Efficient Image Retrieval with Feature Extraction Based On Multi-Image Query

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Abstract- **Now a day's requirement for development of CBIR is enhanced due to tremendous growth in volume of images as well as the widespread application in multiple fields. Texture, color, shape and spatial layout are the underlying traits to represent and index the images. These peculiar features of images are extracted and implemented for a similarity check among images. The problem of content based image retrieval is based on generation of peculiar query. For relevant images that meet their information need, an automated search is initiated by drawing a sketch or with the submission of image having similar features. Similarity between extracted features can be measured by using different algorithms. This proposed approach is for Efficient Image Retrieval with Feature Extraction Based on Multi-Image Query; a new approach to overcome Limitation of the well-known previous CBIR methods. The effect of Co-occurrence Matrix of Color and Edge Orientation, multi-image queries and Local Tetra Patterns is used for enhancing precision and recall of an image retrieval system.**

Index Terms— **Co-occurrence Matrix, Local Tetra Patterns, Multi-Image Queries.**

I. INTRODUCTION

With the development of the Internet, and the availability of image capturing devices such as digital cameras, image scanners, the size of digital image collection is increasing rapidly. It is very important to efficiently store and retrieve images for different application such as fashion design, crime prevention, medicine, architecture, etc. In text-based approach the images are manually annotated by text descriptors. It has lead to two disadvantages. First one is that a considerable level of human labor is required for manual annotation. The second is the annotation inaccuracy due to the subjectivity of human perception. To overcome the above disadvantages in text-based retrieval system, content based image retrieval (CBIR) was introduced in the early 1980s.

The content based image retrieval techniques aims to respond to a query image with query similar resultant images obtained from the image database In the area of CBIR, it overcomes the difficulties of manual annotations by using visual feature based representations, such as color, texture, shape, etc. However, after over a decade of intensified. The major bottleneck of this approach is the gap between visual feature representations and semantic concepts of images. An average normalized rank and combination of precision and recall are considered as metrics to evaluate and compare the HDWT against different methods. Wavelet transformation using lifting scheme and the colour histogram (CH) called lifting wavelet-based colour histogram. The lifting scheme reduces the processing time to retrieve images. There is no clear consensus among researchers about which technique to use for a general image retrieval system. A general solution to the problem of image retrieval is not well-settled, because it is not possible to preempt the type of image data as provided by a user in queries. This work explores how user involvement with an image retrieval system can improve retrieval performance. In particular, This work investigate the effect of feature integration, multiple query images, LTrP and co-occurrence matrix. As mentioned above, features extracted from different techniques emphasize image attributes in different domains. Products, and (3) conformity of style throughout a conference proceedings.

II. BACKGROUND

Content-based image retrieval (CBIR) is done by using image indexing and retrieval algorithm using local tetra patterns (LTrPs). The standard local binary pattern (LBP) and local ternary pattern (LTP) encode the relationship between the referenced pixel and its surrounding neighbors by computing gray-level difference but local tetra patterns (LTrPs) encodes the relationship between the referenced pixel and its neighbors, generic strategy to compute n th-order LTrP using (n-1) th-order horizontal and vertical derivatives for efficient CBIR .Second-order LTrP is on the direction of pixels using horizontal and vertical derivatives. Thus, it is evident that the performance of these methods can be improved by differentiating the edges in more than two directions. This observation has motivated to propose the four direction code, referred to as local tetra patterns (LTrPs) for CBIR.

On the other hand several CBIR projects exist for radiology and several other projects are underway, there is an acute need for a comprehensive and flexible CBIR system for microscopic images with direct implications for the field of pathology and cancer research. The CBIR system uses a multitier approach to classify and retrieve microscopic images involving their specific subtypes, which are mostly difficult to discriminate and classify. There is a growing requirement for effective and efficient content-based image retrieval system. It is robust to rotation and translation, but it lacks spatial information. A novel content based image retrieval algorithm based upon the color and edge orientation. It computes the co-occurrence matrices of intensity.

The rest of the paper is organized as follows: Section I introduce the title of this paper. Section II discusses background of this title. Section III discusses work done on various methodologies. Section IV describes existing methodologies. Section V discusses attributes and parameters and how they affect the result. Section VI describes the proposed methodology. Section VII discusses possible outcomes and results. Finally section VIII Conclude this paper.

