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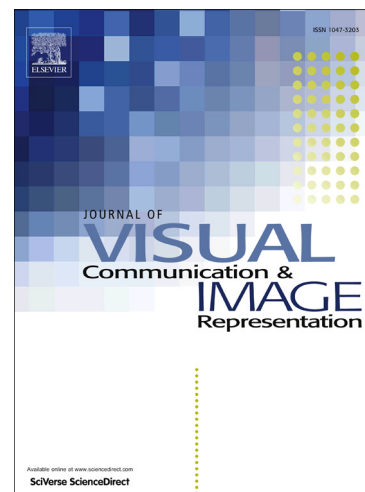
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Merged region based image retrieval

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Abstract—In Region based Image Retrieval (RBIR) methods, region matching mainly focuses on region-to-region and image-to-image methods. The former may cause loss of image information and the latter may lead to similar regions being matched repeatedly. To solve these problems, we propose a new image retrieval method based on merged regions, and feature extraction and matching are processed at the category level. Merged regions in an image belong to the same category to some extent, and are obtained by a statistical region merging and affinity propagation (SRM-AP) algorithm. For feature extraction, regional convolution mapping feature (RCMF) based on the convolutional neural networks (CNN) are extracted. RCMF is further combined with the number and distribution of regions to represent the characteristics of merged regions. Moreover, to match the merged regions according to their significance in images, an integrated category matching (ICM) method is designed. Experimental results on Corel-1000 and Caltech-256 show that the proposed method is more effective than some existing RBIR methods.

Keywords: Image retrieval (IR), Regional convolution mapping feature (RCMF), Convolution neural networks (CNN), Integrated category matching (ICM)

1. Introduction

Along with the development of computer and network technologies, information disseminated through digital images is becoming more and more frequent. In early years, to find the target images in big data, retrieval systems always use textual annotations of images. Text descriptions are used to annotate images manually based on the user's perception. However, manual annotation is a tedious and labor intensive task, and different people have different ways to annotate an image. The use of text-based image retrieval (TBIR) systems is thus limited. To solve the problem associated with TBIR, content-based image retrieval (CBIR) has been proposed. Visual contents of the query image are extracted and encoded as the feature descriptor, which is then used for image indexing and retrieval in CBIR^[1-5]. However, it is acknowledged that the performance of CBIR systems is limited by the gap between low level visual features and human semantic interpretation. To address this issue, one of the most popular approaches in recent years is to change the focus from the global content description of images to local content description based on regions, namely the region based image retrieval (RBIR).

In RBIR, region matching mainly includes region-to-region matching and image-to-image matching. Region-to-region matching is based on individual regions, while image-to-image matching uses all regions. In region-to-region matching, regions are identified by artificial selection or saliency detection method. Artificial selection can bring huge workload for users and saliency detection method cannot always find the regions of interest effectively. In addition, there can be information loss when individual regions are selected to create a match. Image-to-image matching can partially address these limitations. However, with image-to-image matching,

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