

2010

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Association for Computing Machinery (ACM), United States

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# Late Fusion of Compact Composite Descriptors for Retrieval from Heterogeneous Image Databases

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## ABSTRACT

Compact composite descriptors (CCDs) are global image features, capturing more than one types of information at the same time in a very compact representation. Their quality has so far been evaluated in retrieval from several homogeneous databases containing images of only the type that each CCD is intended for, and has been found better than other descriptors in the literature such as the MPEG-7 descriptors. In this study, we consider heterogeneous databases and investigate query-time fusion techniques for CCDs. The results show that fusion is beneficial, even with simple score normalization and combination methods due to the compatibility of the score distributions produced by the CCDs considered.

**Categories and Subject Descriptors:** H.3.3 [Information Storage and Retrieval]: Information Search and Retrieval—*retrieval models, search process*; H.2.5 [Database Management]: Heterogeneous Databases

**General Terms:** Measurement, Experimentation, Theory

**Keywords:** Image Retrieval, CCD, Fusion, Normalization, Combination

perform better than the MPEG-7 descriptors and other descriptors in the related literature.

The Brightness and Texture Directionality Histogram, or BTDH, is proposed for grayscale and medical radiology images [7], and has been found to perform better than other descriptors in several benchmarking databases. The recently proposed Spatial Color Distribution (SpCD) combines color information and its spatial distribution in a quantized histogram [9]. The SpCD is considered suitable for colored graphics, since they contain a relatively small number of colors and less texture regions than natural color images.

The quality of the aforementioned CCDs has so far been evaluated in retrieval from homogeneous benchmarking databases, containing images of only the type that each CCD is intended for. For example, the JCD is tested on NISTER [6] and Wang databases which contain natural color images, the BTDH on the IRMA database consisting of grayscale medical radiology images, and the SpCD on two benchmarking databases with artificially generated images.

In this study, we evaluate the retrieval effectiveness of late fusion techniques which enable the combined use of the JCD, BTDH, and SpCD, on heterogeneous databases.