III. Previous Work Done

The traditional image retrieval is usually based on text. Text based image retrieval has been discussed over many years before CBIR. There are some literatures for the most important CBIR systems. Also, there are some papers that overview and compare the current techniques in this area [1] [2] [3]. The standard local binary pattern (LBP) and local ternary pattern (LTP) methods are used to encode the relationship between the referenced pixel and its surrounding neighbors by computing gray-level difference in [1]. In addition, to the CBIR system and analyze the effectiveness of [1] algorithm by combining it with the Gabor transform. To extract effectively features to improve the performance of image retrieval, a novel content based image retrieval algorithm based upon the color and edge orientation is proposed in [2]. It computes the co-occurrence matrices of intensity, four broadly-tuned color channels of Itti's visual attention model and the edge orientation, and then utilizes energy, contrast, entropy and homogeneity to describe the image features. But system [3] enables both multi-image query and slide-level image retrieval in order to protect the semantic consistency among the retrieved images. New weighting terms, inspired from information retrieval theory, are defined for multiple-image query and retrieval in [3]. There are different system designs for content based image retrieval (CBIR) system.

IV. Existing Methodologies

In Local Tetra Patterns: A New Feature Descriptor for Content-Based Image Retrieval; multiscale feature like GT, GLTrPs, and Query Matching provide good directional information for texture analysis. This algorithm is also applied on Gabor wavelet sub bands (with three scales and two directions) for GLTrPs.

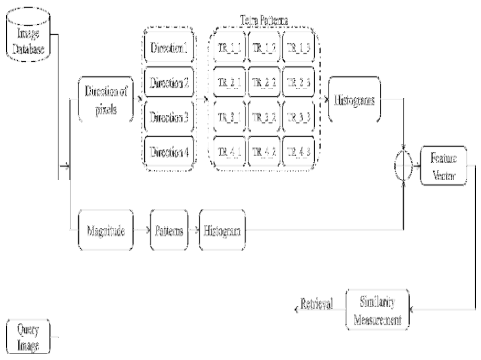

Fig1. Proposed image retrieval system framework

In the Content-Based Microscopic Image Retrieval System for Multi-Image Queries; feature extraction techniques employed to the images in database. Low-Level Feature Extraction, Color features, Texture features CBIR system operates at two tiers.

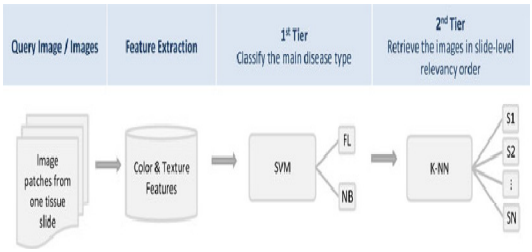

Fig 2. General flowchart for the CBIR system for a given query image or images.

Image Retrieval Algorithm Based upon Co-occurrence Matrix of Color and Edge Orientation is work as follow

1 Extraction of intensity and broadly-tuned color channel maps as $I = (R + G + B)/3$

$$\hat{Y} = (R + G)/2 - |R - G|/2 - B$$

2. Extraction of edge orientation image

3. Co-occurrence matrix and feature vector

4. Distance metric: distance between them is simply calculated as

$$D(T_j, Q) = \sum_{i=1}^{M} \frac{|t_i - q_i|}{1 + t_i + q_i}$$

V. Analysis and Discussion

Novel image indexing and retrieval algorithm using local tetra patterns (LTrPs) for content-based image retrieval (CBIR). LTrPs Encodes the relationship between the referenced pixel and its neighbors, based on the directions that are calculated using the first-order derivatives in vertical and horizontal directions. A second-order LTrP that is calculated based on the direction of pixels using horizontal and vertical derivatives [1]. The performance of the proposed method is measured in terms of average precision, average recall, and average retrieval rate (ARR). While a novel content based image retrieval algorithm computes the co-occurrence matrices and then utilizes energy, contrast, entropy and homogeneity to describe the image features [2]. Content-Based Microscopic Image Retrieval System for Multi-Image Queries uses a multitiered approach to classify and retrieve microscopic images involving their specific subtypes, which are mostly difficult to discriminate and classify [3].

The results are considered to be better if average values of precision and recall are high. The higher orders LTrPs have the capability to extract more detailed information as compared with lower order LTrPs. A Content-Based Microscopic Image Retrieval System for Multi-Image Queries important point for the efficiency of this proposed approach is the parameter selection, i.e., K and $K2$ parameters used to compute weightings of the scores**.** Performance analysis of LTrPs shows that the proposed method improves the retrieval result from 70.34%/44.9% to 75.9%/48.7% in terms of average precision/average recall on different database, and from 79.97% to 85.30% and 82.23% to 90.02% in terms of average retrieval rate on different databases.

