

Advancements in Social Media Retrieval

How did PetaMedia help?

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NEM Summit 2011: Workshop on Search Computing and Social Media, Torino, 28 September 2011

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Multimedia
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peta
media

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FP7 NoE PetaMedia

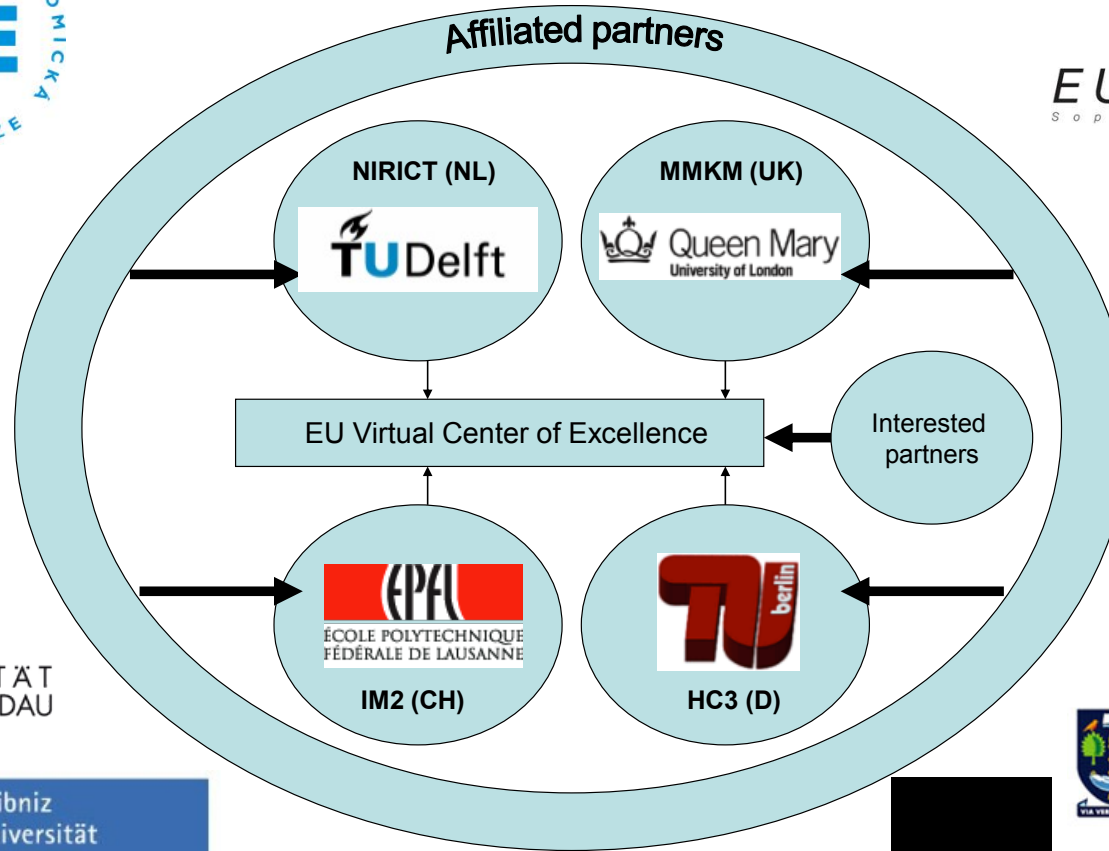


Centrum Wiskunde & Informatica



UNIVERSITÉ DE GENÈVE

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University of Glasgow



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PetaMedia Context:

Multimedia Information Retrieval (MIR)

- Expansion of the text-oriented IR paradigm onto a broader scope of modalities (images, audio clips, video, compound documents)
- Set of theories, algorithms and systems enabling content-based access to multimedia data on the web and in other (large) collections
- Content
 - Meaning of data → Semantics
 - Factual (e.g. objects, scene structure) or perceived (e.g. mood)

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What does MIR stand for?

