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Explicit Study On CBIR Using Color Histogram

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ABSTRACT:

Advances in data storage and image acquisition technologies have enabled the creation of large image datasets. In this scenario, it is necessary to develop appropriate information systems to efficiently manage these collections. The most common approaches use Content-Based Image Retrieval (CBIR). The goal of CBIR systems is to support image retrieval based on *content* e.g., shape, color, texture. Color extraction and comparison can be performed using the three color histograms, conventional color histogram (CCH), invariant color histogram (ICH) and fuzzy color histogram (FCH) .The conventional color histogram (CCH) of an image indicates the frequency of occurrence of every color in an image.To address the rotation and translation an invariant color histograms(ICH) based on the color gradients is used, and to address the spatial relationship fuzzy color histogram (FCH) is used.

Keywords:

CBIR,(CCH**)** conventional color histogram,(ICH)invariant color histogram,(FCH) fuzzy color histogram.

INTRODUCTION

Content-based image retrieval plays a central role in the application areas such as multimedia database systems in recent years. The work focused on using low-level features like color, texture, shape and spatial layout for image representation[1]. Among all the visual features, color is perhaps the most distinguishing one in many applications. It may be represented by a color histogram [2], color moments [3], color correlogram [4].The conventional color histogram (CCH) of an image indicates the frequency of occurrence of every color in an image. The appealing aspect of the CCH is its simplicity and ease of computation. There are however, several difficulties associated with the CCH. The first of these is the high dimensionality of the CCH, even after drastic quantization of the color space. Another downside of the CCH is that it does not take into consideration color similarity across different bins and cannot handle rotation and translation. To address the problem of rotation and translation an invariant color histograms based on the color gradients[5] is used and to address the problem of spatial relationship fuzzy color histogram (FCH)[6,7] is used, by considering the color similarity of each pixel's color associated to all the histogram bins through fuzzy-set membership function. In comparison with the conventional color histogram (CCH), which assigns each pixel into one of the bins only, FCH spreads each pixel's total membership value to all the histogram bins.

PRINCIPLE OF CBIR:

Content-based image retrieval, also known as query by image content and content-based visual information retrieval is the application of computer vision to the image retrieval problem, that is, the problem of searching for digital images in large databases. Content-based means that the search makes use of the contents of the images themselves, rather than relying on human-input metadata suchas captions or keywords. A content-based image retrieval system (CBIR) is a piece of software that implements CBIR.In CBIR each image that is stored in the database has its features extracted and compared to the features of the query image. It involves two steps.

Feature Extraction: The first step in this process is to extract the image features to a distinguishable extent.

Matching: The second step involves matching these features to yield a result that is visually similar.

Block Diagram

Basic idea behind CBIR is that, when building an image database, feature vectors from images (the features can be color, shape, texture, region or spatial features, features in some compressed domain, etc.) are to be extracted and then store the vectors in another database for future use. When given a query image its feature vectors are computed. If the distance between feature vectors of the query image and image in the database is small enough, the corresponding image in the database is to be considered as a match to the query. The search is usually based on similarity rather than on exact match and the retrieval results are then ranked accordingly to a similarity index.

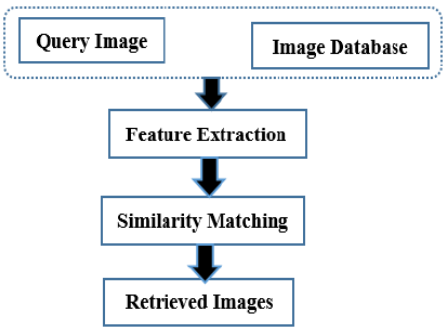

Fig : Block Diagram of CBIR

LITERATURE REVIEW

The approach more frequently adopted for CBIR systems is based on the conventional color histogram (CCH), which contains occurrences of each color obtained counting all image pixels having that color. Each pixel is associated to a specific histogram bin only on the basis of its own color, and color similarity across different bins or color dissimilarity in the same bin are not taken into account. Since any pixel in the image can be described by three components in a certain colour space(for instance, red, green and blue components in RGB space or hue, saturation and value in HSV space), a histogram, i.e., the distribution of the number of pixels for each quantized bin, can be defined for each component. Clearly, the more bins a color histogram contains the more discrimination power it has. However, a histogram with large number of bins will not only increase the computational cost, but will also be in appropriate for building efficient indexes for image data base. Quantization in terms of color histograms refers to the process of reducing the number of bins by taking colors that are very similar to each other and putting them in the same bin. By default the maximum number of bins one can obtain using the histogram function in MatLab is 256. For thepurpose of saving time when trying to compare color histograms, one can quantize the number of bins. Obviously quantization reduces the information regarding the content of images but as was mentioned this is the tradeoff when one wants to reduce processing time. The conventional color histogram (CCH) of an image indicates the frequency of occurrence of every color in an image. The appealing aspect of the CCH is its simplicity and ease of computation. There are however, several difficulties associated with the CCH viz .,a) CCH is sensitive to noisy interferences such as illumination changes and quantization errors; b) large dimension of CCH involves large computation on indexing, c)It does not take into consideration color similarity across different bins and cannot handle rotation and translation. To address the problem of rotation and translation an invariant color histograms based on the color gradients is used and to address the problem of spatial relationship fuzzy color histogram (FCH) is used.Color histograms have been widely used for object recognition. Though in practice these histograms often vary slowly under changes in iewpoint, it is clear that the color histogram generated from an image surface is intimately tied up with the geometry of that surface, and the viewing position. A method is developed to create color histogram based on the color gradients and it is invariant under any mapping of the surface which is *locally* affine, and thus a very wide class of viewpoint changes or deformations[5].The classic histogram is a global statistical feature, which describes the intensity distribution for a given image. Its main advantage is that it is fast to manipulate, store and compare and insensitive to rotation and scale. On the other hand, it is also quite unreliable as it is sensitive to even small changes in the scene of the image. In color image processing, the histogram consists of three components, respect to the three components of the color space. A histogram is created by dividing a color space into a number of bins and then by counting the number of pixels of the image that belong to each bin. It is usually thought that in order for an image retrieval system to perform satisfyingly, the number of regions that the color space is divided into is quite large and thus the colors represented by neighboring regions have relatively small differences. As a result, the perceptually similar colors problem appears, images which are similar to each other but have small differences in scene or contain noise will produce histograms with dissimilar adjacent bins and vice versa due to the small distance that the regions are separated from each other Content-based image retrieval calculates visual similarities between a query image and images in a database. Accordingly, the retrieval result is not a single image but a list of images ranked by their similarities. The result is not a single image, but a list of images that have been developed for image retrieval based on empirical estimates of the distribution of features in recent years. Different similarity/distance measures will affect retrieval performances of an image retrieval system significantly.

CONCLUSION

According to the literature survey the conventional color histogram with quadratic form (QF) distance as similarity measure and the fuzzy color histogram with Euclidean Distance almost similar in their performance. When a rotated image is given as the query, the original image is retrieved as the closest match.To reduce the large variations between neighboring bins of conventional color histograms, fuzzy color histograms are adopted which consists of only ten bins. It is less sensitive to various changes in the images.

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