The performance of the Content-Based Microscopic Image Retrieval System for Multi-Image Queries system was tested

on a dataset. Average classification accuracy at the first rank retrieval, outperforming the image-level retrieval accuracy by about 38 and 26 percentage points, for FL and NB diseases, respectively.

The average retrieval precision values are listed in Table 1. It can be seen that when $D = 2$, the performance of our proposed scheme is the best.

Performance Metric	Distance								
	1	2	3	4	5	6	7	8	9
Precision(%)	41.27	41.33	41.19	41.08	40.73	40.60	40.56	40.63	40.56
Recall(%)	4.95	4.96	4.94	4.93	4.89	4.87	4.87	4.88	4.87

Table 1: The average precision and recall with different distance

VI. Proposed Methodology

Most of the image retrieval systems support the single query model only. In the single-query model a database of images is search images similar to a given query image. However, it may be desirable to query an image database using more than one query images for detailed knowledge representation. An aim of this paper is to develop a paradigm that supports the multi-image query approach. An advantage of the multi-image query approach is that it overcomes the limitation on the specification of image content using a single query. Multiple images are given to both LTrP and co-occurrence matrix as a query.

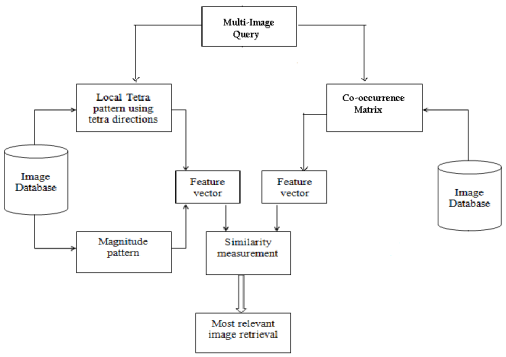

Fig 3. Proposed Framework for Efficient image retrieval with feature extraction based on multi-image query.

The LTrP is able to encode images with four distinct values as it is able to extract more detailed information. LTrP encodes the relationship between the center pixel and its neighbors based on directions that are calculated with the help of (n-1) th-order derivatives. LTrP encodes the relationship based on the direction of the center pixel and its neighbors, which are calculated by combining (n-1) th - order derivatives of the 0 and 90 directions. Other part co-occurrence matrix; is a matrix that is defined over an image to be the distribution of co-occurring values at a given offset. Value of an image is originally the gray scale value of a specified pixel. In our case we take the values to be the color and edge orientation.

Although the sign component extracts more useful information as compared with the magnitude constituent, exploiting the combination of sign and magnitude mechanisms can provide better clues, which are not evident in any one individual constituent. This concept has motivated us to propose the 13th binary pattern by using the magnitudes of horizontal and vertical second-order derivatives. Calculate the feature vector for the every image in the database. Compare the query image with the images in the database and Select the top-matched images by measuring the distance between the query image and the images in database using

$$D(Q, DB) = \sum_{i=1}^{Lg} \left| \frac{f_{DB_{j,i}} - f_{Q_i}}{1 + f_{DB_{j,i}} + f_{Q_i}} \right|$$

Finally, it measures the similarity and retrieves the most relevant matches from database.

VII. Possible Outcomes And Result

The image in the database contains the different dimensions and it's collected into single database images. The performance of the efficient image retrieval with feature extraction based on multi-image query is measured in terms of average precision and average recall. In case of content based images co-occurrence matrix and LTrP will give better results because content is formed by repeating a particular element or number of elements and very less time is required for retrieval of the images. The large increase in precision is an empirical justification of the proposed notion of using more than one query image. A query image can be retrieved efficiently from a large database in short interval of time along with better accuracy and precision.

VIII. Conclusion

Content Based Image Retrieval has overcome the limitation of Text Based Image Retrieval by considering the contents or features of image. Automatic analysis and retrieval of images from a database is a challenging task in CBIR. User interaction may be used to provide some information to an image retrieval system that is difficult to obtain automatically. Structure, color, and texture features are extracted by using three different methods and the efficient image retrieval with feature extraction based on multi-image query has been developed. Due to the effectiveness of the proposed approach, it can be also suitable for other pattern recognition applications such as face recognition, fingerprint recognition, crime prevention, medicine, historical research etc.

IX. Future Scope

The future of this field depends on the collective focus and overall progress in each aspect of image retrieval, and how much the ordinary individual stands to benefit from it. Results

can be further improved by considering the diagonal pixels for derivative calculations in addition to horizontal and vertical directions.

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