A novel image recognition method using multiple component resemblance score synthesis and genetic algorithm

Inumula Veera Raghava Rao¹, Ali Baig Mohammad², D Satish Kumar³

¹² Department of ECE, ³ Department of Mathematics, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India – 522502,
E. Mail: raghva.inumula@kluniversity.in, mdabaig@kluniversity.in, satishkumar2999@kluniversity.in

Abstract- In the proposed title Image Recognition using multiple component and Genetic Algorithm, one attribute of the image narrates from one point of view only; it is one-sided description. Combined multiple component resemblance score is expected to enhance the systems recognizability. In the proposed method, the recognition results from color and texture component are inspected, and the method of combining of multiple component resemblance score is explained, for the motive of assigning the synthesis of weights of multiple component resemblance scores the genetic algorithm is applied. The methods that are also executed are image recognition based on color component, texture component and combining of color and texture component resemblance score with balanced weights. The proposed method outperforms the above-mentioned methods.

Keywords: CBIR; Synthesis; Multiple Component resemblance

1. Introduction
Because of expeditious growth of Network and Multimedia Technology, humankind ingress more amount of the interactive media data. As humans who require making brimful use of Interactive Media Data resources, the foremost question raised is for asking the Interactive Media Data of attentiveness. Query in Text can be register to Interactive Media Data recognition, even though it has immanent discrepancies. One side, Text notation of Interactive Media Data will utilize much of human power and resources and it is incapable, another side notation text is generally an individual interest of Interactive Media Data. It belongs to smack of individual contrast and people of state and of environment, and the analyzed result much more single sided. In support of it is clearly insufficient to analyze content more Interactive Media Data with a tiny quantity of text. Content Based Image Recognition (CBIR) method introduced in 1990, it concludes the above queries well, and it consider low level Components like Color, Texture and Shape to narrate content, and shatter the limitation of ancient Query in Text method. CBIR system developed based on individual component, single image Component narrates the contented of image from anangle. It could authorize for few images, and difficult to narrates for other images. However, narrating an image with single component is insufficient. Compete an image Expected to achieve with more angles strong results. If information is from multiple sources, then fusing method for multiple components is adverse. Combining content can be conveyed in level of component, combining information at component level has tremendous advantages at some of extent, because multiple components produce the multiple attributes of the image, if these components are unsegregated obviously then the results would be both retain the differentiation of contents of multiple component and avoid the intervention results from the differentiation of multiple components. The proposed method redeemed region matching using a component synthesis based on index of color and location. Shape in the MPEG – 7 frame works. Prominent regions in the image are induced using combined color, shape and location components, the proposed CBIR method based on effective combination of multiple resolutions color and texture components. Auto Corel grams of the color are HUE and Saturation parameters of an image in HSV color space considered as color component. BDIP and BVLC moments of texture value adopted as component. The texture and color components are extracted in the domain of multi resolution wavelet which defined as other new image component treated as texture component and color correlogram. Using the texture spectrum
Algorithm, the component of the texture is attained, and it is synthesis with the vector of color component and then intended the color – texture component spatial correlation vector acquired texture representation with the help of local Fourier Transform. To differentiate the differential latitudes of simultaneous occurrence of image pixels in color space eight characteristics are attained. The maps with first and second moments are representing the natural distribution of Color image pixels in a resulted 48-dimensional component vector. The Color – Texture Moments name attained by the novel low-level Component (CTM). In the Color moments extension, certain to this CTM helps in eight templates of orthogonally.

The proposed title of an Image Recognition Using Multi Component and Genetic Algorithm using Resemblance Score Synthesis explained image recognition results depend on color components and texture components. In the proposed method, a procedure to multi component resemblance score synthesis was adopted, after that with the help of genetic algorithm automatically weights have been assigned to the resemblance score and a fine image recognition is obtained. In this paper remaining matters organized as selection explains the extraction method for color component and texture component. Multi Component resemblance score Synthesis introduced strategically by Selection. The technique of allocating weights of multi component resemblance score done by Genetic Algorithm.

