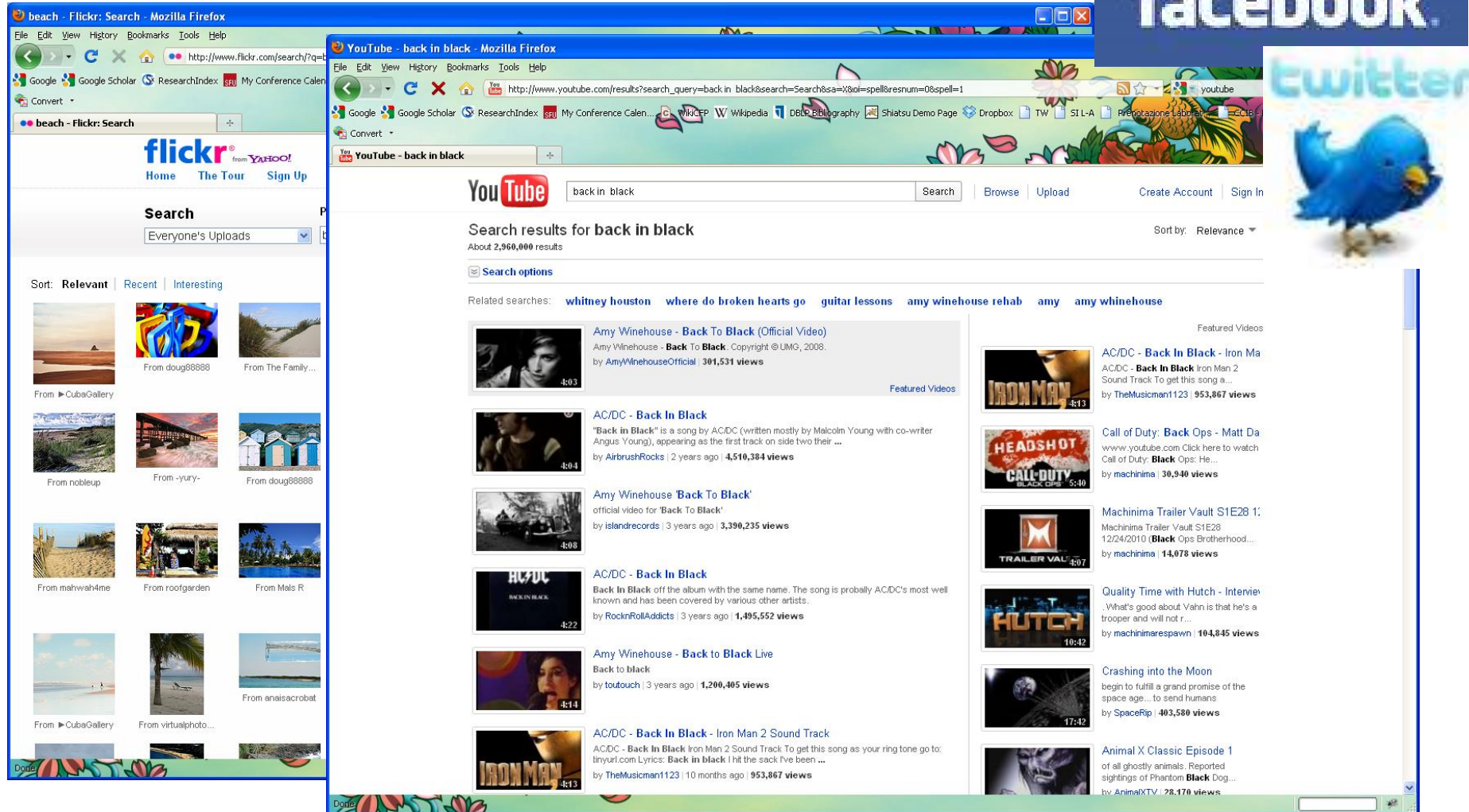
Example: advanced search engines

- How do they work?
 - Different types of data/queries w.r.t. traditional (documents) search engine



Example: social networks

- Users personal data sharing



Module II bibliography (1)

at 23rd September, 2015

Books:

- Zhongfei Zhang, Ruofei Zhang. *Multimedia Data Mining: A Systematic Introduction to Concepts and Theory*. CRC Press
- Ricardo Baeza-Yates, Berthier Ribeiro-Neto. *Modern Information Retrieval*. Addison Wesley
- K. Selçuk Candan, Maria Luisa Sapino. *Data Management for Multimedia Retrieval*. Cambridge
- Christos Faloutsos. *Searching Multimedia Databases by Content*. Kluwer Academic Publishers
- Borko Furht, Stephen W. Smoliar, HongJiang Zhang. *Video and Image Processing in Multimedia Systems*. Kluwer Academic Publishers
- Yossi Rubner, Carlo Tomasi. *Perceptual Metrics for Image Database Navigation*. Kluwer Academic Publishers

Links:

- Google Images: <http://www.google.it/imghp>
- Wikipedia: <http://en.wikipedia.org>
- Wikipedia list of CBIR engines: http://en.wikipedia.org/wiki/List_of_CBIR_engines
- Windusrf: <http://www-db.disi.unibo.it/Windsurf/>
- Shiatsu: <http://www-db.disi.unibo.it/Shiatsu/>
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