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# Image Indexing System Using Texture Mining

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***Abstract -*** The aim of this research to work on new methods of image feature extraction, image retrieval and feature vector indexing. This research work presents a new weighted histogram based statistical features, which integrate the pixel spatial distribution information into a numerical value. As a fundamental retrieval method, it can easily be integrated with multidimensional R- Tree indexing method. The experiment results show that this method is still effective when the data scale is very large, and it has superior scalability than traditional indexing methods. We analyzed the performance of the system under four classes of different database environment.

***Keywords : T***amura , Texture , Content based, R-Tree, Indexing

## I. INTRODUCTION

In recent years, with the rapid development of multimedia technology and computer networks, digital image capacity worldwide is growing at an alarming rate. Whether it is military or civilian facilities will have the capacity equivalent to a day several gigabyte images. The digital image contains a lot of useful information. However, since these images are chaotically distributed in the world of information, contained in the image cannot be efficiently access and use. This requires a way to quickly and accurately find access to images of technology, also known as image retrieval technology. Since the 1970, under the jointly promote the two database systems and computer vision research in the field of image retrieval technology has become a very active area of research [1]. Databases and computer vision on are two major areas of research from different angles to image retrieval technology, based on the text of the former, while the latter is based on the vision.

## II. PROBLEM STATEMENT

Image indexing and the retrieval have turn into a significant research focus in the image database community. Numerous systems have been developed to get better the performance and efficiency during retrieval. In our study we found that an efficient indexing technique can perform better result in the retrieval process. In this manner we use an efficient indexing with multidimensional tree and extracted multiple texture features of the image based on the content of a basic problem of image analysis and image retrieval is feature extraction. Broadly speaking contexts associated with the image of text can also be referred to as image features, but this feature is literal in nature, rather than the visual characteristics of the image.

## III. LITERATURE REVIEW

Image features affect every aspect of a CBIR system, and so it is important to carefully choose the right image features for any CBIR system. Most of the CBIR systems explore low-level image features such as color, texture, shape, motion, etc. because they can be computed automatically. Middle-level features like regions and blobs which can be generated without human assistance are used in object-level image retrieval.

### a. Colorbased Features

Xiaojun Qi et al. [12] propose a novel approach to image retrieval. In their retrieval method, an image is represented by a set of color clustering based segmented regions and the global edge histogram. For the system result, the resemblance of two images is measured by the overall similarity using both regions-based and global based image level similarities. In this approach, every segmented object or parts of an object is depicted by two different sets color and texture features which is of fuzzified. In a fuzzy matching method for regions or objects set, allows one object to match with several objects. The issues associated with the color or texture accuracy and segmentation uncertainties. Finally the matched objects, with a simple semantics for determination of each region, and further used to calculate the object based image similarity [2].

### b. Texture based Features

Texture is a powerful discriminating feature, present almost everywhere in nature. Texture similarity, however, is more complex than color similarity. Two images can be considered to have similar texture when they show similar spatial arrangements of colors (or gray levels), but not

 

necessarily the same colors (or gray levels). There are several possible approaches to represent and extract the texture properties of an image [3].

**c. Shape based Features**

Color and texture are both global attributes of an image. Shape goes one step further and typically requires some kind of region identification process to precede the shape similarity measure process. In other words, an image must be segmented into meaningful objects and background before applying most shape descriptors. In many cases this has to be done manually, but in restricted domains automatic segmentation is possible. Segmentation of "difficult" scenes is an open problem in computer vision. Shape representation techniques can be classified into three broad categories [14].

## IV. Methodology

**1. Find the features based on texture**: The image contains different features like color, texture and shape. In this thesis the texture feature is an important one. The features are extracted using Statistical approach. The methods used in the relatives of statistical approaches do apply of the intensity values of each pixel in an image, and apply a variety of statistical formulas to the pixels in order to compute feature descriptors.