2. Image component extraction
Color, Texture and Shape are the main content components of an image. These components describe the image from different angles. To obtain the more information multi components will be consider on the image part. This paper focused on multi component resemblance score synthesis, for better understanding this title explained method of fusing two component resemblance score only, without loss universality, color and texture are used Components, the used extraction method for color and texture are explained with the following part.

2.1 Color component extraction
A uniform color space is formed by HSV color model by using linear gauge. The Euclidean and perceived distance of Color is proportional to each other in terms of HSV color model pixels, which conforms feelings of eyes about color, for Resemblance comparison it is highly suitable. In this proposed paper the HSV color space treated as color histogram for describing the color Component of the image content, foe color histogram calculation quantifies the HSV color space. Color is the three parameters of HSV space in the view of human cognitive and it is non-uniformly quantified, Hue is available in 16 bins and its range is [0, 15], saturation available in 4 bins and its range is [0, 3], Value is available in 4 bins its range is [0, 3]. Hue and Saturation are the main components for Color Component and then Value have the priority, these values are quantized as given in equation (1).

\[ C = 16H + 4S + V \]  

(1)

Where \( C \) is an integer having value between 0 and 255. Thus, by the histogram of an image in the color space we get color component.

2.2 Texture component extraction
In this proposed work, considered co-occurrence matrix as the texture component about image because of its statistical properties, first and foremost a gray scale image obtained from color image and then co-occurrence matrix of the image is gained. By means of five statistical properties as contrast, energy, entropy, correlation, local stationary are calculated which describing the image content in 4 directions, finally we may get 20 texture components, at last we calculate the Mean and Variance as statistical properties in all five kinds, this will be treated as texture component denoted as \( T = \{ \mu_i; \sigma_i \} \), where \( i = 1, 2, 3, 4, 5 \).

3. Multi-Component resemblance scores synthesis
From the concrete definitions of altered appearance are different, and amount ranges are differential, affinity array of altered appearance can’t be correlated. So, afore multi-
component affinity accounts are fashioned, they would be normalizing. Affinity array must be normalized by the afterward methods. Let \( P \) be the concerned image. by artful distance metrics amid the concern angle and images in databases sources, affinity account set \( \{ P_i \} \) would be getting, area \( i = 1, L, N \), \( N \) is the number of images in database sources. Thus, resemblance score normalization can be treated as given in equation (2)

\[
P_{NI} = \frac{p_i - \min(p_i)}{\max(p_i) - \min(p_i)}
\]

The multi-component resemblance scores obtained are given by equation (3)

\[
P_{FI} = \frac{P_{nci}}{w_c + P_{nNi} - w_t}
\]

The parameters in the above equation are as follows: \( P_{FI} \) is the alloyed affinity score. \( P_{nci} \) is the normed affinity account. \( P_{nNi} \) is the normed arrangement affinity score. \( w_c \) and \( w_t \) are the weights of affinity score and arrangement affinity score respectively.

## 4. Genetic Algorithm

The assignment of weights of a Resemblance score is the major problem while performing the act of Resemblance score Synthesis. The performance of the image recognition system is affected by this major problem. To assign the weights of color component and texture component resemblance score reasonably, we have considered this as an optimization problem. That is to find the optimum in weight value space. The genetic algorithm is used to solve this problem for assigning optimum weight values in the proposed approach.

### 4.1 Determination of Solution Space

Assigning the weights of texture component resemblance score between I and \( W_C \) is the main purpose of synthesizing resemblance scores. The positive integer \( I \) is the color component resemblance score and texture component resemblance score to gain a better image recognition performance. Choosing the value of weight of color component resemblance score \( W_C \) between 0 and \( I \) results in the better performance of the image recognition process, where \( I \) is a positive integer. The proper choice of this weight improves the accuracy of the solution. More accurate solution results with the higher the value of ‘I’. However, this process of obtaining better accuracy takes more time. To make use of genetic algorithm, the weights that are chosen to be assigned must be encoded. Therefore, the chosen weight is converted into binary form. The value of \( I \) is taken to be equal to \( 2L \), where \( L \) is the encryption length of the solution.