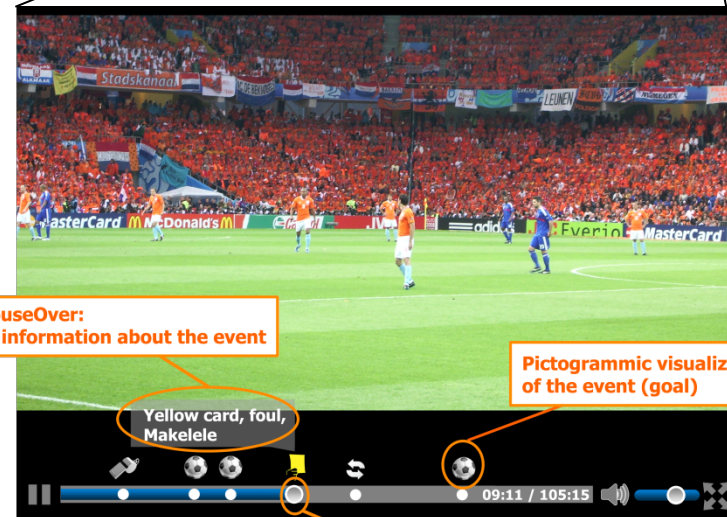


He wants a video that fits his current mood!



She wants a compact overview of the news of today while getting ready for work

I want to see a 5-minute summary of the soccer game I missed, with pointers to interesting actions and events



OnMouseOver:
Extra information about the event

Pictogrammic visualization of the event (goal)

Yellow card, foul,
Makelele

Currently playing:
Fourth abstract segment (white dot)
Pictogram indicates yellow card event

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A Historical Perspective

- Initially: Two separate MIR “worlds”
 - **Content:** Multimedia Content Analysis (MCA)
 - Data-driven, automatic extraction of content-related metadata
 - Advocated by signal processing/computer vision/pattern recognition communities

overview in **Hanjalic et al., PIEEE April 2008** and **Snoek&Worring, FTIR 2009**
 - **Context:** Web (2.0) inspired and (Geo-)Tags enabled
 - Relying on implicit and explicit user actions “around content”, e.g. taking photos, inserting (geo-) tags, user interactions in social networks and textual “context” of an image on a website
 - Advocated by the WWW community

initiated in **Davis et al., ACM MM 2004**

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A Historical Perspective

- Recently: Bringing Content and Context closer together
 - **Social Media Retrieval (SMR)** - a new paradigm for approaching the development of robust and reliable MIR solutions

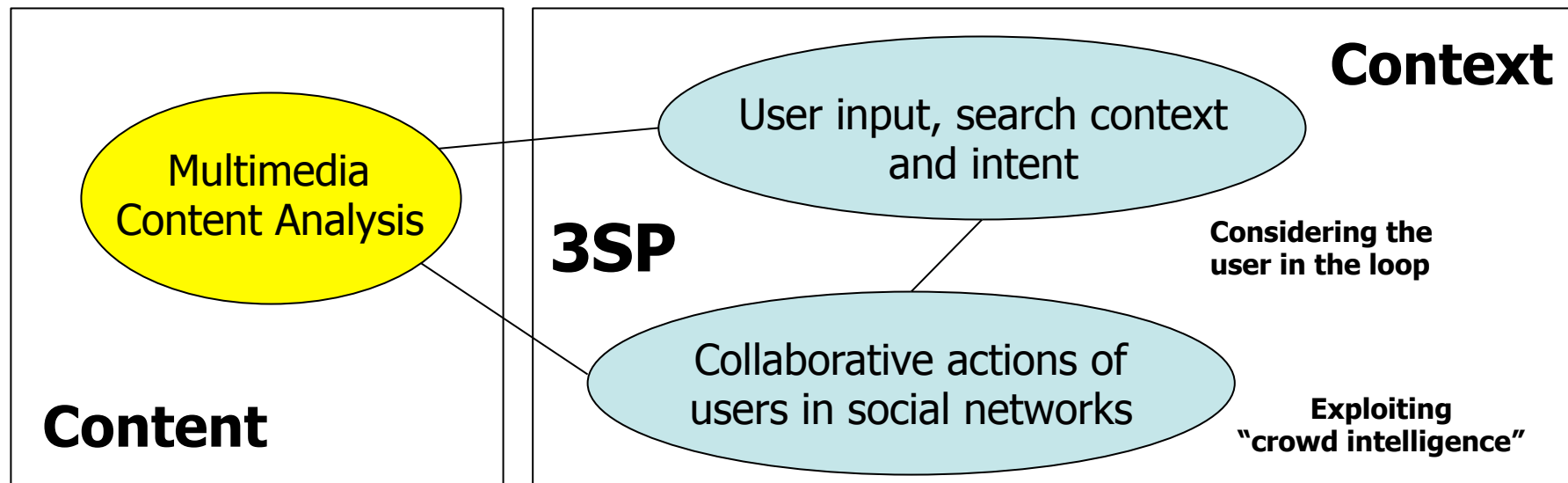
one of first articles in this direction: **Boll, IEEE Multimedia Jan.-Mar. 2007**
 - EC FP7 Network of Excellence **PetaMedia** - Pioneering holistic effort exploring the possibilities to combine the best of two MIR worlds
 - Rationale:
 - Increasing contextualization of multimedia data in social networks
 - Consciousness about imperfection of each of the MIR worlds considered separately
 - Awareness of a broad scope of available information resources to help compensate for deficiencies of each of the two worlds
 - Potential for improving MIR **Reliability, Quality of Experience** and **Scalability**

