Community-Aware Semantic Multimedia Tagging
–
From Folksonomies to Commsonomies

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Agenda

• Motivation
  - Social Software
  - Web 2.0 Multimedia Communities

• Multimedia Sharing in Communities
  - Folksonomies
  - MPEG-7 Tagging
  - Commsonomies (Community aware Folksonomies)

• Multimedia Commsonomies in M7MT
  - Sample
  - Commsonomy-Services
  - Technical Aspects

• Conclusions & Outlook
# Social Software

- **Data is the Next Intel Inside**
  - Unique data
- **Users Add Value**
  - No Restrictions, Inclusive
- **Network Effects by Default**
  - Collective Intelligence
- **Some Rights Reserved**
  - Standards, Remix
- **The Perpetual Beta**
  - Smaller modular Components
- **Cooperate, Don't Control**
  - Light Web Services, Loose Syndication of Data and Systems (RSS, Mash-ups)
- **Software Above the Level of a Single Device**
  - Software mobile and ubiquitous
- **The Long Tail**
  - Small Communities

What is Web 2.0? [O'Reilly 2005]

## Social Software

<table>
<thead>
<tr>
<th>Social Software</th>
<th>Users (in Millions, by the end of 2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Life</td>
<td>3</td>
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<tr>
<td>Wikipedia</td>
<td>4</td>
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<td>WOW</td>
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<td>LiveJournal</td>
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<td>Skype</td>
<td>171</td>
</tr>
</tbody>
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Web 2.0 Multimedia Communities

• Cross-Media Information Systems
  - Personalized, adaptive Web-interfaces
  - Metadata management for multimedia
  - Multimedia semantics

• Cross-Community Information Systems
  - Community-centric requirements analysis
  - Web-Services for Social Software

• Reflective Information Systems
  - Traceability of social interaction
  - Analysis & visualization of multimedia usage

⇒ Agency & Patienthood on the Web 2.0
Folksonomies

• Collaborative Indexing based on:
  - Free text annotations (a là Flickr)
  - (Usually) Mono-medial annotation support only
  - Semantic freedom in annotating
  - Misleading and even contradictory metadata
  - „Chaos“ (Folksonomies) vs. „Structure“ (Categories)

⇒ Lack of high-level semantic structuring
  &
  Risk of semantic misinterpretation
MPEG-7 Tagging

Collaborative Indexing based on Semantic MPEG-7 Basetypes

- Agent
- Event
- Concept
- Object
- Place
- Time
- State

⇒ Lack of Community Awareness
Commsononies

- Community aware Multimedia Folksononies by
  - Support of annotating multimedia contents
  - Freetext annotations
  - MPEG-7 based semantic basetypes
  - Community specific storage & retrieval
  - Cross-community content sharing
  - MPEG-7 compliance

⇒ Metadata annotations become community dependent
Commsonomy Tagging

- Basic Concepts:
  - Semantic Tagging within a Community Context
  - Tag Visibility depending on Community Memberships
  - Semantic Search Results depending on Community Memberships

Let $M$ be a Multimedia Item, $C_1$, $C_2$, $C_3$ Communities and $S_1,S_2,S_3$ Semantic Tags:
e.g. Location *Bamiyan*, Concept *Buddha*, Object *Statue*

Example Commsonomy Tagging for $M$:

$\{C_1::C_2::Bamiyan, C_2::Buddha, C_3::Statue\}$
Commsonomy Tag Visibility

- Let \( U1, U2 \) be members of communities
  - \( U1 \) member of \( C1 \) & \( C2 \)
  - \( U2 \) member of \( C2 \) only

- Tag Visibility for \( U1 \) on \( M \):
  \{C1:C2::Bamiyan, C2::Buddha\}

- Tag Visibility for \( U2 \) on \( M \):
  \{C2::Buddha\}

- Tag Statue is not visible for any of \( U1 \) or \( U2 \)!
MPEG-7 Multimedia Tagging \((M7MT)\)

- Collaborative Indexing based on:
  - Keyword Annotations (a lá Flickr)
  - Semantic MPEG-7 Basetypes
  - Community Aware Folksonomies
The M7MT Application

- Powered by LAS
  - MPEG-7 Services
- Multimedia Player:
  - Image (JPG, PNG, GIF)
  - Streaming Video
  - Extensible
- Multimedia Annotation:
  - Free Text Annotations
  - Keyword Tagging
  - Semantic Tagging
  - Communsonomy Tagging
XML-Databases and MPEG-7

• Open-Source Database eXist
  - XQuery- and XUpdate Support
  - Indexing
  - Lack of Definition and Validation according to a given Schema
  - Lack of Transaction Control

• Oracle 10g
  - XQuery Support „encapsulated“ in SQL
  - Transaction Control
  - Validation according to Schema only for simple ones (e.g. without Inheritance)
  - Lack of Indexing for complex Schema (e.g. MPEG-7) ⇒ very slow

• IBM DB2 Version 9 (Viper)
  - XQuery Support „encapsulated“ in SQL
  - Transaction Control
  - Validation according to Schema only for small ones (e.g. not MPEG-7)
  - Despite lack of Indexing for complex Schema (e.g. MPEG-7) very fast
M7MT Summary

• Community Support
  - Java Platform Independence
  - Easy to Maintain and Extend at Runtime
  - Core Services for Community-Administration
  - Fine-grained Access Control
    ▪ Method Level
    ▪ Object Level
    ⇒ „Security-First“-Concept
    ⇒ Platform for Community-Hosting

• Multimedia Support
  - Interoperable (Multimedia) Metadata
  - Cross-Community Support by MPEG-7/21 Compliance
  - Automatic Conversion to/from Dublin Core
  ⇒ Schema-compliant MPEG-7/21 Modifications via XMLBeans

⇒ Better Community and Multimedia Support than comparable Application Server such as Tomcat or Zope/Plone
Conclusions & Outlook

• Application of MPEG-7 in real-life Information Systems
  - Size & Complexity of MPEG-7 Schema problematic ⇒ MPEG-7 Profiles
  - MPEG-7-Validation requires two steps
    ▪ Syntax ⇒ MPEG-7 Services (cf. I-Know 2006 [Spaniol et. al])
    ▪ Semantics ⇒ Imagesemantics (cf. I-Media 2007 [Spaniol et. al])
  - Enhanced Database support for MPEG-7

• Further Development of M7MT towards mobile Community-Hosting
  - GPS-Embedding
  - Mobile End Devices
  - Application of M7MT as part of Virtual Campfire (cf. M3A-Demo 2007 [Cao et. al])

• Conceptual Enhancements
  - Graphical Editors for User Interface Design in Communities
  - Modeling of Media Usage based on the Actor-Network-Theory
  - Analysis of “Agency and Patiethood” Phenomena in Communities