A New Pattern Recognition Approach Based on Color Structure and Image Euclidean Distances

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Abstract

In this paper, we proposed an approach based on color structure and Euclidean distance method for pattern recognition. Pattern recognition is the task of deciding what is the structure of the image and check that it is similar to database images.

In color structure we examine whole image pixel values and will showing the color clusters then after, we find a new distance for images called IMage Euclidean Distance (IMED) that based on Isomap method.

After calculate the IMage Euclidean Distance of query image and database image then we can achieve the final result.

Keywords: *MPEG-7, Image Processing, Object Analysis, Color Structure.*

I. INTRODUCTION

In statistical pattern recognition one studies techniques for the generalisation of decision rules to be used for the recognition of patterns in experimental data sets. This area of research has a strong computational character, demanding a flexible use of numerical programs for studying the data as well as for evaluating the data analysis techniques themselves. As still new techniques are being proposed in the literature a programming platform is needed that enables a fast and flexible implementation. Pattern recognition [2,5,7] is studied in almost all areas of applied science. Thereby the use of a widely available numerical toolset like Matlab may be profitable for both, the use of existing techniques, as well as for the study of new algorithms. Moreover, because of its general nature in comparison with more specialised statistical environments, it offers an easy integration with the preprocessing of data of any nature. This may certainly be facilitated by the large set of toolboxes available in Matlab.

The more than 100 routines offered by tools in its present state represent a basic set covering largely the area of statistical pattern recognition. In order to make the evaluation and comparison of algorithms more easy a set of data generation routines is included, as well as a small set of real world datasets. Of course, many methods and proposals are not yet implemented.

Anybody who likes to contribute is cordially invited to do so. The very important field of neural networks has been skipped partially as Matlab already includes a very good toolbox in that area. At the moment just some basic routines based on that toolbox are included in order to facilitate a comparison with traditional techniques.

II. COLOR DESCRIPTOR

The previous MPEG standards [6,9] was called MPEG-1 and MPEG-2 concentrated as a image compression, while MPEG-4 moved to a higher level of abstraction in coding objects and using content-specific techniques for coding content. The next version of MPEG is MPEG-7 [5] has moved to an even higher level of abstraction of multimedia data. Color is the main visual feature, along with texture, shape and motion, towards content localization. The colors in an image should be presented relating to its perception, coherency and spatial distribution.

MPEG-7 defines seven color descriptors are following:

• Color Space
• Color Quantization

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• Dominant Color
• Color Structure
• Scalable Color
• Color Layout
• Group of Frames/Group of Pictures Color
  • *Color Structure:*

The Color Structure Descriptor is also based on color histograms [7,8], but aims to identifying structure of color distributions. The color structure descriptor is adopting the Hue-Min-Max-Difference (HMMD) color space. It is very good for find matching of between two color images that have similar or dis-similar pattern [1,4,6].

III.   EUCLIDEAN DISTANCE

Different from the traditional Euclidean distance, the IMED considers the spatial relationships of pixels. It characterizes by robust to small perturbation. Given an $M \times N$ image, it is actually a point in an MN-dimensional image space with the base point then calculate distance of the respective points.

The Euclidean distance of any two images like *x*, *y* is written by

$$d_E(x,y) = \sum_{I,j=1}^{MN} g_{ij}(x_i - y_i)(x_j - y_j) = (x-y)^T G (x-y)$$

if euclidean distance is zero then both images are identically equal otherwise both images are different.

