Multi-descriptor retrieval in digitized photographs collections
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Introduction

Efficient fusion method for image descriptors, fusion of inverted indices (FII), is proposed for image retrieval.

- Developed on the inverted multi-index approach [1], fusion using MultiSequence algorithm.
- Allows to fuse any number of image descriptors by integrating their responses to a query in inner subspaces.
- Descriptors are quantized separately & efficiently through dimension reduction techniques, Principle Component Analysis (PCA) & Partial Least Squares (PLS), before fusion.

Global Workflow

Principle Idea

- A data structure for similarity search build on the quantization of interest point descriptors in inverted index (as in Video Google) [2] is proposed. Three multidimensional words (colored circles) are distributed in the descriptor & clustered are represented by green number squares.

(a) Classical inverted file: identifies the cluster to which the query belongs & retrieves all associated descriptions inside.
(b) Inverted multi-index: subdivides the descriptor space into n subspaces (n = 23).
(c) Fusion of Inverted indices (proposed approach): descriptors are used to find image that match the query with more similarities (a 2D descriptor A & a 3D descriptor B). Each cluster in a descriptor space represents only the nearest descriptions from each matched image (descriptions in hooped dotted circles). By combining n subspace responses, we are able to obtain a direct ranking of images that better match the query.

Conclusions

- The combination of different image characteristics clearly improves the content representation, & the strategy of fusion brings distinctiveness during nearest neighbor search.
- The use of dimension reduction as description decomposition, improves distinctiveness during similarity search & potentially reducing the volume of manipulated features.
- Proposed fusion approach has demonstrated its superiority comparing state-of-the-art fusion approach.

References


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