

New Research Progress in Image Retrieval

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Abstract. Image retrieval is generally divided into two categories: one is text-based Image Retrieval; another is content-based Image Retrieval. Early image retrieval technology is mainly based on the text, after 90 years, the content -based image retrieval emerged. So far, we mainly use image retrieval technology that based on color, texture, layout analysis and retrieval. That is: content-based Image Retrieval (CBIR). This paper review the two kinds of image retrieval methods, and introduces a variety of techniques in content-based image retrieval, we also prospect of fusion research of text and content.

Introduction

With the rapid development of digital imaging, digital storage and Internet technology, effective organization, indexing and retrieval has become an important topic in recent years for large image databases. Image retrieval passed decades of development. in nineteen seventies, the relevant research on image retrieval has been began, at the time, it mainly contained text-based image retrieval technology (TBIR). 90 years later, the semantic content of images, such as color, texture, layout analysis and retrieval of image retrieval, that is the content-based image retrieval (CBIR) technology. This article will first introduce the text-based image retrieval technology, and then introduces the content-retrieval of image, feature detection and extraction, feature matching, and solving method based on semantic gap; finally prospect the fusion research of text and content.

Present Situation of Image Retrieval Research

Text-based Image Retrieval. Text image retrieval technology based on the traditional text-based retrieval, Avoid the analysis of image visual elements, but indexing image from aspects of the image name, image size, type of compression, the author general in the keywords to quiz and query image, or browse and query the specific purpose image in the form of directory hierarchy. The image annotation of traditional text-based image retrieval using artificial, and on this basis, use traditional text search engine to query image. This query is intuitive and can achieve better effect. However, due to manual annotation is time-consuming and laborious, makes this retrieval scheme cannot be applied to a large database. In order to avoid a lot of manual tagging, Ahmad [1] put forward the semantic support and efficient image retrieval algorithm, this method using keywords and text annotation to provide semantic support and conduct quick image retrieval.

Content-based Image Retrieval. Content-based image retrieval is branch of large-scale digital image content retrieval in the field of computer vision research. In essence, content-based image retrieval is a kind of approximate matching technology, involves technology in many fields of computer vision, image processing, image understanding and database etc. Content-based image retrieval is realized depends on two key techniques: image feature extraction and matching. Image

feature extraction is divided into two categories: low-level vision, including color, texture, shape and so on; semantic content contains the conceptual level responses of high-rise, need for identification and interpretation of objects.

Feature Extraction. The common feature extraction methods are: Fourier transform, the windowed Fourier transform (Gabor), wavelet transform method, least square method, edge direction histogram method, based on the Tamura texture feature extraction and so on.

(1) The shape feature. The information of the image shape is the stable characteristics of objects, it does not change with the change of image characteristics such as color. Wang Bin et al. [2] proposed a kind of invariant region shape descriptor based on Fourier transform, the regional shape image is resampled into shape pixel matrix using polar coordinate grating, and make twice one-dimensional Fourier transform to the matrix and a phase correction of matrix operation, which then low and Fourier coefficient is used as a shape descriptor. Luo Ronghua et al. [3] put forward multi-scale and most stable limit proposed regional characteristics which are the most stable in image space and scale space. According to the limit region could be used to describe the characteristics of contour, the local gradient information and shape information combine to design a new feature describer. Yuan Jie et al. [4] proposed a new wavelet pyramid energy distribution characteristics, under the retrieval framework which based on SVM classifier, combined with the PHOG shape description of the image to retrieve image. Khalid[5] proposed an efficient shape representation, shape contour is represented as time series, and using of orthogonal basis functions to model, shape matching is performed in spatial characteristics of the selection, the method is robust for distortions and affine transformation.

(2) The texture feature. Texture is an important feature of the scenery, often think of texture is some kind of regularity on the performance of gray or color distribution of the image, the law has different characteristics in different types of texture. Spectral method is very good texture analysis method, which using signal processing means such as wavelet transform, converted the image to frequency domain.

Wavelet transform did not make full use of the geometric features of the data in the high dimensional case, cannot characterize the singularity of high dimension space effectively, so the Ridgelet transform, Curvelet transform, Contourlet transform, multiscale geometric transform have been proposed, and applied to texture analysis and image retrieval successfully. Shao Zhenfeng et al. [6] proposed a texture image progressive retrieval algorithm which is multiscale and multidirectional rotation invariant, using the NSCT transform domain low-frequency which is treated with rotary and displacement and high-pass subbands to realize texture image retrieval and fine retrieval crude. Gonde [7] improved Curvelet transform and combined vocabulary tree to retrieve images for feature set, Curvelet transform using the trous wavelet transform for image decomposition.

(3) The color feature. Color histogram in specific color space, statistics the image ratio of different colors in the whole image from the perspective of mathematics. The distribution of any color in the image can be represent use its moments, and color information are mainly concentrated in the low moments of image color. Wang Xiang yang et al. [8] proposed a block color histogram image retrieval method based on visual weight. Firstly, the method divide the image, and calculate the color histogram of image blocks; then combined with the pixel color complexity which reflects the variation of the local area, calculate the image block visual weight; finally, making weighted processing on block color histogram using visual weight, and retrieve image based on weighted color histogram.

Feature Matching. After feature extraction finished, we will need to match the features. Feature matching is a key part in image retrieval. The matching process often use the distance function among the feature vectors for similarity measure, that is features which extracted from the image can be

composed of a vector, two images can be calculated similarity degree by defined a distance or similarity measure.

Content-based image retrieval, it exists a difference between the low-level features and high-level understanding of the semantic gap, i.e. There are mainly 3 ways to bridge the semantic gap: (1) the relevance feedback, user intervention or automatic selection of some of the most consistent with results returned his query result that is positive feedback; or select some return result intention the most didn't meet his query, namely negative feedback. (2) image segmentation, in order to increase the amount of information of the local feature, image can be divided into different regions, but also to bridge the semantic gap in certain degree. (3) establish classific model. She Qiao Qiao et al. [9] fusion random forest technology and marker propagation technology, proposed a new method of image classification based on marker propagation.

Image Retrieval Technology based on the Combination of Text and Content. In fact, image retrieval system user ask retrieval system with description method that has some semantic meaning, image meaning discrimination according to the similarity between images. Schroth et al. [10] provides a text feature and content- based image retrieval algorithm, text is the main information sources, without the need for considering optical character recognition error prone, the detected character use characteristics describe robustness such as SURF.

Summary

In this paper, we summarize some methods of image retrieval, especially people do more for a review in recent years. In recent years, researchers on image retrieval also have a lot of achievements. Now research in image retrieval is mainly to study the retrieval based on content, the mainstream trend is researching use low-level feature extraction and matching algorithm, whether the feature descriptor, support vector machine, local invariant features, clustering, or to reduce the dimension of data, all serve the content. I think that image retrieval should be more comprehensive text and content in the later, this method is more humanized, consistent with the public's habit.

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