IV.   PROCEDURE FOR PATTERN RECOGNITION OF THE IMAGE

In this work first we using color structure method for determine the pattern of the image and then find the Euclidean distance and histogram for matching with images database. Figure 1 shows the block diagram of my work and show the combination of two concepts of color structure and Euclidean distance.
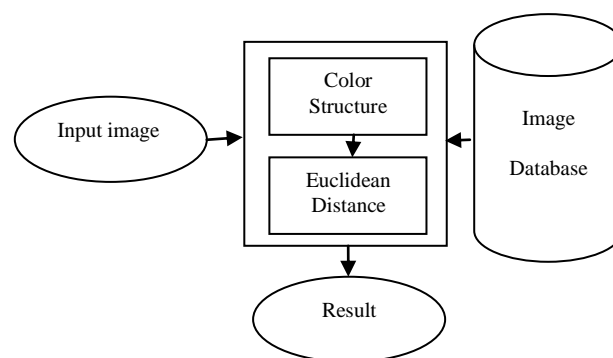

Fig. 1

I have taken a query image and finding the pattern for matching with database.

Input: - Take a query images.

Output: - Find image pattern based on color and also calculate euclidean distance for matching.

Process:-
    Q_{image} = Query_image
      BG_{image} = Structure image

    $[r, c]$ = Size (Q_{image})

  For 1: r
    For 1: c

      C_value   =   Impixel (Query_image,r,c)

      If (C_value_R > C_value_G) &&
        (C_value_R > C_value_B)
        BR=Create(BR_{image})
     End

      If (C_value_G > C_value_R) &&
        (C_value_G > C_value_B)
        BG=Create(BG_{image})
    End

      If (C_value_B > C_value_R) &&
        (C_value_B > C_value_G)
        BB=Create(BB_{image})
    End

     Im=Mearge(BR,BG,BB)
    End
    End

Show (im)

Im2= Create binary image (Im)
Im3 = BW_connect component (im2)
Show(Number of clusters)
Show(Maximum size of cluster)

Image1	65	534
Image2	248	863
Image3	165	5280
Image4	309	5065
Image5	115	1342
Image6	51	1127
Image7	73	6905

V.   RESULT AND ANALYSIS

In the evaluation of image retrieval systems, it also has determine pattern recognition of any color image. In this algorithm we are regarded as the two most important aspects and therefore both of them should be considered at the same time. In order to verify the recognition effect of algorithm proposed in this paper, a great number of experiments on an image database are performed. The database holds 25 color images which is composed of different-2 color and also have many flower, tree, architecture of earth and lands. We are showing a table that show number of clusters and maximum size of cluster.

Some images are following that come from database.

Fig. 2

Now we are showing the result of color structure of some query images is given below in table.

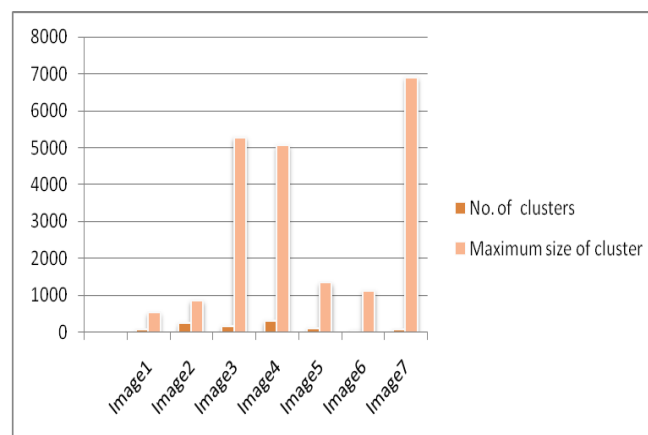| Images	No. of clusters	Maximum size of cluster

Fig. 3

VI.   CONCLUSION AND FUTURE WORK

In our work, we propose an approach for matching the pattern of image based on color structure and Euclidean distance method. In color descriptor we find out all possible color clusters. This step is called pattern identification of the image and then we use Euclidean distance for pattern matching from pre-defined image database by some key point like number of clusters, maximum size of cluster and Euclidean distance of the image.

It depends strongly on the quality and accuracy of the pattern classification and matching which allow deciding if an image is belong to database or not.

In future we add some concept like DCT and MPEG -7 for better pattern recognition and matching with database of 10 lac images or more.

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