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Social Media Retrieval in PetaMedia

The Triple Synergy Paradigm (3SP)

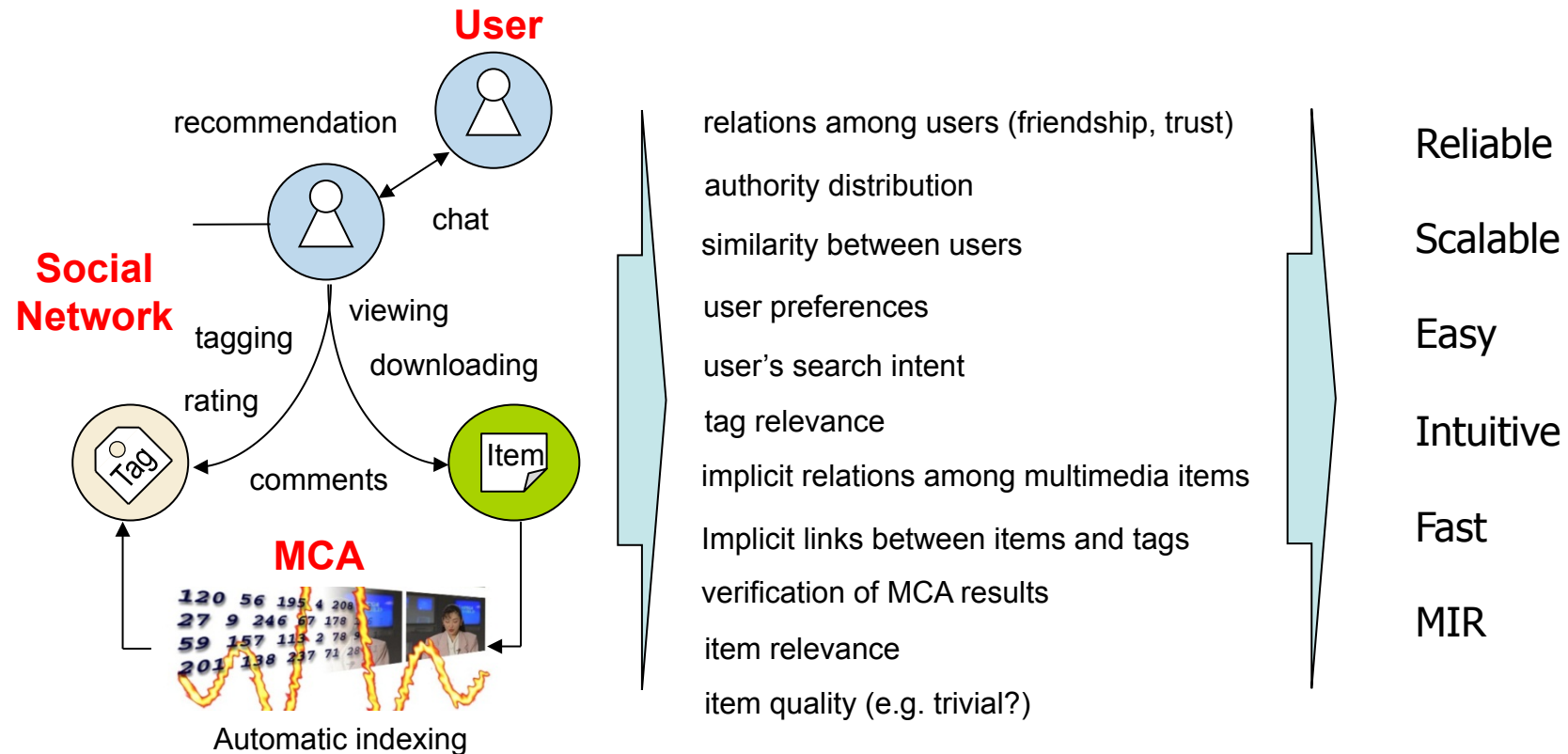
- Enhancing the “classical” multimedia information retrieval (MIR) paradigm by taking into account the information inferred from individual and collaborative interactions of the users with multimedia content



