Advance Cbir By Using Cts Features With Relevance Feedback

Rahul Mehta, Dr. Rakesh Kumar Bhujade

Abstract: Due to availability of internet databases of images is expanding tremendously and hence there is a strong need of extraction of accurate retrieve image from these large databases. As the image database size is very large so we need a fast retrieval search engine that can retrieve documents as well as images accurately. Required images can be retrieved accurately by retrieving their features accurately. These features may include Color, Texture & Shape. This is one of the hottest research areas and during past decades researchers had developed so many vast techniques who utilizes these features for retrieving the images effectively and efficiently from the large image databases. This paper will cover the wide survey of the Content Based Image Retrieval (CBIR) techniques that mostly used Color, Texture and Shape with Relevance Feedback for retrieving the images.

Index Terms: CBIR, Color, Texture, Shape, Multidimensional Indexing, Wavelet Transformation, Gabor Filter, SVM, Relevance Feedback

1. INTRODUCTION

For past decades after the rapid revolution of internet and vast increment in online image databases the CBIR is made its impact deeply and now it is known as one of the best methods for retrieving the user query images from the available large image databases accurately according to the user feedback and its interest. The reason CBIR is used widely because it can handle image database very efficiently and the user has the access of its data effectively. Due to huge increase in the digitally produced images there is a requirement of new methods which not only archive it but also access them efficiently. The images can be retrieved or search through using color features, texture features & shape features. In CBIR [1], the image is searched by considering its actual content not through its metadata like name or description etc. The CBIR System not only abstract the image features but also index them by using advanced structures but also provide the relevant answers as per the user's query. In order to fulfill the user query accurately, CBIR mainly works on the typical same. In first step CBIR as an input uses the RGB image, then it performs feature extraction on it. After that it calculate the computation which are based on their similarities along with the databases stored images and after that it provide the resulted output image which is based on similarity computations. Below we discuss some fundamental methods of CBIR such as feature extraction method, multidimensional indexing methods as well as Retrieval system architecture with similarity matching.

- *Rahul Mehta, P.hD. in Computer Science Engineering in MIT, University, Mandsaur(M.P.), India. E-mail: rahul.mehta@hotmail.co*
- *Dr. Rakesh Bhujade is currently Associate Professor in Computer Science Engineering in MIT, University, Mandsaur(M.P.), India.*

2. FEATURE EXTRACTION

Feature extraction can be done in two ways either through textually or visually. In Textual extraction we can include some keywords with annotations or tags. While Visual extraction mainly composed of color feature, space or texture features. For pattern recognition of images visual features plays an important role.

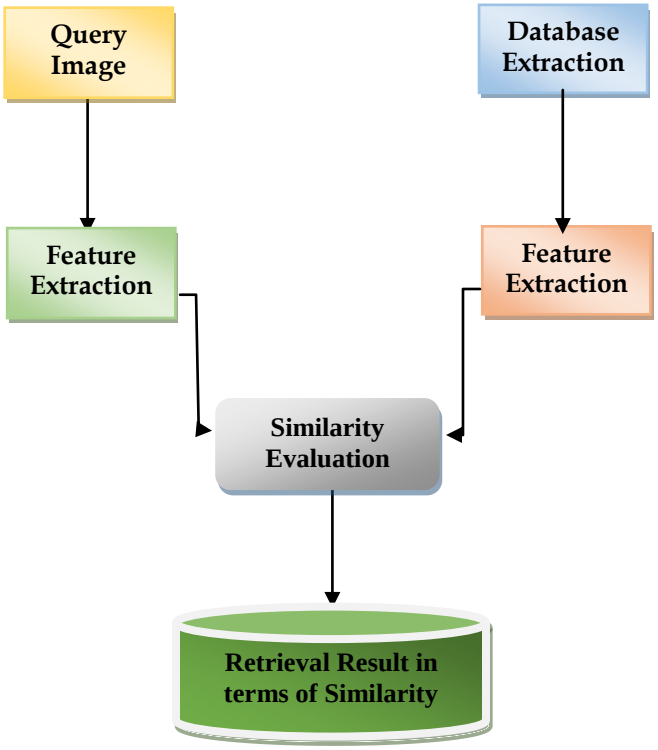

Fig 1: *Common CBIR Systems*

2.1 Color Feature

Color feature in the typical CBIR may includes histograms. They may be either block based or color-based histogram moments in which color features dominantly are being used in order to retrieve the images from databases effectively. Due to its benefits this feature is widely utilized in image representation and another benefit is that it is independent of the image. For the extraction of color features, we use the concept of color space or quantization as well as we can also consider the similarity measurement which is one of the key

components. RGB is color based and HSV [2] is categorized as those color models which are hardware-based, and they are widely utilized for this type of feature extract.

