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## Region-based image retrieval in the compressed domain using shape-adaptive DCT/DWT

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Content-based image retrieval (CBIR) has drawn substantial research and many traditional CBIR systems search digital images in a large database based on features, such as color, texture and shape of a given query image. A majority of images are stored in compressed format and most of compression technologies adopt different kinds of transforms to achieve compression. Therefore, features can be extracted directly from images in compressed format by using, for example, discrete cosine/wavelet transform (DCT/DWT) for JPEG/JPEG2000 compressed images. Region-based image retrieval (RBIR) is an image retrieval approach which focuses on contents from regions of images, instead of the content from the entire image in early CBIR. Although RBIR approaches attempt to solve the semantic gap problem existed in global low-level features in CBIR by using local low-level features based on regions of images. This paper proposes a new RBIR approach using shape adaptive discrete cosine transform (SA-DCT). At a bottom level, local features are constructed from the coefficients of quantized block/subband transforms (low-level features) for each region. Quantization acts for the concentration of block-wise information in a more condense way, which is highly desirable for the retrieval tasks. At an intermediate level, histograms of local image features are used as descriptors of statistical information. Finally, at the top level, the combination of histograms from different image regions (objects) is defined as a way to incorporate high-level semantic information. In this retrieval system, an image has a prior segmentation alpha plane, which is defined exactly as in MPEG-4. Therefore, an image is represented by segmented regions, each of which is associated with a feature vector derived from DCT/DWT and SA-DCT/SA-DWT coefficients. Users can select any region as the main theme of the query image. The similarity between a query image and any database image is ranked according to a same similarity measure computed from the selected regions between two images. For those images without distinctive objects and scenes, users can still select the whole image as the query condition. The experimental results show that the proposed approach is able to identify main objects and reduce the influence of background in the image, and thus improve the performance of image retrieval in comparison with a conventional CBIR based on DCT/DWT.

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