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PetaMedia Challenge

Getting the most from 3SP to improve MIR



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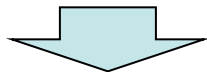
PetaMedia Contribution

- Scientific advancements
 - Broad bottom-up (*grassroots*) approach investigating different aspects of 3SP

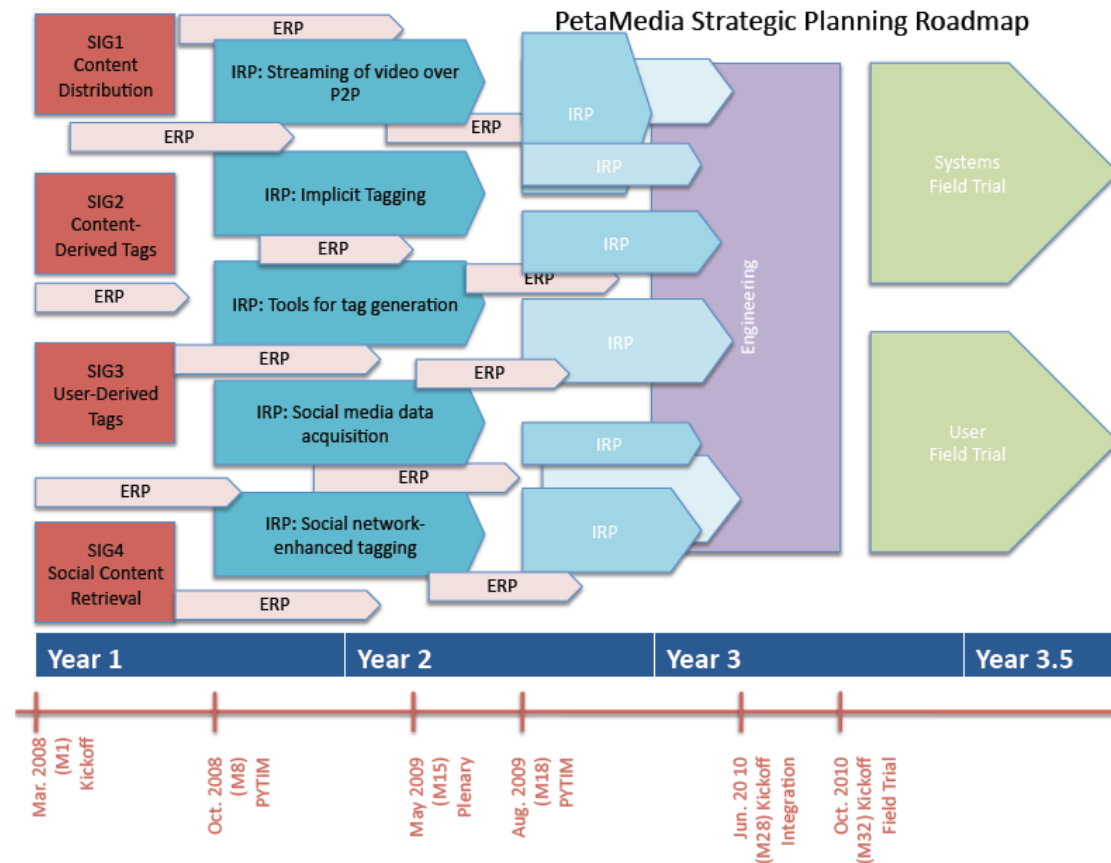
Exploratory individual projects (ERPs)



Integrated projects (IRPs)



Large-scale field trials



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Scientific challenges of PetaMedia

