ABSTRACT

We explore the application of a graph representation to model similarity relationships that exist among images found on the Web. The resulting similarity-induced graph allows us to model in a unified way different types of content-based similarities, as well as semantic relationships. Content-based similarities include different image descriptors, and semantic similarities can include relevance user feedback from search engines. The goal of our representation is to provide an experimental framework for combining apparently unrelated metrics into a unique graph structure, which allows us to enhance the results of Web image retrieval. We evaluate our approach by re-ranking Web image search results.

Keywords: Web Image Search, Web Image Re-ranking, Query Log Analysis, Content-based Image Features

Evaluation

To evaluate, we re-rank Web image retrieval results, by using the rank induced by the stationary distribution scores of the visual-semantic graph.

We used the Yahoo! Image Search query log over 2 weeks, first week was used to build the graphs and second week for evaluation. Each week contained over 7 million unique image clicks. Queries which were repeated in the first and second week were used for evaluation of re-ranking (2.7 million queries).

3 visual similarity graphs were computed using EHD, HSV and OMD content-based descriptors.
1 semantic similarity graph was computed, using the query log click-graph.

We have presented a new type of graph that combines visual and semantic features that are useful for Web image retrieval. Performing a random walk process over this graph and using the steady state probability distribution as scores for image re-ranking, our experiments show that it is possible to improve over 5% the baseline. We have also shown that not all combinations of visual features are useful: in this case, only one is recommended, OMD.

References