**2. Separate the features**: Tamura is proposed expression for texture features. Tamura texture features have four components corresponding texture features in a psychological perspective on the four attributes, namely roughness (coarseness), contrast (contrast), the direction of the (directionality), and coarse degrees (roughly). Wherein the first three components are particularly important for image retrieval. Next we will focus on the definition and mathematical expression roughness, contrast and orientation of the three characteristics.

3. **Feature Indexing using R - trees**: R-trees are hierarchical data structures based on $B^+$-trees. They are used for the dynamic organization of a set of d-dimensional geometric objects representing them by the minimum bounding d-dimensional rectangles (for simplicity, MBRs). Each node of the R-tree corresponds to the MBR that bounds its children. The leaves of the tree contain pointers to the database objects instead of pointers to children nodes. The nodes are implemented as disk pages.

## V. EXPERIMENTAL RESULT

**a. Experiment Setup -** Experiments are conducted to evaluate the performance of proposed method for image indexing and retrieval. The dataset we used to test our proposed technique includes 1000 classified images. All the images tested over proposed system and get corrected result of 99.1%. With this testing process we conclude that the system accuracy is increased for Image indexing and retrieval system.We have tested proposed system on the images of different categories with different image formats.

**b. Datasets**

The image database is the selected as a subset of the Corel image database. Corel image database is a collection of photos, web images, animations, videos and clips. We selected about 1000 images from the database as our training database.

**c. Texture Features Analysis**

In this work, the texture features were extracted in four different categories. The feature vectors of one class are computed by taking average of all the values of texture descriptors.

**i. Tamura Texture Features**

The tamura texture features were extracted for each image of the dataset and for every individual image a normalized vector stored. This normalized feature vector is the mean value of the all four extracted texture features.

**ii.Tamura Feature Vectors**

Table 1: Tamura Feature Vectors

| S.No | Image | Roughness | Contrast | Direction Degrees | Coarseness | Mean Value |
|---|---|---|---|---|---|---|
| 1 | 1.jpg | 0.5601 | 0.9171 | 0.8228 | 0.0971 | 0.599275 |
| 2 | 2.jpg | 0.7912 | 0.8325 | 0.7590 | 0.0539 | 0.605125 |
| 3 | 3.jpg | 0.8901 | 0.9899 | 0.6390 | 0.1087 | 0.599275 |
| 5 | 5.jpg | 0.7176 | 0.8012 | 0.6966 | 0.0953 | 0.605125 |
| 5 | 5.jpg | 0.7502 | 0.8955 | 0.7182 | 0.1870 | 0.656925 |
| 6 | 6.jpg | 0.8801 | 0.9161 | 0.6965 | 0.0556 | 0.577525 |

Table 1 shows the Tamura feature vectors of six different images of a single class and the mean value for the all four feature vectors. This individual feature vectors used as an index value for the particular image stored in database.

**d. Histogram based Statistical features**

The texture features, in statistical texture analysis are computed from the distribution in statistical way of the combinations of intensity values positions relative to each other in a digital image. Histogram of an image is a graphical demonstration of the intensity distribution. The histogram in an image processing perspective, the histogram of an image usually refers to a histogram of the pixel intensity values. This histogram is a graph presenting the number of pixels in an image at each various intensity value set up in that image as mentioned in figure 1. A statistical features basis on histogram removes an image texture as a quantitative calculates of the organizing of intensities in a region. In common this move in the direction of is easier to compute and is more widely used, since natural textures are made of patterns of asymmetrical sub elements. Therefore on the basis of these distributions, we can calculate statistical features of the image.