2.2 Texture Feature

Texture defines the visual patterns and has many significant and useful information related to the surface structural arrangement. This can include cloud, mountain, trees, hair, various cloth fabrics and their relationship with nearby surroundings. Below are the methods mainly used to classify by using texture features Color Co-Occurrence Matrix, Low Texture Energy and Wavelet Transform

2.3 Shape Feature

Shape is an important feature from human beings point of view as it helps in identifying and recognizing the real-time objects. The main logic behind it was to change the simple forms of geometrics for example straight lines which are in the various other directions. We can also group them in two parts which may be based on either contour or region [3]. The contour based helps in calculating shape features specifically to the shape boundary, while the entire region features can be extracted through region-based feature.

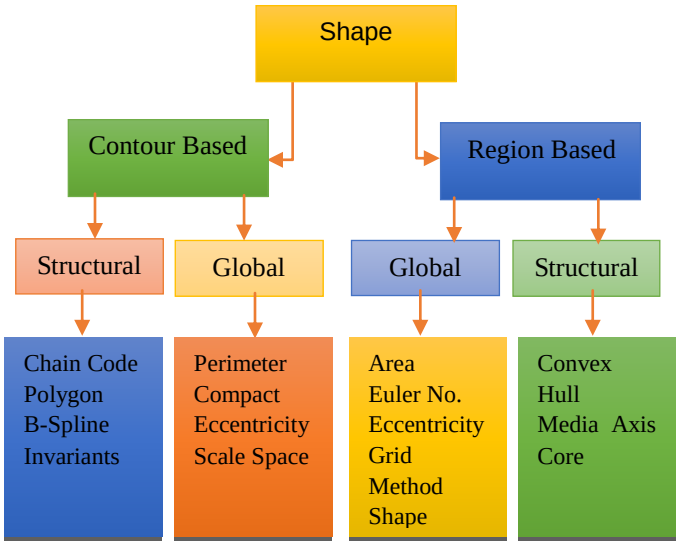

Fig 2. *Shape Representation & its Extraction Techniques*

2.3.1 Shape Parameter

Those image retrievals which are using Shape parameters their emphasis is mainly on calculate those shapes which are exhibiting similar characteristics and through their features they are going to be represented. For effective description of shapes, we can use simple geometric features. These are important filters which are being used to remove false hits or also we can combine them with other shape descriptors in order to discriminate the shapes [4]. The important shape parameters which we are discussing below are Area, Centroid and Eccentricity: -

- Area - Whenever the boundary points has been changed through shape boundary and two successive boundary points formulates the area of the triangle then the center of gravity also changes. Shape representation mainly exploited as an area function. The area function is linear under affine transform. The important point is that in order to make this linearity works the samples of the shape must be taken on same vertices.
- Centroid – Centroid is termed as the center of gravity. We must keep the position of it with respect to shape fixed.
- Eccentricity - Eccentricity is calculated through its aspect ratio. It can be calculated by taking their length ratio of major axis and the minor axis. We can calculate them through two methods mainly method of principal axes and method of minimum bounding rectangle.

2.4 Multidimensional Indexing

The Multidimensional indexing techniques makes the CBIR more scalable which can handle large size images very effectively. In many cases we found that in many images there is a property of high dimensionality. So, these images can be indexed by following this approach, we can first try to reduce the dimensionality and after that we can done the further indexing of the images. In order to reduce dimensions, we mainly used Clustering. We can use clustering in many ways like in pattern recognition, or in speech analysis and in information retrieval. To perform the recognition or grouping we can use either row wise or column wise approach.

2.5 Architecture of Retrieval System and Similarity Matching

Before performing the calculation of similarity, we first extract the important features of the images. Their Similarity can be calculated when the extracted features of queries image is compared with expected image features which are already available in the database. When we say Similarity measure then it means that we are talking about the maximum value of the similarity between query and expected images. The important point to be consider is that there must be a smaller distance between similarity images while different images may exhibit larger distances.