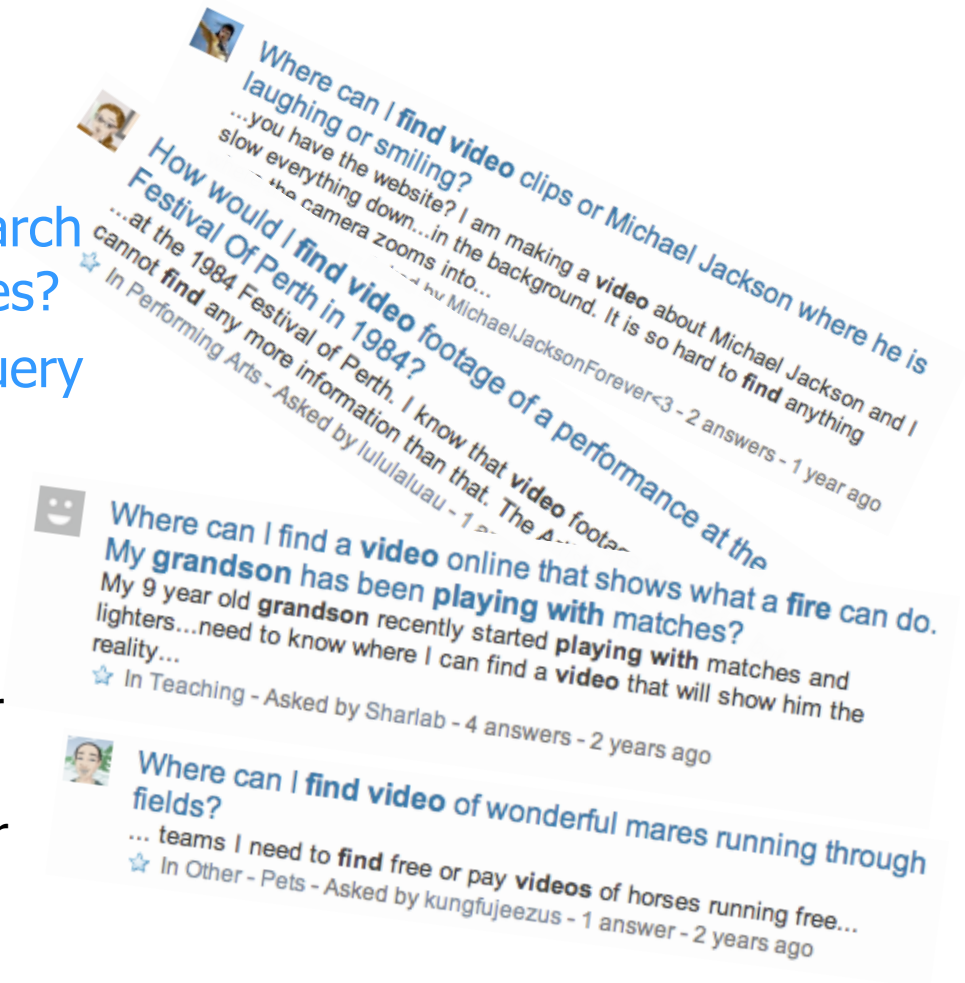
- Learning what the user is really searching for
 - Bridging the gap between query specification and search intent
 - Context-aware content recommendation
- Making the most out of user-generated annotations
 - Tag relevance estimation and propagation
- Making the most out of the community and data collection
 - Inferring the relations among the users (trust, friendship, authority)
 - Inferring the relations among multimedia items and metadata
- Integrating the above towards new MIR solution concepts
 - Maximizing the quality of the “best educated guess” (BEG) of MCA
 - Making the BEG optimally link to social information resources

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Predicting web MM search failure

Kofler, Larson, Hanjalic, ECIR 2011

- What are the typical user's search strategies in failure-prone cases?
- Can we predict that a given query formulation is likely to fail?
- Approach via
 - collecting user content needs from Yahoo! Answers
 - deploying Mechanical Turk for acquiring ground truth
 - evaluating the outcome of our classification scheme (search failure or not)



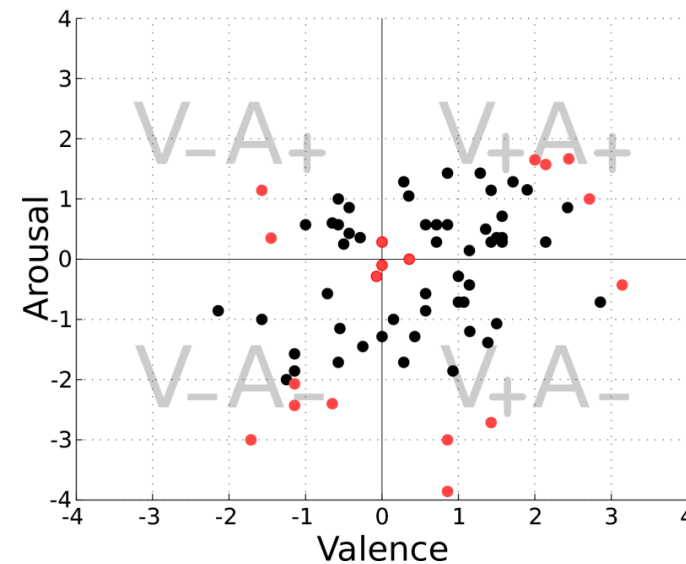
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EEG Analysis for Implicit Video Tagging

