Multimedia Information Seeking Through Search and Hyperlinking

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Overview

Background and Motivation

Search and Hyperlinking
  Search and Hyperlinking at MediaEval 2012
  Search and Hyperlinking at MediaEval 2013

Conclusions and Research Prospects

References
Search and hyperlink navigation are well established approaches to information seeking on the textual web.
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Realizing the potential of this content requires users to be provided with engaging ways to interact with it, helping them to discover, browse, navigate and search.
Introduction

- Search and hyperlink navigation are well established approaches to information seeking on the textual web.
- Increasing amounts of online digital multimedia content is creating new challenges and opportunities for information access.
- Realizing the potential of this content requires users to be provided with engaging ways to interact with it, helping them to discover, browse, navigate and search.
- Different classes of users, such as media professionals, students, researchers and home users will potentially have different needs and preferred means of access.
Introduction

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- Social recommendation based on user behaviour.
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Our work in search and hyperlinking aims to explore multimodal access over multimedia content, and linking of video content to support potential user interests or needs.
Search for “Things to do in London”
Background and Motivation

Vision of Hyperlinked Video
Background and Motivation

Vision of Hyperlinked Video
Search and Hyperlinking

- These studies take place within the context of the MediaEval Multimedia Evaluation Benchmark campaign (www.multimediaeval.org).
Search and Hyperlinking

- Audio-visual archive exploration scenario.
- Video-to-video linking.
- Start with archive search assuming an “information need”.
- Assume search becomes serendipitous or exploratory by following hyperlinks.
Search and Hyperlinking

- **Video**, e.g. 2 hours
- **Interesting segment**, e.g. 10 minutes
- **Anchor**: segment for which a user would like to link from (e.g. 1 minute), e.g. “I want to know more about ...”
- **Hyperlink**
- **Target**: relevant segment for a given anchor, e.g. 5 minutes
Search and Hyperlinking

Search sub-task

Query: text, visual cues

video 1
video 2
video 3

Hyperlinking sub-task

video 4
video 5
video 6

Legend
- known item
- Additional info.
- Link
- Segment

Jump-in point
Anchor
MediaEval 2012 Search and Hyperlinking task (dataset blip.tv):

- **Search**: retrieve known-item video segment given a natural language description
- **Hyperlinking**: link known-item video segment to similar segments in the collection

MediaEval 2013 Search and Hyperlinking task (dataset BBC archive):

- **Search**: retrieve known-item video segment given a natural language description
- **Hyperlinking**: link user-defined anchor within the known-item to relevant target video segments in the collection
Multimodal search where relevance can be related to both visual and/or audio information streams.

Models scenario where user seeks single relevant known-item fragment of multimedia content.

Once the relevant fragment has been located the user can engage in browsing or exploratory search by following automatically created hyperlinks to related multimedia fragments within the same collection.
The Blip10000 dataset was created by the PetaMedia EU Network of Excellence:

- Contains 14,838 Creative Commons videos crawled from blip.tv, and corresponding user provided metadata.
- Total of ca. 3,260 hours of data: Divided into 5,288 development videos, and 9,550 test videos.
- Automatically created visual features:
  - shot boundaries - ave. shot length 30 secs
  - single keyframe for each shot
  - visual concepts from a set of 589
- Two automatic speech recognition transcripts created: LIMSI/Vocapia and LIUM.
- Comparative experiments using only English language dataset: 4,890 test videos.
Test Query Set

- 30 textual queries consisting of natural language type statements and search engine style queries.
- Textual information collected via crowdsourcing using the Amazon Mechanical Turk (AMT) platform; multimodal features added manually afterwards.
- Query set for video selected at random from the top 10 genre categories.
- Turkers required to:
  - locate an interesting region of the video
  - mark the beginning and end points of the interesting region
  - transcribe the words spoken exactly
  - create natural language and search engine type queries which they would use to re-find this region of the video
Evaluation

Average Precision

$$AP = \frac{1}{n} \sum_{r=1}^{N} P[r]$$
Search and Hyperlinking

Evaluation

Average Precision

$$\text{AP} = \frac{1}{n} \cdot \sum_{r=1}^{N} P[r]$$

Generalized Average Precision:

$$\text{GAP} = \frac{1}{n} \cdot \sum_{r=1}^{N} P[r] \cdot \left( 1 - \frac{\text{Distance}}{\text{Granularity}} \cdot 0.1 \right)$$
Hyperlinking

- Linking effectiveness evaluated using MAP.
- Relevance of each of the top 10 proposed links for each submitted run evaluated using AMT.
- Separate Qrel file created for each run; pooled unified Qrel created by merging run qrels.
- Turkers given the following options:
  - Video segments totally unrelated
  - Video segments related, same topic or focus, but different information
  - Video segments related, different perspective or view on the same information
  - Video segments are basically the same.
Search and Hyperlinking at MediaEval 2013

- Working with 270 hours of BBC archival data:
  - one complete week
  - material not owned by the BBC excluded
- Task designed to explore the information needs and task activities of home users.
  - Expected to favour exploratory search options.
- Search queries created by 30 public users with computer and online experience.
Search and Hyperlinking at MediaEval 2013

- Users given a general introduction on video search using the AXES Pro system.
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Scope and type of the collection explained, and users allowed to explore the collection.
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Ask the user to identify anchors within their chosen video: specify region, spoken words or whole segments.
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Explain reasons why these anchors were selected.
Search and Hyperlinking at MediaEval 2013
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Search and Hyperlinking

Specification of Anchors

Select start and end of segments within your clip for which you would like to see links to other videos.

Select anchor using sliders

Describe anchor

Describe target

Segments

<table>
<thead>
<tr>
<th>From To</th>
<th>Name</th>
<th>Clip description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:00:00:15</td>
<td>Clip on eating fish and chips in</td>
<td>Recipe on fish and chips</td>
</tr>
<tr>
<td></td>
<td>London</td>
<td></td>
</tr>
</tbody>
</table>
Classification of Selected Clips

- Documentary: 20
- Comedy: 15
- Sports: 10
- Special Interest: 10
- Music: 10
- News: 6
- TV Show: 4
- Health And Fitness: 4
- Animation: 3
- Other: 3
- Children and Family: 2
- Gay and Lesbian: 2
- Political: 2
Classification of Anchors

- Whole Scene: 80
- Speech: 60
- Other: 10
- Object, moving: 10
- Object, static: 1
Search and Hyperlinking at MediaEval 2013

- Set of 50 known-item experimental queries selected
- Corresponding set of 100 anchors selected
Search and Hyperlinking

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MediaEval 2013 workshop 18th-19th October
Conclusions and Research Prospects

- Search is a more established task, but little research so far on identifying reliable jump-in points.
- Promising results from Search and Hyperlinking in 2012 encouraged us to move to user studies with BBC data.
- Work so far with volunteer subjects suggests that users will make use of video hyperlinks.
- Results and other findings from Search and Hyperlinking in 2013 will be used to help develop focused research agenda for 2014 and beyond.
References

Acknowledgements

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