Using semantics to improve interactive information access

Lynda Hardman
http://www.cwi.nl/~lynda

CWI, Interactive Information Access
UvA, Institute for Informatics

http://www.flickr.com/photos/iboy/4528401870/
Google: Rembrandt van Rijn
Interactive Information Access

• Users need support for
  – the processing of information-bearing content
  – in one or more media types
  – for their specific task

• We need to be aware that there is more than the information “expressed" by the media asset itself, e.g.
  – the intended purpose of the creator
  – the context in which the media asset was created
We don’t care about the media!

We need to enable
  – the processing of information-bearing content
  – of one or more media types
  – that can be interpreted by end users

End-users are primarily interested in
  – the meaning conveyed by a combination of media assets
  – interacting further with the media
    • as part of complex search task
    • passing it on to someone else in media “chain”
How can we get this to work?

We need mechanisms

- for identifying (part of) an individual media asset
- for associating metadata with an identified fragment
- for agreeing on the meaning of metadata
- that enable larger meaningful structures to be composed, identified and annotated

http://www.flickr.com/photos/jannem/3312115991
Outline of talk

• Explain information processes in which media and metadata play a role
  – “canonical processes of media production”

• Example systems showing different types of user interaction enabled by media and metadata
  – MultimediaN E-Culture
  – Vox Populi
  – EventMedia
Understanding Multimedia Applications Workflow

• Identify and define a number of canonical processes of media production

• Community effort
  – 2005: Dagstuhl seminar
  – 2008: Multimedia Systems Journal Special Issue (core model and companion system papers)
    editors: Frank Nack, Zeljko Obrenovic and Lynda Hardman
Canonical Reduced to the simplest and most significant form possible, without loss of generality
Overview of Canonical Processes

- Premeditate
  - Create
    - Annotate
      - Package
      - Organize
    - Construct Message
  - Query
  - Publish
  - Distribute
Example: CeWe Color PhotoBook

• Application for authoring digital photo books
• Automatic selection, sorting and ordering of photos
  – Context analysis methods:
    e.g., timestamp, annotation
  – Content analysis methods:
    e.g., color histograms, edge detection
• Customized layout and background

http://www.cewe-photobook.com
CeWe Color PhotoBook Processes

My winter ski holidays with my friends

Premeditate
Construct Message
CeWe Color PhotoBook Processes

- Media assets are captured, generated or transformed
CeWe Color PhotoBook Processes
CeWe Color PhotoBook Processes
CeWe Color PhotoBook Processes

- Query

- Organize
Organize using domain annotations

chiaroscuro

Rembrandt

1631
1628
1638

Caravaggists

1623
1628
CeWe Color PhotoBook Processes

- Publish
- Distribute
CeWe Color PhotoBook Processes

1. Premeditate
2. Create
3. Annotate
   - Package
   - Construct Message
   - Organize
   - Query
4. Publish
5. Distribute
Canonical Processes

1. Premeditate
2. Create
3. Annotate
4. Package
5. Organize
6. Construct Message
7. Query
8. Publish
9. Distribute
How can we use Semantics to support Interactive Information Access?

• Long term goal to find and present information to end-users
  – In a way that is useful to them
• We understand how to design information interfaces by hand.
  – How can metadata help us in giving more flexible access to media collections?
• We can link media assets to existing linked data, and use this to improve presentation, e.g. by
  – Selecting a sub-set
  – Grouping, ordering and linking media assets
  – Influencing the presentation
How can semantics help?

• What can be expressed explicitly?
  – the message to be conveyed
  – objects that are depicted in a media asset
  – domain information (e.g., art, painter)
  – human communication roles (discourse)

• What can they be used for?
  – disambiguating queries
  – grouping similar items for conveying topic breadth
  – visualizing items for presentation, e.g. timeline, map
  – finding similar items
  – ...

Browsing annotated collections of cultural heritage artefacts

- Users interested in cultural heritage, exploring artefacts available in repository
- Searching across multiple, linked collections
- Thesaurus structure used for identifying topics
- Artworks grouped into different topic structures to present results
E-Culture Linked Data Cloud
This cultural search engine will give you access to artworks from several museum collections.

Type a keyword, for example: Domain, calligraphy, or 1967.

[Search bar]

Collections

Archive.com (>3,000 objects)
Rijksmuseum.nl (>16,000 objects)
RMV.nl (>10,000 objects)
Kl.nl (>10,000 objects)
Bibliopolis.nl (>1,000 objects)

Vocabularies and thesauri

AAT
ULAN Person
TGN Place
SYCN
WordNet

© 2006-2008 E-Culture Multimedia

Powered by CalPaTriA 1.0 alpha 3 (14/04/2005)

http://e-culture.multimediam.nl/demo/session/search
Use of linked data in E-Culture

• Query construction
  – auto-completion uses strings found in “data” and “concepts”
  – suggestions are grouped and ordered using links among items

• Result set
  – uses empirical balance between “closeness” to search string and non-intuitive path