Koelstra, Muehl, Patras, ACII 2009

Koelstra, Yazdani, Soleymani, Muehl, Lee, Nijholt, Pun, Ebrahimi, Patras, Conf. Brain Informatics 2010

- Search for neuro-physiological indicators to validate tags attached to video content
- Observing emotional reaction to music in terms of valence and arousal

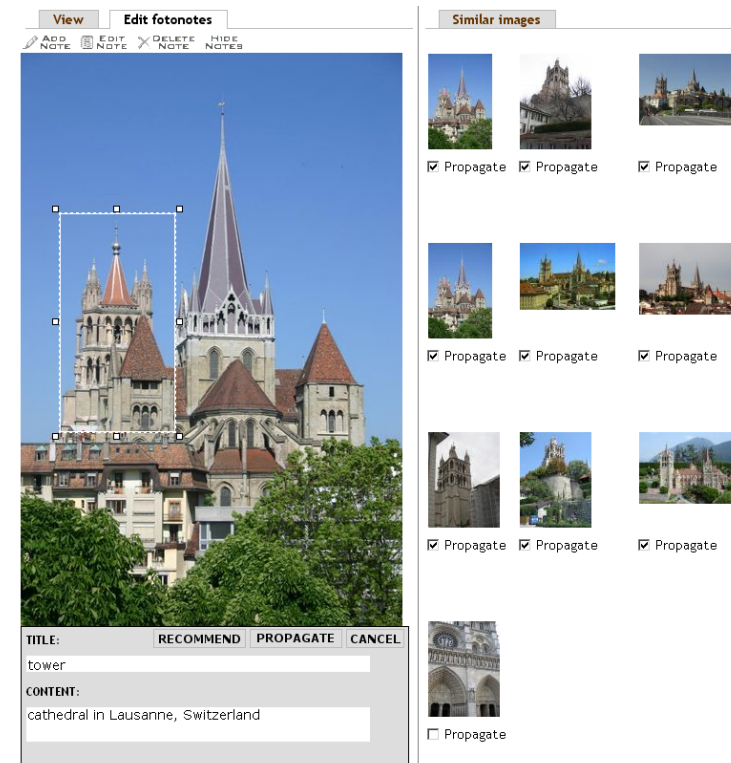


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Object-based Tag Propagation for Semi-Automatic Annotation of Images

Ivanov, Vajda, Goldmann, Lee, Ebrahimi, ACM MIR 2010

- Automatic recommendation of tags from images containing user-marked object
- User interaction reduced to verifying the recommended tag set and approving tag propagation



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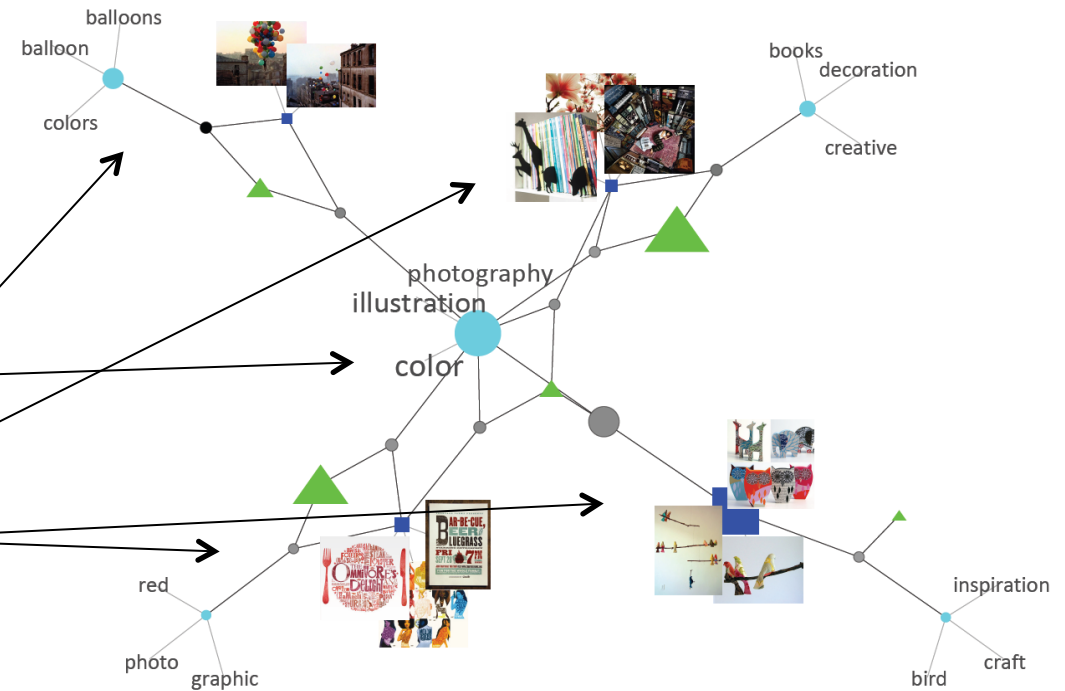
Understanding the Social Network