3. REVIEW OF LITERATURE

As we already CBIR is a better way of search in comparison to the normal search by using and comparing various image features related to color features, texture features or shape features. In order to search any image which is queried by some user we first search in our images database [5] [6]. In this case we may use the CBIR method over the traditional way of searching through labels or meta tags and for further process and finding the expected image we may use different retrieval processes of the image. The three basic fundamental on which CBIR depends are visual features, system design retrieval and the multidimensional indexing:

1. As per selected visual features the feature extraction and indexing of image database is done which in turns formed the perceptual feature space examples are color, shape, texture or any of their combinations.
2. After that query image important Feature extraction is done.
3. Expected image matching is done with the most similar database images which are already present by using the principle of image-image similarity measure. This is the main basis which forms the search part of typical CBIR systems. Extraction of common features are the main basis of the various CBIR systems [11] [12].

In CBIR we have mainly two types of important visual features:
1. Primitive features which are mainly related to color, texture and shape.
2. Domain specific which are mainly application specific they include human faces and finger prints.

4. CBIR TECHNIQUES

Below are some effective approaches of the CBIR system described which are being utilized for image retrievals in various other methods of retrieval.

4.1 Relevance Feedback

As it is well known that different users can have different needs. For relevance feedback in CBIR a typical user may follows the following scenario:
- In the first step Machine gives results of early image retrieval.
- Then user opinion is taken for that image to know either the output image is expected by user or not.
- After taking opinion of the user machine perform next searching for finding the image as per the user query.

4.2 Semantic Template

It is built and mainly utilized in order to retrieve those images having the level higher and due to this it is not utilized very commonly. It is based on that concept in which we are collecting the representative features from the given sample of images.

4.3 Wavelet Transform

This is composed of those waves which are extremely small in nature and they are also known as wavelet of whose frequency modified after limited time. Discrete Wavelet transform is mainly used to partition the input images mainly into different four portions which are normally named as High Freq. (HH), High Low Freq. (HL), Low High Freq. (LH), and Lower Freq. (LL) parts [7]. It computes the moments of all parts only when it completes the first level of image degradation of the vertical portions.

4.4 Gabor Filter

For texture analysis we used this mainly because it has much similar characteristics in comparison to normal person senses. In a typical 2D Gabor func. g(x, y) we have a wave with some frequency and it belongs to curved surface and having an inclination termed as 2D Carrier [8]. In order to modulate it we can also use Gaussian Envelope.

4.5 Support Vector Machine

In this method we first analyze the input and try to identify its pattern which can further be used for our classification purpose [9] [10]. In classification we start with some sample sets of input data, then we try read it in order to forms the output according to each required input and if in any case we find that the output is coming continuous then we perform regression.

5. VARIOUS IMPLEMENTATIONS AREAS OF CBIR

Below are some of the areas which mainly used CBIR:
1. CBIR is one of the important and effective tools for our police force department as it helps them to recognize pictures of criminals which ultimately help in crime prevention.
2. CBIR is widely used in various medical experiments and tests.
3. CAD / CAM also utilizes the functionalities of CBIR.
4. Historical Researches with digital libraries widely used CBIR.
5. CBIR plays an important role in Geological info gathering and remotely sensor areas.

6. CONCLUSIONS

It is true that the CBIR technology is currently in the researching stage and there is a large scope for the involvement of new techniques and methods for fast and accurate retrieval. In the past few years several different methods are being introduced in mostly available CBIR applications which are based on the content-based principles. The main issue with majority of the available approaches is that they are mainly either based on a one algorithm or they don't want to combine with other algorithms. It has been also found that all those methods using the common feature extraction techniques can be sometime successful on some specific sampled images but when we applied them on different image database then they show lack in their it has been found that there is significantly downfall in their output efficiencies. This paper is covering all the currently available methods and approaches which can be useful for providing expected outcome. Some methods are using either only one feature based or some common combinations of Color features, Texture features & Shape features. In many cases the current methods showing less accuracy and not very efficient too. In CBIR there is a large scope for further improvement and have much higher capabilities and efficiency for more researching in order to fulfil the current gaps to produce better results as per the user needs.

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