Objectives and Unique Features

- Fusion of detection and searching techniques at different levels across modalities
- Combination of parts-based graph model and fixed-feature classifiers for concept detection
- Information-theoretic Cue-X clustering for story segmentation and search re-ranking
- Semantic search over multi-modal metadata (ASR/MT and semantic concepts)
- Automatic discovery of query topic classes and user search patterns

Cue-X Information-theoretic Framework

- Robust story segmentation over TRECVID 05 data, F1=0.87 (ARB), 0.84 (CHN), 0.52 (ENG) w/o using text
- Cue-X discovers optimal relevant clusters and re-orders the search results. Shown effective in video search.

Parts-Based Detector for Objects & Near-Duplicates

- Parts-based statistical graph models effective for detecting objects/scenes with dominant spatio-feature cues.
- Improvement of 10% when fused with fixed-feature classifiers.
- Near-duplicate browser as most effective tool in our interactive search.

Automatic Discovery of Query Classes

- Learn distinct query topic classes by clustering query semantics and search performances jointly

Evaluation

- Tested over 170+ hours of multi-lingual news video, TRECVID 2005
- Story-based searches improves >100% accuracy in automatic search
- Near-duplicate browsing doubles the relevant shots in interactive search
- Cue-X re-ranking and concept search proved very useful

System/Demo

- Web-based interactive search engine deployment
- Standard database (MySQL) and modular processing add-ons
- Personal user profiles and activity logs

Concept Search and Query expansion

- Populate visual concepts over a large lexicon
- Shots represented as smoothed concept vectors
- Match text queries to concept vectors by incorporating semantic relevance (WordNet) and detector robustness

Automatic Joint semantics-performace grouping

- Manualy defined query classes
- Key video, text
- Audio

System/Demo

- Columbia on-line Video Search Engine

Components (in automatic search TRECVID 2005)

<table>
<thead>
<tr>
<th>Component</th>
<th>MAP</th>
</tr>
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<tbody>
<tr>
<td>Text</td>
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</tr>
<tr>
<td>Text+Story</td>
<td>0.087</td>
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<tr>
<td>Text+Story+Anchor Removal</td>
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<tr>
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<td>0.114</td>
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</tbody>
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(close to the top performance of automatic search)