Neubauer & Obermayer, NIPS 2009.

- Detecting communities and thematic clustering structures in social graphs

Common theme

Thematic clusters

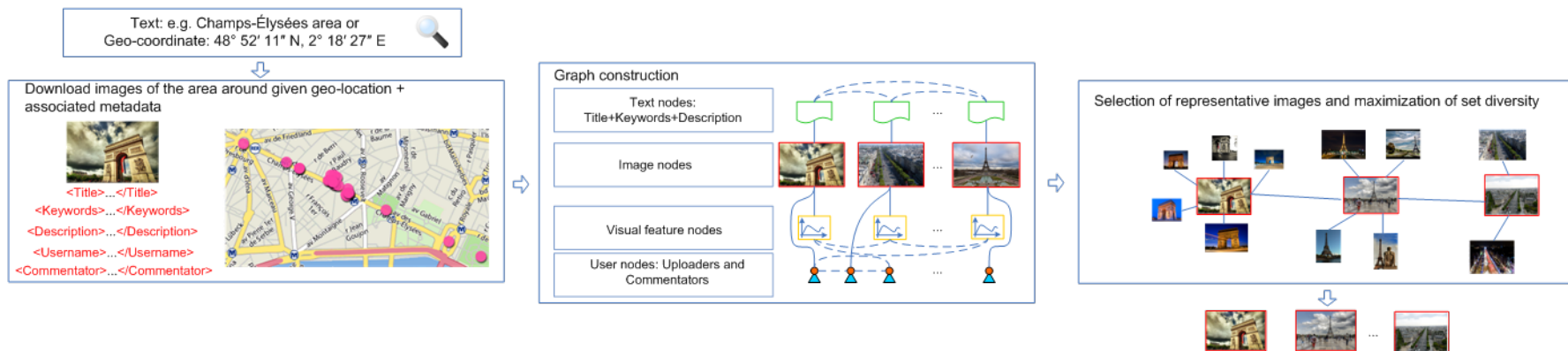


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Off-the-beaten-track aware location augmentation

Rudinac, Larson, Hanjalic, ACM Multimedia 2011

- Goal is to create visual summary of a given location
- Emphasis on jointly optimizing representativeness and diversity
- Social graph modeled and deployed as the source of explicit (visual) and implicit (via users and metadata) similarity relations among images



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PetaMedia Contribution

- Community building and dissemination
 - Graduate School on Social Media Retrieval
 - MediaEval International Evaluation Benchmark
 - Tutorials and special sessions at ACM Multimedia/ICMR
- Goal:
 - Push the 3SP to become the key paradigm in the international MIR research agenda



MediaEval Benchmark

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PetaMedia Legacy: Virtual Center of Excellence (VCE)

	Maximize triple synergy impact	Explore triple synergy challenges
Academia	<ul style="list-style-type: none"> ✓ Content and tools portal. ✓ Summer school. 	<ul style="list-style-type: none"> ✓ Content and tools portal. ✓ MediaEval benchmark. ✓ Triple synergy grand challenge. ✓ Ideas market.
Company	<ul style="list-style-type: none"> ✓ Content and tools portal. ✓ Technology demonstrations and transfer. 	

VCE in 2011 combined with EIT ICT Labs OpenSEM activity

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Thank You!



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