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Content-based image retrieval using color and texture fused features

Jun Yue [a,b], Zhenbo Li [b,1], Lu Liu [b], Zetian Fu [b,*]

[a] School of Information Science and Engineering, LUDONG University, YanTai, 264025, China

[b] College of Information and Electrical Engineering, China Agricultural University, Beijing, 100083, China

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ABSTRACT

This paper presents a method to extract color and texture features of an image quickly for content-based image retrieval (CBIR). First, HSV color space is quantified rationally. Color histogram and texture features based on a co-occurrence matrix are extracted to form feature vectors. Then the characteristics of the global color histogram, local color histogram and texture features are compared and analyzed for CBIR. Based on these works, a CBIR system is designed using color and texture fused features by constructing weights of feature vectors. The relevant retrieval experiments show that the fused features retrieval brings better visual feeling than the single feature retrieval, which means better retrieval results.

1. Introduction

Images are widely used nowadays. It has the advantage of visual representation and it is usually adopted to express other mediums. With the rapid development of computers and networks, the storage and transmission of a large number of images become possible. Instead of text retrieval, image retrieval is wildly required in recent decades. Content-based image retrieval (CBIR) is regarded as one of the most effective ways of accessing visual data [1]. It deals with the image content itself such as color, shape and image structure instead of annotated text. Huge amounts of data retrieval challenge the traditional database technology, but the traditional text-object database cannot satisfy the requirements of an image database. The traditional way of an annotated image using text, lacks the automatic and effective description of the image. In order to implement CBIR, the system need to understand and interpret the content of managed images. The retrieval index should be produced automatically, which provides more a visual retrieval interface to users.

CBIR refers to image content that is retrieved directly, by which the images with certain features or containing certain content will be searched in an image database. The main idea of CBIR is to analyze image information by low level features of an image [2], which include color, texture, shape and space relationship of objects etc., and to set up feature vectors of an image as its index. Retrieval methods focus on similar retrieval and are mainly carried out according to the multi-dimensional features of an image.

As images are rich in content and without language restrictions to facilitate international exchanges, etc., CBIR has very broad and important applications in many areas including military affairs, medical science, education, architectural design, the justice department and agriculture, etc. Many CBIR systems have been developed gradually. Typical examples of the CBIR retrieval systems include QBIC [3], Virage [4], Photobook [5], VisualSEEk [6], Netra [7] and SIMPLIcity [8] etc.

The progress of CBIR research was lucidly summarized at a high level in [2,9]. Features are the basis for CBIR, which are certain visual properties of an image. The features are either global for the entire image or local for a small group of pixels. According to the methods used for CBIR, features can be classified into low-level features and high-level features.

* Corresponding author. Tel.: +86 13562559603.
E-mail address: yuejun509@gmail.com (Z. Fu).

[1] Zhenbo Li contributed equally with Jun Yue, and is the co-first authors for this paper.

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