

Knowledge Base Video Retrieval at TRECVID 2012

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Abstract

This paper describes Knowledge Base Video Retrieval's (KBVR) participation in TREC Video 2012. We submitted 3 runs in the automatic Known-Item Search Task (KIS). Run KBVR_1 uses a probabilistic information retrieval model based on the BM25 ranking function. Runs KBVR_2 and KBVR_3 enhance the initial model using a re-ranking approach based on concept expansion.

Automatic Known-Item Search Runs:

- KBVR_KIS_1
 - Run 1 uses a probabilistic retrieval model based on the BM25 ranking function, with video Automated Speech Recognition (ASR) and meta-data.
- KBVR_KIS_2
 - Run 2 extends the probabilistic retrieval model with a concept expansion based on the Large Scale Concept Ontology for Multimedia (LSCOM).
- KBVR_KIS_3
 - Run 3 extends the probabilistic retrieval model with concept expansion based on the English Wikipedia.

Automatic Known-Item Search Task

The baseline retrieval system for KBVR at TRECVID 2012 [4] uses a probabilistic text retrieval model based on the BM25 [3] ranking function. The test video collection was indexed using both the Automated Speech Recognition (ASR) [1] and the meta-data associated with each video. The BM25 ranking function was then used to return the top 100 videos based on similarity to the query description.

Runs KBVR_2 and KBVR_3 use a concept re-ranking algorithm to boost a video's initial position in the text retrieval result set. The re-ranking approach first returns a list of the top 200 ranked videos for a given query using our baseline retrieval model. KBVR_2 expands both the video and query descriptions with a set of concepts from the LSCOM list [2]. Finally, the system re-ranks the initial result list using a similarity score for both the original text features and the new concept features. KBVR_3 follows a similar concept expansion approach, using a subset of the English Wikipedia [5] topics to generate a concept feature vector.

Description	Mean Inverted Rank
KBVR KIS Run 1 – Classic Retrieval Model	0.22
KBVR KIS Run 2 – Concept Expansion	0.18
KBVR KIS Run 3 – Wiki Expansion	0.21

Table1: Automatic KIS 2012 Results

Conclusions

Our baseline run, using a probabilistic retrieval model, provided our top Mean Inverted Rank. The two additional runs based on concept expansion and re-ranking, showed no improvement at the global level. The initial analysis of the concept expansion runs show that performance degraded for two primary reasons. First, the concept expansion resulted in a large number of concepts being assigned to every video in the initial retrieval list. These high frequency concepts provided little to know positive change during the re-ranking process. Second, the Wiki expansion resulted in significant semantic drift from the original query and video meta-data. The assignment of general or unrelated concepts to the original query forced a number of high ranked videos to be pushed down the re-ranked list. In the future, we plan to continue investigating approaches to map both the query and video into a concept space, useable by both image and text feature vector.

References

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