A Review-Content based Image Retrieval with Interactive User Feedback Using Multifeatures

Neetesh Gupta, Member IACSIT, IAENG, Dr. Vijay Anant Athavale

Abstract - With advances in the computer technology and the World Wide Web there has been an explosion in the amount and complexity of multimedia data that are generated, stored, transmitted, analyzed, and accessed. This ever increasing amount of multimedia data creates a need for new stylish methods to get back the information one is looking for [1]. Thus content-based image retrieval attracted many researchers of various fields. Retrieval of Images from Image library using appropriate features extracted from the content of Image is currently an active research area. For the intention of content-based image retrieval (CBIR) an up-to-date comparison of state-of-the-art low-level color and texture feature extraction approach is discussed[1],[2]. This Paper Elaborates Review of Content Based Image Retrieval Methods and Different Type of Features Used in This Retrieval and Their Properties. Image Retrieval with interactive Relevance feedback improve retrieval performance. Our aim is to select the most informative images with respect to the query image by ranking the retrieved images.

Keywords- CBIR, Relevance Feedback, Color, Texture, Shape Feature Extraction.

I. INTRODUCTION

Recent Development of computing Hardware has resulted in a rapid increase of visual information such as a database of images. To successfully utilize this database now a day’s having the contents in the form of images and so there is a need for such a system which can retrieve similar image on the basis of content-based search capabilities. These phenomena led to the implementation of many content-based image retrieval systems [1], [2], [3].

However, there are many problems faced in designing such a retrieval system. The most basic issue is how to measure the similarity in terms of content? In traditional retrieval systems features are added by hand, e.g. adding text strings describing the content of an image. Advances in data storage and image acquisition Technologies have enabled the creation of large image datasets. In order to deal with these data, it is necessary to develop appropriate information systems to efficiently manage these collections. Image Searching is one of the most important services that need to be supported by such systems developing effective methods for automated annotation of digital an image continues to challenge for computer scientist. Image retrieval algorithms are dividing into two categories. QbT are often annotated with keywords, organized by topical or semantic Hierarchies, and perhaps managed by database management Systems. However, such manual annotation methods are time-consuming, costly, and subjective; therefore, it is difficult for them to support a variety of task-dependent.

Content-based image retrieval (CBIR) concerns Automatic or semi-automatic retrieval of image data from an imagery database based on semantic similarity between the imagery content. The semantic similarity is typically defined through a set of imagery features. These features are extracted from shape, texture, or color properties defined in the imagery domain. The relevance between a query image and images in the database is ranked according to the similarity measure computed from the features. Due to its wide application potential, CBIR research has received intensive attention over the last few years. The General Image Retrieval System as follows [2].

(Fig 1: General Image Retrieval System)[2]

In traditional retrieval systems features are added by hand, e.g. adding text strings describing the content of an image. As mentioned before, manual systems require too much manpower taking into account the amount of image data available nowadays. In this way the misleading effects of Using the similar Feature Vector for the Entire Image. Can be by passed. There are two major challenging problems in this approach:

(i)How to extract the similar image area so that preliminary indexing and feature vector assignment to individual regions are possible.

(ii)How to use the similarities of these partitions to calculate an overall similarity for a given image pair. The notion of texture generally refers to properties of homogeneity direction information. The three texture feature extraction methods presented in this section generate a multi-scale, multidirectional representation of image [4].

II. RELATED WORK

A broad range of research efforts and commercial products [4] is reported to address the general-purpose CBIR problem. Almost all of the approaches proposed are based on indexing imagery in a feature space. Color
The color correlogram (CC) expresses how the spatial correlation of pairs of colors changes with distance. A CC for an image is defined as a table indexed by color pairs. The $d^{th}$ entry at location $(i,j)$ is computed by counting the number of pixels of color $j$ at a distance $d$ from a pixel of color $i$ in the image, divided by the total number of pixels in the image \([1],[2],[5]\).

**B. Texture Feature:**

There is no precise definition for texture. However, one can define texture as the visual patterns that have properties of Homogeneity that do not result from the presence of only a Single color or intensity. Texture determination is ideally suited for medical image retrievals. In this work, computation of gray level concurrence matrix is done and from which a number of statistical measures are derived. The autocorrelation function of an image is used to quantify the regularity and the coarseness of a texture. This function is defined for an image $I$ as: The notion of texture generally Refers to properties of homogeneity direction information. The three texture feature extraction methods presented in this section generate a multi-scale, multidirectional representation of image \([4]\).

1. **Texture Feature Extraction Models**

(a) **The Steerable pyramid**

This pyramid recursively splits an image into a set of oriented sub-bands and a low pass residual. The image is decomposed into on decimated low pass sub bands and a set of un-decimated directional sub bands. Analytically the band pass filter in polar co ordinates \([4],[5]\).