• Result presentation
  – uses grouping of result set to show breadth of results
  – uses no particular ordering within each group
Generating video documentaries from annotated media repositories

Stefano Bocconi, Frank Nack (CWI, Amsterdam)
Outline

• Motivation
• Example
• Scenarios
• Technical details
  – Annotations
  – Editing Process
• Conclusions
Video Documentaries on the Web

• Traditional video authoring: there is only one final version, what is shown is the choice of the author/editor

• Proposed video authoring:
  – Annotate the video material semantics
  – Show automatically what the user asks to see, using presentation forms a film editor would use
Video material

• Focus on video interviews about controversial issues

• Interview with America video footage with interviews and background material about the opinion of American people after 9-11

www.interviewwithamerica.com
Example: What do you think of the war in Afghanistan?

“I am never a fan of military action, in the big picture I don’t think it is ever a good thing, but I think there are circumstances in which I certainly can’t think of a more effective way to counter this sort of thing…”

http://www.flickr.com/photos/soldiersmediacenter/1183836576
What do you think of the war in Afghanistan?

War has never solved anything

Two billions dollar bombs on tents

I am not a fan of military actions

I cannot think of a more effective solution
The annotations

- **Rhetorical**
  - Rhetorical Statement
    (mostly verbal, but visual also possible)
  - Argumentation model: Toulmin model

- **Descriptive**
  - Question asked
  - Interviewee (social)
  - Filmic *next slide*
Filmic annotations

Continuity, e.g.

– lighting conditions
– background sound
– gaze direction of speaker
  left, centre, right
– framing continuity
  close-up, medium shot, long shot
– camera movement
  none, pan left/right, shaking,
  tilt up/down, zoom in/out

We need your metadata!
Statement encoding

• Statement formally annotated:
  – <subject> <modifier> <predicate>
  – E.g. “war best solution”
• A thesaurus containing:
  – Terms (155)
  – Relations between terms: similar (72), opposite (108), generalization (10), specialization (10)
  – E.g. war opposite diplomacy
Connect statements

• Using the thesaurus, generate related statements and query the repository
  “war best solution”,
  “diplomacy best solution”,
  “war not solution”

• Create a graph of related statements
  – nodes are the statements
    (corresponding to video segments)
  – edges are either support or contradict
Semantic Graph

- diplomacy best solution
- war best solution
- war not solution

- support
- contradict
57 Claims, 16 Data, 4 Concessions, 3 Warrants, 1 Condition
War has never solved anything

Two billions dollar bombs on tents

I am not a fan of military actions

I cannot think of a more effective solution

Claim

Concession

Claim

Claim

support

contradict

weaken
Facts and features

- Annotations: 1 hour annotated, 15 interviews, 60 interview segments, 120 statements
- Partially tunable: examining the Segment graph gives feedback on the quality of the annotations and the thesaurus
Controlling the Bias

• Video documentaries are not neutral account of reality: the selection and editing of the footage expresses a point of view

• Editing strategy:
  – Balanced
  – Pro opinion X
  – Against opinion X

• We use:
  – Logos (the statements)
  – Ethos (based on user profile)
  – Film editing (e.g. framing, gaze)
Conclusions

• Automatic generation of video interviews augmented with supporting and/or contradicting material

• The **user** can determine the subject and the bias of the presentation

• The **documentarist** can add material and let the system generate new documentaries
Pointers & Acknowledgments

• Demo available at:
  http://www.cwi.nl/~media/demo/VoxPopuli/

• VoxPopuli research was funded by the Dutch national ToKeN I²RP and CHIME projects
EventMedia

http://eventmedia.cwi.nl/
EventMedia Interlinking

• Linking Agents with
  – Freebase, Dbpedia, MusicBrainz
• Linking Venues with
  – Geonames, Dbpedia, Foursquare (via Uberblic)
• Linking Events with
  – Last.fm, Upcoming, Eventful
• Linking Categories with
  – Facebook, Eventful, Upcoming, Zevents, LinkedIn, Eventbrite, TicketMaster
• Linking Users with
  – Social Graph API
EventMedia 3

• size of different events to depend on no. of participants (popularity)
• image itself chosen most viewed image on flickr
• use image clustering to find largest numbers of similar images -> more important -> bigger;

• Looking at event (several hundreds)
• use (real-time) image clustering to show most different images.

• Metadata from tags to detect poster, ticket, stage, vocal
What are my messages?

• Metadata associated with media assets can be used for different stages of interactive access
• Metadata can be created and added by hand, linked automatically or automatically extracted
• The message itself can be made explicit (more metadata)
• Media content and metadata can be passed around and among systems
• We need community agreement on how to do this (e.g. canonical processes)
• Users can be given much richer and more flexible access to (semantically annotated) media content, but...
• we need to understand why we are generating metadata and store it in a reusable way
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"I have seen the dark universe yawning
Where the black planets roll without aim,
Where they roll in their horror unheeded,
Without knowledge or luster or name."

-- H. P. Lovecraft, *Nemesis*