Technologies and Scenarios for Event-based Retrieval

FRANCESCO DE NATALE
DISI-UNIVERSITY OF TRENTO
• **PROJECT CALL**
  • FP7 4th call - Objective ICT-2009.1.5: Networked Media and 3D Internet (Target outcome ‘c’: Networked search and retrieval)
  • Type of project: Large-scale Integrated Project

• **STARTING DATE AND DURATION**
  • December 1st 2009 – 36 months

• **COORDINATING PARTNER**
  • DISI – University of Trento, Italy

• **TOTAL PROJECT COSTS (ORIGINAL)**
  • 7.4 Meuro
  • 816 man/months

• **RECENTLY EXTENDED UNDER EXTENDED-EU INITIATIVE**
The Consortium

- DISI - UNIVERSITY OF TRENTO **R&D (PROJECT COORDINATOR)**
- ISOCA S.A.  **R&D (SYSTEM INTEGRATOR)**
- ALINARI-24ORE SPA **R&D / USE CASES (EXPLOITATION MANAGER)**
- CENTER FOR RESEARCH AND TECHNOLOGY HELLAS **RESEARCH**
- YAHOO IBERIA SL **R&D / END-USER**
- AGENCE FRANCE PRESSE **R&D / USE CASES**
- DFKI GMBH **R&D**
- EXALEAD **R&D/ END-USER**
- L3S - UNIVERSITAT HANNOVER **RESEARCH (RESEARCH MANAGER)**
- INRIA **RESEARCH**
- BUT – UNIV. OF BRNO **RESEARCH (JOINING JULY 1ST 2011)**
Why GLocal

- **Content-based search** is intrinsically limited (feature-based descriptors, scalability, semantic gap, computational burden)
- Using **Content AND Context** is a possible way out
- **Events** are a good tool to map media into life experiences
  - Events have **structures and relationships** that can be modeled
  - Events have both a local (personal) and a global (social) dimension, which can be exploited to create models and make them evolve
EVENTS
- Tsunami
- Miyagi, Japan
- Mar 11, 2011
GLOCAL EVENT MODEL
- Tsunami
- Miyagi, Japan
- Mar 11, 2011
A WHEEL OF A LARGE MECHANISM
A world of Events
HOW TO MAKE IT WORK
• **Events** as the primary means for organizing and indexing media: events provide the context, while media represent the personal experience

• It is possible to distinguish:
  • a **local** dimension (personal-events): a single user handles own data through local event models populated with media
  • a **global** dimension (community-events): different users have a common way to understand and represent similar (or the same) events
Social sharing of local and global (GLocal) knowledge about events to achieve a mutual benefit in the representation, indexing and retrieval of media.
Provisioning components

- Background Importer (job)
- Geo Localization
- Event Repository (WP3)
- SWEB
- Event-based Media Clustering (job)
- Multimedia Event Metadata Extractor
- Global Multimedia Event Detector
- Local Multimedia Event Detector
- Analysis of Events (subscriber)
- Event Discovery from Media
- Adaptive UI
Annotation Components

- Adaptive UI
- Upload Manager
- Propagator (Foreground Importer)
- External APIs (Flickr etc.)
- Content Repository
- Event Analysis
- Geo Localization
- Media Event Metadata Extractor
- Media Converter
- Event-based Annotation
- Image Concept Detection

GLOCAL
A glance on Glocal Technologies and Scenarios
Objective: Automatically detect high-level events in large media collections

Method outline & innovation

- Don’t examine isolated visual concept detectors, due to their unreliability
- Instead, images / video shots are represented by visual model vectors
- Mixture subclass discriminant analysis (MSDA) learns event classes [1]
- MSDA reduces the dimensionality of the model vectors
- Nearest Neighbor classifies images / shots to events

High-level event detection using discriminanti visual concepts

• Advantages
  – Concept detection results (lots of them!) are used as evidence
  – No training of event-specific detectors (concept detectors trained on legacy data)
  – Promising results on large scale datasets [2]

• Block diagram of GLOCAL system component

# Demonstration

## Image Concept Detection & Media Event Indexing

### TRY WITH YOUR OWN IMAGE

**Your input**

- Enter link to an image and click GO
  - ![Image Link](http://)
  - **Go**

- or browse for a local image and click UPLOAD
  - ![Browse](browser_icon)
  - **Upload**

**Photographer's name (optional)**

- ![Check](check_box)
  - Copyrighted image (will appear underlined in orange)

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### ABOUT THE DEMO

This is a live demo of image concept detection and media event indexing for the Glocal European Project.

For a given image, a set of concepts and event are returned. For your convenience you can select pre-processed images from the repository to avoid waiting times.

### SELECT FROM REPOSITORY

Recently pre-processed images to choose.

- ![Image 1](image1.png)
- ![Image 2](image2.png)
- ![Image 3](image3.png)

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### See all images

- Uploaded images appear after confirmation
- Copyrighted images appear underlined in orange
Event-based organization of photo albums
An example

Categorisation of a collection of pictures into structured events
• Managing cultural and social events (concerts, sports, etc.) for non-professional users

• Focus:
  – Social ties,
  – Event recommendation,
  – User generated content

• Important for:
  – Knowledge fusion (i.e., aggregating events from different sources)
  – Analysis and recommendations based on social networks

• Cultural events usually have participant information linked to social networks
Data Types

• Social networks
• Event information
• Images for events

Corpora:

• 13k events from Upcoming
• 316k Flickr images linked to Upcoming events
• 250k LastFM events
• 800k images linked to LastFM events
• 320k users from LastFM with connections
• 3m Flickr images with tags, time, description, users, geo-location (~25% of the photos)
Data Linkage
Recommended connections

“Friendship value”
Good friends ⇔ Acquaintances
Filter recommended events

Explain recommendations (depending on communities, friends, location, etc.)
Additional material
Detect/identify new events in tagged photo collections: clusttour demo

Objective: Automatically detect and visualize in a map-based interface city events and places.

Method:
- Create a joint visual-tag feature space using multi-layer pLSA [1]
- Employ a parameter-free extension of the SCAN algorithm that uses photos as graph nodes and pairwise similarities of the photos as graph edges, to discover clusters of photos [2]
- Classify the discovered clusters to events or landmarks [3]

Clustour – City Exploration with Photo