(b) **The Contourlet Transform**

This is combination of a Laplacian pyramid (LP) and a Directional Filter Bank (DFB). LP provides the multiscale decompositions and DFB provides multidirectional decompositions. The LP is decompositions of original image into a hierarchy of images such that each level corresponds to a different band of frequency components \([12],[15]\).

(c) **The Gabor Wavelet Transform**

This Transform dilates and rotates the Two dimensional Gabor function. The image is then convolved with each of the obtained Gabor functions \([12]\).

2. **Shape Feature:**

Shape is used as another feature in image retrieval. However, it is evident that Retrieval by shape is useful only in very restricted environments, which provide a good basis for segmentation (e.g. art items in front of a homogeneous background). Shape descriptors are diverse, e.g. turning angle functions, deformable templates, algebraic moments, and Fourier coefficients.

3. **D. Combinations of Color, Texture, Shape features:**

Features Similarity is based on visual characteristics such as dominant colors, shapes and textures. Many systems provide the possibility to Combine or select between one or more models. In a combination of color, texture and contour features is used. Extends the color histogram with textural information by weighting each Pixel’s contribution with its Laplacian, also provides several different techniques for image retrieval. These methods use the feedback from the user in order to automatically select or weight the different models, such that the requirements of the user are best fulfilled. Several systems perform segmentation and
characterize each region by color, texture, and shape. As stated before these systems crucially depend on a good segmentation which is not always given. This can result in retrieval results which seem to have nothing in common with the query. Among various flowers the system returns an image that does not display a star-shaped object but for which the segmentation delivered a star-like region as an artificial boundary within a textured region. We therefore consider segmentation-based methods reliable only for applications that allow for a precise segmentation [25] [23].

E. Similarity Computation:

Similarity measurement is a key to CBIR algorithms. One of the main tasks for CBIR systems is similarity comparison, extracting Feature signatures of every image based on its pixel values and defining rules for comparing images. Similarity distance computation is crucial to measure resemblance between two images similarity between two images is defined as the weighted sum of distances is the feature space, between all regions from different images. Similarity distance algorithm is introduced to minimize error obtained during image segmentation overall similarity between two images captured by the overall distance between the images is a balanced scheme in similarity measure between regional and global matching. These algorithms search image database to find images similar to a given query, so, they should be able to evaluate the amount of similarities between images. Therefore, feature vectors, extracted from the database image and from the query, are often passed through the distance function d; the following metric axioms must be satisfied.

- \( d(f_1, f_2) \geq 0 \) if and only if \( f_1 = f_2 \)
- symmetric property, i.e. \( d(f_1, f_2) = d(f_2, f_1) \)
- triangular inequality property, i.e. \( d(f_1, f_2) \leq d(f_1, f_3) + d(f_2, f_3) \)

Where \( f_1, f_2, f_3 \) are three different N-dimensional feature vectors [9].

The aim of any distance function (or similarity measure) is to calculate how close the feature vectors are to each other. There exist several common techniques for measuring the distance (dissimilarity) between two N-dimensional feature vector \( f \) and \( g \). Each metric has some important characteristics related to an application. The following are the most important metrics used in the literature [15], [16].

F. Image Classification

It is processing techniques which apply quantitative methods to the values in a digital yield or remotely sensed scene to group pixels with similar digital number values into feature classes or categories [11],[6]. Image classification and annotation are important problems in computer vision, but rarely considered together. Intuitively, annotations provide evidence for the class label, and the class label provides evidence for annotations. Image classification is conducted in three modes: supervised, unsupervised, and hybrid. General, a supervised classification requires the manual identification of known surface features within the imagery and then using a statistical package to determine the spectral signature of the identified feature [19], [17]. The spectral fingerprints of the identified features are then used to classify the rest of the image. An unsupervised classification scheme uses statistical statistics (e.g. the ISODATA algorithm) to classify the image into a predetermined number of categories (classes). These classes are statistically significant within the imagery, but may not represent actual surface features of interest. Hybrid classification uses both techniques to make the process more efficient and accurate.

III. CONCLUSION

The purpose of this Paper is to provide an overview of the functionality of content based image retrieval systems. Most systems use color and texture features, few systems use shape feature, and still less use layout features. Classifier has been used extensively in various areas to improve the performance of the system and to achieve better results in different applications. Interactive Content Based Image Retrieval System which aims at selecting the most informative images with respect to the query image by ranking the retrieved images. System which is more robust and computationally efficient. Complexity will be reduced in terms of resources. The current feature set can be extended to cover a broader class of descriptors, including higher level of texture and shape descriptors. Lastly the attribute mapping of our sliding areas can be enhanced by allowing the user formulate queries in the form “look for this on this kind of background” to benefit from the background’s distinctiveness.

REFERENCES


[22] Ville Viitanen and Jorma Laaksonen. “Techniques for still image scene classification and object detection” In Proc. of