

Image retrieval based on fuzzy color histogram processing

Abstract-In this paper, we use a fuzzy logic approach for content-based image retrieval diagnosis we provide. In this paper we used a color histogram-based color space images. The histogram creation method in hand was assessed based on the performances achieved in retrieving similar images from a widely diverse image collection. Based on tests performed on the database consisting of 1000 images and 10 class Wang sense, can be seen. This method is accurate recovery of 90 percent compared with earlier work has a high retrieval accuracy.

Index Terms-Image processing; Image retrieval; Fuzzy systems; Color histograms; Intelligent systems

1. Introduction

Image retrieval since the 1970s research is an active field of research and researchers in these studies received two major areas: Database management, and the field of machine vision. Text-based view of the first group and the second group is based on visual acuity. Text-based image retrieval began in the early 1970s, in which a general framework of image retrieval initially annotate images with keywords, and then use the database management system to retrieve images presented. There are two major problems in this type of recovery, especially when the size of the database is large, the problem is too much time spent annotate images, and the second problem due to the high content of different understanding of human images and images obtained. In the early 1990s, due to the rapid increase of pictures with high volume and lack of accountability-based systems, the systems were introduced content-based retrieval of images. In these systems, instead of manually annotate summary text for images, using their visual content can be indexed. The image retrieval system based on content retrieval through automatic extraction of image characteristics such as color, texture, shape, and location is done. The use of content based image retrieval color feature in the system is very wide applications. Generally, systems-based image retrieval search by combining color, texture, shape, and location to retrieve results. The most common method for color image retrieval using color histogram, which is the most important recovery techniques based on the color content of the image and it is due to the effectiveness and efficiency [1]. To add location information to other techniques have been proposed in recent years, such as the color histogram of color [2] vector color dependence

[3] and correlated color journalist [4], some of them work and some improved color histogram vector the image segmentation, spatial information extracted color characteristics increase. In this paper, based on image characteristics and the proposed method performs better than previous work.

2. background research

The most common method to determine the color content of the image using color histogram. General steps of the method includes selecting the appropriate color space, color space quantization, histogram calculations, applying metric histogram, and the shortcuts are indexed. However, due to problems such as the above, that, along with pre-filtering and indexing hierarchical arises, the high complexity of calculating the distance function, and ultimately its weakness in local data extraction image-based retrieval newer techniques for color are presented. In addition to traditional techniques based on color, new techniques are summarized as follows:

Cheng and Smith [5] techniques Back Projects to extract areas of color, and color format of the techniques used in the Sikh visual system. They use the HSV color space quantization is performed classification colors. A filter means for filtering and minimizing image noise have effect. In the next step of a two-level image is created for each color, and the technique is applied to the areas mined.

Stryker [6] a fuzzy image is divided into five zones or areas slightly overlapping and three torque are color-coded for each area. Due to overlapping regions and fuzzy, this technique is not sensitive to changes in translation and rotation.

Hsu et al. [7] The different colors in the picture earns spatial information and spatial information retrieval based on color images were complex. First, they represent a set with its own technique chose the color of

the image, and then select the color for the representation of two color histograms (one for video and one for the central part, by applying a heuristic), were used. All the above methods are used to restore the image of the segmented images.

Pass [8] to restore the image of the histogram were improved. In this method, the pixels based on their spatial dependence dependent and independent pixels are classified in two classes, and ultimately improved vector color histogram for a particular discrete, using the associated pair is determined. Two images with the same global histogram can have CCV completely different.

Huang et al [9] used a statistical method. They introduced a feature vector correlation table is included as a new paint color is even, so that the k -th input to the $\langle i, j \rangle$ probability of a pixel color of the pixel to color j, i with distance k shows. This technique wide variations in the appearance of the image obtained as a result of different situations point of view, is not very sensitive. The results showed that this method is more reliable than traditional methods such as color histograms global and local color histograms. Chytara [10] technique based on global color histogram signature bit string to display as their color characteristics. The image of a certain number of colors and color histogram global quantization to acquire images. Each element of color in global color histogram is divided into ranges of binary.

This method is efficient in terms of retrieval and use less storage volume is better than the global color histograms. Sterling et al. [11] technique based on color histogram named. And in it instead of a histogram, the histogram of the number of variables used and it was named -shaped color histogram, which is only based on the actual number of colors to display the image color is characteristic.

The results show that this method compared with the global color histogram and local color histogram retrieval accuracy of 90 percent.

3. The proposed approach

One of the reasons why the $L^*a^*b^*$ color space was selected is that it is a perceptually uniform color space which approximates the way that humans perceive color. However, the main reason is that $L^*a^*b^*$ was found to perform better than other color spaces in various retrieval tests performed in the laboratory for this exact purpose [12]. In $L^*a^*b^*$, L^* stands for luminance, a^* represents

relative greenness-redness and b^* represents relative blueness-yellowness. All colors and grey levels can be expressed throughout a combination of the three components. However, L^* does not contribute in providing any unique color but for shades of colors, white, black and grey. Thus, the L^* component receives a lower weight with respect to the other two components of the triplet. After a large number of tests performed on the regions of the $L^*a^*b^*$ color space, we reached to the conclusion that in order for the CBIR system to work effectively the a^* and b^* components should be subdivided into five regions representing green, greenish, the middle of the component, reddish and red for a^* , blue, bluish, the middle of the component, yellowish and yellow for b^* , whereas L^* should be subdivided into only three regions: dark dim and bright areas. The fuzzification of the input is accomplished by using triangularshaped built-in membership functions (MF) for the three input components (L^* , a^* , b^*) which represent the regions as shown in Fig. 1. The reason for which the middle MF exists both in a^* and b^* , is that in order to represent black, grey and white as seen in L^* , then a^* and b^* must be very close to the middle of their regions; this is a wellknown fact about the $L^*a^*b^*$ space [13].