 

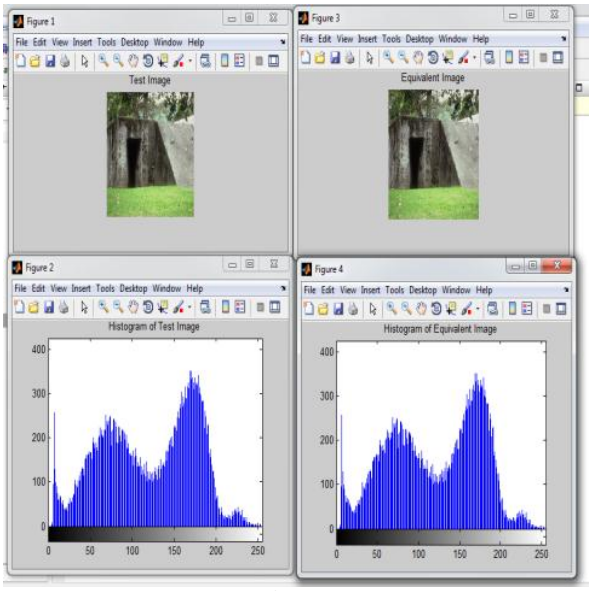


Figure 1: Histogram of Test and Equivalent Image

Table 2: Histogram Statistical Feature Vectors

| S.No | Image | Mean | Variance | Sleekness | Kurtosis | Energy | Entropy | Average |
|---|---|---|---|---|---|---|---|---|
| 1 | Img 1 | 0.5601 | 0.9171 | 0.8228 | 0.0971 | 0.599275 | 6.2646 | 1.543496 |
| 2 | Img 2 | 0.7912 | 0.8325 | 0.7590 | 0.0539 | 0.605125 | 6.6377 | 1.613238 |
| 3 | Img 3 | 0.8901 | 0.9899 | 0.6390 | 0.1087 | 0.599275 | 6.9374 | 1.694063 |
| 4 | Img 4 | 0.7176 | 0.8012 | 0.6966 | 0.0953 | 0.605125 | 6.3470 | 1.543804 |
| 5 | Img 5 | 0.7502 | 0.8955 | 0.7182 | 0.1870 | 0.656925 | 6.5419 | 1.624954 |
| 6 | Img 6 | 0.8801 | 0.9161 | 0.6965 | 0.0556 | 0.577525 | 6.8255 | 1.658554 |

Table 2 shows the Histogram based feature vectors of six different images of a single class and the mean value for the all six feature vectors. This individual feature vector used as an index value for the particular image stored in the database.

**e. Auto regressive texture model**

In this study, the estimated autoregressive parameters are considered as the feature extracted from the image which takes an important part of the indexing.

**f. Wavelet Transform**

The wavelet transform of an image is a time-frequency, description of digital signal. In this feature vector we use standard deviation of the energy level distribution.

**g. Overall System Analysis**

To verify the effectiveness of our approach, a benchmark test is performed over all the system modules. All the testing images are basically divided into four classes according to the nature of images. Images are basically taken from the Corel standard database for specifically designed for the content based image retrieval. Our benchmark test results are summarized in a tabular form where four classes of image database indicated with number of images in each class. Our system detected the number of images from testing database indicated in the "image detected" column and corresponding accuracy presented. The overall system performance calculated on the basis of these four classes. This demonstrates that our approach has, total 99.1% accuracy. This confirms the effectiveness of our approach for image retrieval detection and removal.

**h. Overall Result analysis**

In this research we need to know how accurately the texture segmentation results can be used for image retrieval. We found from the results that texture features are very strongly retrieve images with high accuracy as 99.6% for flower texture , 99.2% for grass texture, 99.0% for sky texture and other textures are 98.5% on training databases and corresponding testing databases.

Table 3 Overall Result analysis

| S.No | Class | No. of Images | Image Detected | Image Not Detected | Accuracy (%) |
|---|---|---|---|---|---|
| 1 | Flower Texture | 250 | 259 | 1 | 99.6% |
| 2 | Grass Texture | 250 | 258 | 2 | 99.2% |
| 3 | Sky Texture | 300 | 297 | 3 | 99.0% |
| 5 | Miscellaneous Texture | 200 | 197 | 3 | 98.5% |
| Overall | | 1000 | 991 | 9 | 99.1 % |

## VI. CONCLUSION AND FUTURE WORK

**a. CONCLUSION**

We have developed an improved R-Tree indexed based image retrieval system. The system uses an R-Tree based image insertion and searching algorithm to improve image retrieval process. As for feature extraction we focused on the texture features of the digital image. The feature vector categories into four sections. The algorithm has been implemented and tested using 1,000 Corel color image and the retrieval performance is analyzed.

