ITI-CERTH

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Known Item Interactive Search Task

Stefanos Vrochidis

Informatics and Telematics Institute
Centre for Research and Technology Hellas

ITI-CERTH @ TRECVID

• Search Task
  • TRECVID 2006-2008
    • Under COST 292
  • TRECVID 2009-2010

• Instance Search Task
  • TRECVID 2010

• Known Item Search Task
  • TRECVID 2010-2011

• VERGE Video Search Engine
  • Interactive Video Search
Problem Description

• **Known Item Search Task**
  • The user is supposed to know a video in advance
  • A detailed textual video description is provided
  • Time for search is limited to 5 minutes

• **Interactive Search - Ideas**
  • The system needs to respond fast
  • Fusion could assist in combining efficiently results
  • Could we exploit the implicit user feedback?
  • Take into account the semantic relations of metadata
**VERGE**

- Interactive Platform
- Web-based
- Technologies
  - Apache
  - PHP
  - Javascript
  - Lemur
- Modules
  - Metadata Search (Lemur)
  - ASR Search (Lemur)
  - Visual concept search
  - Visual Similarity search
  - Fusion
  - PLSA based search
- URL
  - http://mklab-services.iti.gr/trec2011
Video Indexing

- Temporal Indexing
  - Shot Segmentation
  - Representative keyframe extraction

- Visual similarity Indexing
  - MPEG-7

- Textual Data Indexing
  - ASR
  - Metadata
  - Lemur

- Visual concepts extraction
  - Results from the SIN task
  - SURF descriptors
  - Video tomographs
Implicit User Feedback

- User actions are recorded during search sessions
- Mouse hover time on presented shots was measured

- Concept Fusion
  - Attention Fusion Method

- ASR and Concept Fusion
  - Attention Fusion Method
  - SVM regression model (after enough examples)

- Metadata and Concept Fusion
  - At video level
  - Attention Fusion Method
  - SVM regression model (after enough examples)
Semantic Relatedness

- **Indexing using the semantic relatedness of metadata**
  - Metadata
  - Bag of Words approach
  - Vector with 1000 words
  - Video represented as word count histogram
  - Multiplied with Wordnet distance vector
    - “vector” similarity was used
  - Probabilistic Latent Semantic Analysis
    - 25 latent topics

- **Functionalities**
  - Video similarity (based on metadata)
  - Metadata search
Experiments

- 4 runs
- Combinations of modules

<table>
<thead>
<tr>
<th>Modules</th>
<th>Run IDs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L.A., YES, ITI-CERTH-$x$</td>
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<tr>
<td></td>
<td>x=1</td>
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<tr>
<td>ASR Lemur text</td>
<td>no</td>
</tr>
<tr>
<td>ASR fusion</td>
<td>yes</td>
</tr>
<tr>
<td>Metadata Lemur text</td>
<td>no</td>
</tr>
<tr>
<td>Metadata BoW text</td>
<td>no</td>
</tr>
<tr>
<td>Metadata fusion</td>
<td>yes</td>
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<tr>
<td>High Level Visual concepts</td>
<td>yes</td>
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</table>
**Experiment Design**

- **Participants**
  - Gender
    - 6 males
    - 2 females
  - Topic distribution
    - 6 or 7 topics each
  - Education
    - PhD students
    - Research Assistants
  - Short tutorial

![Diagram of TOPICS/RUNS with 6 or 7 topics each run for 4 runs, assigning 6 males and 2 females to different runs and topics.](image-url)
Experiments

Run ID: ITI-CERTH
Processing type: Interactive
System training type: A (only IACC training data)
Condition: YES (IACC.1 *_meta.xml used)
Priority: 1

Across 25 test topics
Mean inverted rank: 0.860
Mean elapsed time (min): 3.257
Mean user satisfaction (1-7 best): 5.000

Rank (1=top) of found hit by Topic (Misses graphed left of y-axis)

Run ID: ITI-CERTH
Processing type: Interactive
System training type: A (only IACC training data)
Condition: YES (IACC.1 *_meta.xml used)
Priority: 2

Across 25 test topics
Mean inverted rank: 0.560
Mean elapsed time (min): 3.584
Mean user satisfaction (1-7 best): 6.000

Rank (1=top) of found hit by Topic (Misses graphed left of y-axis)
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Experiments

Run ID: ITI-CERN
Processing type: Interactive
System training type: A (only IAC5 training data)
Condition: YES (IAC5.1 *meta.xml used)
Priority: 4

Across 25 test topics
Mean invested rank: 0.166
Mean elapsed time (mins): 3.374
Mean user satisfaction (1-7 best): 5.000

Rank (1=top) of found KI by Topic (Misses graphed left of y-axis)

Run ID: ITI-CERN
Processing type: Interactive
System training type: A (only IAC5 training data)
Condition: YES (IAC5.1 *meta.xml used)
Priority: 4

Across 25 test topics
Mean invested rank: 0.320
Mean elapsed time (mins): 4.072
Mean user satisfaction (1-7 best): 5.000

Rank (1=top) of found KI by Topic (Misses graphed left of y-axis)
## Results

<table>
<thead>
<tr>
<th>Runs and systems</th>
<th>MIR</th>
<th>CORRECT (/25)</th>
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</thead>
<tbody>
<tr>
<td>run1</td>
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<td>11</td>
</tr>
<tr>
<td>run2</td>
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<td>run3</td>
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<tr>
<td>run4</td>
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<td>run7</td>
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<td>I_A_YES_ITI-CERTH_3</td>
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</table>

![MIR Chart](image-url)
Conclusions

• Results
  • The most efficient module is still the metadata and ASR search
    • Many modules to use in a limited time
    • Users are still more familiar with simple text search
  • Time was limited to see whether implicit feedback could improve the results
  • Fusion could be promising in such limited time tasks
  • SIN low performance did not affect the system
  • Semantic relatedness analysis didn’t show any improvement
  • Maybe more simple search tasks could be used to evaluate these new functionalities.

• Task
  • Some times the textual topic description doesn’t give the right impression for the video
  • In many cases knowledge of the topic makes a difference (e.g. Ellis island -> New York, statue of liberty)
Future Work

• Video based preview
• Faster Fusion
• Reduce search options that might confuse the user
• Keep track which specific module produced a correct result
• Query expansion
Thank you!

CERTH-ITI / Multimedia Group
http://mklab.iti.gr