The Mamdani type of fuzzy inference is used in which the fuzzy sets from the output MFs of each rule are combined through the aggregation operator which is set to max and the resulting fuzzy set is defuzzified to produce the output of the system. The implication factor which determines the process of shaping the fuzzy set in the output MFs based on the results of the input MFs is set to min and the OR and AND operators are set to max and min, respectively. The output of the system has only 10 equally divided MFs, as shown in Fig. 2. So, the final fuzzy histogram consists of only 10 bins approximately representing black, dark grey, red, brown, yellow, green, blue, cyan, magenta and white. The defuzzification phase is performed using the lom (largest of maximum) method along with the 10 trapezoidal MFs, thus producing 2500 clustered bin values ($50 \cdot 50$) which lead to the 10 bin final fuzzy histogram.

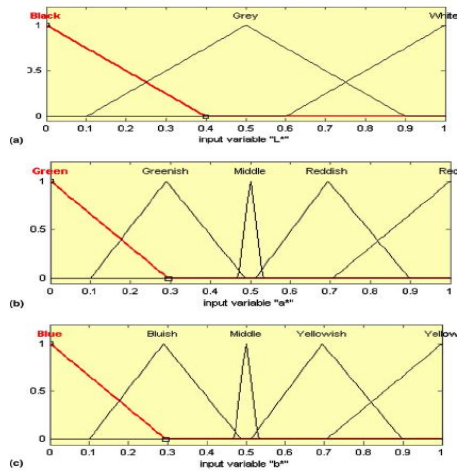


Fig1.Membership functions of L*, a* and b*

Fig2. Membership functions of the output of the fuzzy system
The proposed method of formula (1) to assess the similarity of our image retrieval.

$$H(H_Q, H_C) = \frac{\sum_{i=1}^N \min(H_Q(i), H_C(i))}{\min(\sum_{i=1}^N H_Q(i), \sum_{i=1}^N H_C(i))} \quad (1)$$

where H_Q and H_C are the query and challenging histograms, respectively, and N is the number of bins.

notice that $H_Q(i), H_C(i)$ Each one corresponding column histogram inquiry and images in the database that the two histograms are similar to each other is closer to a production number It should be noted that prior to compare all columns histograms are normalized between zero and a normal Batqsym the column to all columns is done.

In this paper we present a new method of zoning is the same method as mentioned in the second part uses fuzzy. And the output of each pixel according to the label does note that in addition to the 10 colors of both color expression we've considered as a new label. (Figure 3) we work output dataset is Corel thousand.



Fig3. output using Corel dataset thousand

4-simulation

To evaluate the effectiveness of the proposed system, the database Carroll standard is used. This database consists of 1000 images in 10 distinct semantic class. Figure 4. Corel thousand each sample database, which can be found below. This image recovery is 90 percent accurate.



Figure 4. Correll sample database

5. compare the proposed approach with previous work

In order to compare the proposed system was mentioned as a common base, the evaluation system recovery images. The average accuracy of image retrieval for 100 calls were investigated.

Table 1. Comparison of the proposed method and other systems

recommended system	Lin et al.[10]	Vadivel et al.[9]	Semantic class
79.35	68.3	78.25	Africa
54.70	54.0	44.25	Beach
69.75	56.2	59.10	Building
94.25	88.8	86.05	bus
99.15	99.3	98.70	Dinosaur
59.25	65.8	59.00	Elephant
94.85	89.1	85.35	Flower
92.10	80.3	74.95	Horse
45.55	52.2	36.55	Mountain
82.50	73.3	64.40	Food
77.15	72.70	68.66	Average

6. Conclusions and future perspectives

The proposed method is a method of image retrieval using fuzzy histogram explained. Although this method because the pixels are taking place, but the problem was that we could offer a new way of zoning. In the future, you can add this method with other features and by taking a regional approach to better results.

Table 2. filtering performance obtained for 5 procedure. It can be seen that the proposed method is superior to the other four. This is because of the transient nature of this approach to the changes in the image, is made less sensitive [9].

Image set	swain and ballard	classic L*a*b* histogram	Tico(HSI)	Tico (L*a*b*)	Liang RGB)	Liang(HSI)	Fuzzy linking (L*a*b*)
1	80%	75%	75%	55%	70%	90%	95%
2	70%	75%	70%	75%	50%	67%	85%
3	90%	90%	75%	90%	65%	80%	95%
Time(s)	511.8	226.95	303.5 2	367.5 3	221. 73	318.99	525.54

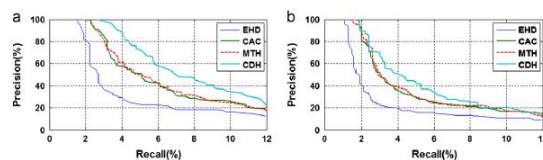


Fig6. average retrieval precision and recall results using the Corel datasets

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