### 4.2 Initializing of population

The solution of any genetic algorithm is mostly influenced by the initial values of individuals and the total number of individuals in the population. In the proposed approach, the number of individuals in population \( N \) is taken as square root of \( I \). The value of \( N \) is chosen as a higher value to obtain the optimal solution in sooner time. The arrangement space is segregated into \( N \) number of uniform subspaces and the focuses of those subspaces are taken as the beginning estimations of the population.

### 4.3 Obtaining the Strength Function

The evaluation procedure of strength of individuals is explained in this section. We can find \( N \) number of clusters of recognition results from the weights that are obtained. The top \( M \) number of images are accepted from every cluster. \( MN \) number of total number of images are thus formed. The strength of every individual in the cluster is calculated after finding the frequency of existence of images of every cluster in all images. The operations that are carried out for the determination of strength function is as follows Let \( N_i \) denote if \( k \)th image \( A_k \) of \( i \)th cluster \( G_i \) is in \( j \)th cluster \( G_j \) or not. That can be formulated as given in equation (4)
\[ N_{ijk} = \begin{cases} 1 & A_{ik} \in G_j \\ 0 & A_{ik} \notin G_j \end{cases} \] (4)

Then the frequency of existence of kth image \( A_{ik} \) of \( i \)th cluster \( G_i \) in all MN images is given by equation (5),
\[ N_{ik} = \sum_{j=0}^{n} N_{ijk} \] (5)

The frequency of existence of all images of \( i \)th cluster \( G_i \) in all MN images is given by equation (6)
\[ N_{i} = \sum_{k=1}^{m} N_{ik} \] (6)

The normed version of it is given by equation (7)
\[ P_{i} = \frac{N_{i}}{\sum_{i=0}^{n} N_{i}} \] (7)

The bigger value of \( P_{i} \) shows that the entries in \( i \)th cluster \( G_i \) possesses a high proportion in all MN entries.

4.4 Obtaining Optimal Solution
The genetic algorithm is used in the proposed method for an optimum solution of this problem. If the number of iterations is three then the iteration process ends. This is considered as ending the iteration process. The optimal solution is taken as maximum \( P^* \) becomes equal to \( \max P_i \) after the iteration process is ended. As per the best solution obtained, the weights \( W_{C}^* \) and \( W_{T}^* \) are chosen as the final recognition results.

5. Inference of experimental results
The images of Corel library are acclimated as analysis images to test the performance of the proposed method. It has many categories, with each one containing about 60 analysis images. The total number of images is about one thousand. Some of these test images are flower, waterfowl, automobile, beach, mountain, lion, bridge, butterfly, plane, building and tiger, etc. The texture and color components of every test image stored in the database are obtained for building the component database of images.

The two key parameters used to test the performance of the proposed algorithm are recall rate and precision rate. The main methods used for image recognition process are two-component resemblance score synthesis method with same weights, texture component extraction method and color component extraction method. The relation between precision rate and recall rate for these methods based on multi-component resemblance synthesis using geneticalgorithm is better than other methods. The multi-component resemblance score synthesis method with equal weights was used in the proposed algorithm. The simulation results indicate that the color component-based method outperforms texture component-based method. The below Figure 1 shows the effects of multi-component resemblance synthesis results obtained during image recognition process. The image recognition method based on multi-component resemblance score synthesis shows better performance because the method based on texture component exhibits better performance synthesis.
6. Conclusion
This paper focuses on development of an efficient image recognition method based on multi-component resemblance score synthesis. In the proposed method, different resemblance score lists are obtained for an input query image. The resemblance scores obtained from the previous step are synthesized using genetic algorithm and better image recognition results are obtained.
7. Future scope
In future we can work towards component selection and introduce other distance measures to the user to improve the results. We can add a few more components using shape-based techniques and segmentation-based techniques to the present work, which improves the retrieving accuracy and speed of operation on the database images.

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