The performance of our algorithm has been shown to perform better compared with other color and shape based feature methods. Overall, our system performs well in the condition of good contrast images where the foreground and the background is visible in the image and in other hand performs not well when the image is complex and the

 

objects have sharp edges. While the implementation, we also found that by taking unique object during similarity computation improve the accuracy retrieval process.

**b. FUTURE WORKS**

In this work, we used the set of images that are general purpose and four different variations in the texture such as sky, grass, flower and artificial in different angle and distance. We only look for four textures of interest only but it can be tested for multiple textures in future work. This technique can be tried and implement to more set of images such as satellite images, medical images etc. The set of images that we used in this study are also lossy, which may affect and lose the important texture information. This technique can be tried and applied in set of images that are lossless and clearer images. Currently, we only worked for one type of feature as texture. Further investigations will also be needed in finding the best combinations features other than texture or combination of texture, color, and shape. This might improve the image retrieval accuracy. In this current study, we found successful results with four type of texture.

## REFERENCES


**[1].** P.S. Patwal, A.K. Srivastava "A content-based indexing system for image". Indian Journal of Science and Technology. 2016; 9(29):1–7

[2]. M.M. Shah and P.S. Patwal, "Multi-Dimensional Image Indexing with R+-Tree", IJIACS ISSN 2347 – 8616 Volume 3, Issue 1 April 2014.

[3]. M.M. Shah and P.S. Patwal "Pattern Reorganization-Review of Texture Analysis Techniques", National Conference "Emerging Trends In Intelligente Computing and Communications, 2012" Galgotia University, Greater Noida"

[4]. M.M. Shah and P.S. Patwal " Image Retrieval Using Wavelet Based Techniques", International Conference on Technical Innovation through Modern Engineering Sciences-TIMES-2013.

[5]. N. Jain, M.M. Shah and P.S. Patwal "Shape Based Image Indexing and Retrieval for Diagnostic Pathology", International Conference on Technical Innovation through Modern Engineering Sciences-TIMES-2013

[6]. P.S. Patwal, A.K. Srivastava, "Image Retrieval Based on Content with Color Feature using Quadratic Distance Metric Technique",International Conference on Technical Innovation through Modern Engineering Sciences-TIMES-2013

[7]. P.S. Patwal, A.K. Srivastava, "An Analysis of Spatial domain techniques - Neighborhoods Processing" ,

[8]. Pratap Singh Patwal, A.K. Srivastava, "An analysis of Spatial domain techniques - Point Operations",International Journal of Graphics & Image Processing |Vol 4|issue 3|Aug. 2014

[9]. E. Bruce, Goldstein "The Ecology of j. j. gibson's perception",Printed in Great BritainLeonardo, Vol. 14, No. 3, pp. 191-195, 1981.

[10]. Y.Rui and S. Thomas. "Image Retrieval: Current Techniques, Promising Directions, and Open Issues", Journal of Visual Communication and Image Representation, PP. 39–62, 1999.

[11]. M.R. Turner, RuzenaBajcsy,"Underestimation of Visual Texture Slant by Human",Technical Reports (CIS), Department of Computer & Information Science January 1990

[12]. Qi. Xiaojun and HongxingZheng "A new integrated method for shape based image retrieval", Computer Science Department, Utah State University, Logan, UT, 84322-4205.

[13]. S NajimunNisha, K.A MeharBan "Performance Enhancement of an Image Retrieval by Integrating Text and Visual Features", International Journal of Advanced Research in Computer Science & Technology (IJARCST), Vol. 2 Issue Special 1 , PP.67-71, 2014.

[14]. K V Shriram, P.L.K. Priyadarsini, "CBIR – An analysis and suggestions for improvement", International Journal of Computer Applications (0975 – 8887) Volume 42– No.14, March 2012.


 