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VISUAL CONTENT SMILARITY IDENTIFICATION USING COMPOSITE SWARM INTELLIGENCE TEHNIQUE

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***Abstract*—Text detection and recognition is a hot topic for researchers in the field of image processing, pattern recognition and multimedia. It draws attention of Content based Image Retrieval (CBIR) community in order to fill the semantic gap between low level and high level features. Several methods have been developed for text detection and extraction that achieve reasonable accuracy for natural scene text (camera images) as well as multi-oriented text. However, it is noted that most of the methods use classifier and large number of training samples to improve the text detection accuracy. To tackle the multi-orientation problem, the methods use connected component analysis. Since the images are high contrast images, the connected component analysis based features with classifier training work well for achieving better accuracy. However, the same methods cannot be used directly for text detection in video because of low contrast and complex background which causes disconnections, loss of shapes etc. In this case, deciding classifier and geometrical features of the components is not that easy. To overcome from this problem our proposed research uses Gradiant Vector Flow and Grouping based Method for Arbitrarily Oriented Scene text Detection method. The GVF of edge pixels in the Sobel edge map of the input frame is explored to identify the dominant edge pixels which represent text components. The method extracts edge components corresponding to dominant pixels in the Sobel edge map, which we call Text Candidates (TC) of the text lines. Experimental results on different datasets including arbitrarily oriented text data, non-horizontal and horizontal text data, Hua's data and ICDAR-03 data (Camera images) show that the proposed method outperforms existing methods in terms of recall, precision and F-measure.**

I. INTRODUCTION

Image Processing has grown in to a subject in its own rights with application spanning all areas of Human endeavour. The analysis of a picture using techniques that can identify shapes, colours and texture that cannot be perceived by the human eye. Image Processing is used to solve identification problems, such as in forensic medicine or in creating weather maps from satellite pictures. It deals with images in bitmapped graphics format that have been scanned in or captured with digital cameras. It is based on the computational challenges of making code that deals with image files.

A. Content Based Identification

In earlier days two important technique such as text based and content based image retrieval are carried out. Text based technique found to be very difficult to annotate the image manually. Image retrieval relies heavily based on the related file-names, categories, annotated keywords, and other descriptions done manually.This kind of textual-based image retrieval always suffers from two problems: high-priced manual annotation and inappropriate automated annotation. High-priced manual annotation cost is prohibitive in coping with a large amount of data set. On other hand inappropriate automated annotation yields the distorted results for semantic image retrieval. Textual descriptors are used for annotation but it suffers to satisfy the perspective of the user. The difference between representation of image and information need of the user is more in this technique. To overpass these drawbacks the retrieval of image is carried out based on the image content such as colour, texture, edge, etc.. which is so called Content Based Image retrieval(CBIR)

CBIR have been categorised in to four directions such as global image properties, region level features, relevance feedback and semantic based. In order to get the better result user interaction is very much essential to this technique.

The increase in computing power and electronic storage capacity has lead to an exponential increase in the amount of digital content available to users in the form of images and video, which form the bases of much entertainment, educational and commercial applications. Consequently, the search for the relevant information in the large space of image and video databases has become more challenging to obtain accurate retrieval results is still an unsolved problem and an active research area.

The CBIR system uses features such as color, texture, edge of an object for retrieval of images.

B. Problem of Image Retrieval

In user oriented CBIR system, color feature is extracted using HSV method which requires more retrieval time. To improve on this problem YUV method is used which reduces the retrieval time compared to RGB and HSV. YUV method uses mean and standard deviation values to extract Y component, U component and V component. Interactive Genetic Algorithm uses genetic operators such as mutation and crossover which requires more computational cost for retrieving the images. To overpass this problem Particle Swarm Optimization technique is used.

II. PROPOSED METHODOLOGY

The proposed system applies a User oriented CBIR approach to image retrieval which is performed by extracting the feature from the image as well as the database. Low level features such as color, texture, edge, etc that are extracted both from the query image and the database. In order to improve the retrieval performance and accuracy, this system uses YUV (luminance(y), blue chrominance (u),red chrominance(v)) method for color feature extraction. Texture feature is extracted using Grey Level Co-occurrence Matrix method and edge feature is extracted using Edge Histogram Descriptor method. After extracting these features similarity is computed between the query image and the images in the database using Euclidean distance and images are retrieved which are optimized further using composite Swarm Optimization.

A. Feature Extraction:

The proposed system consists of three main phases such as feature extraction, similarity computation, optimization.

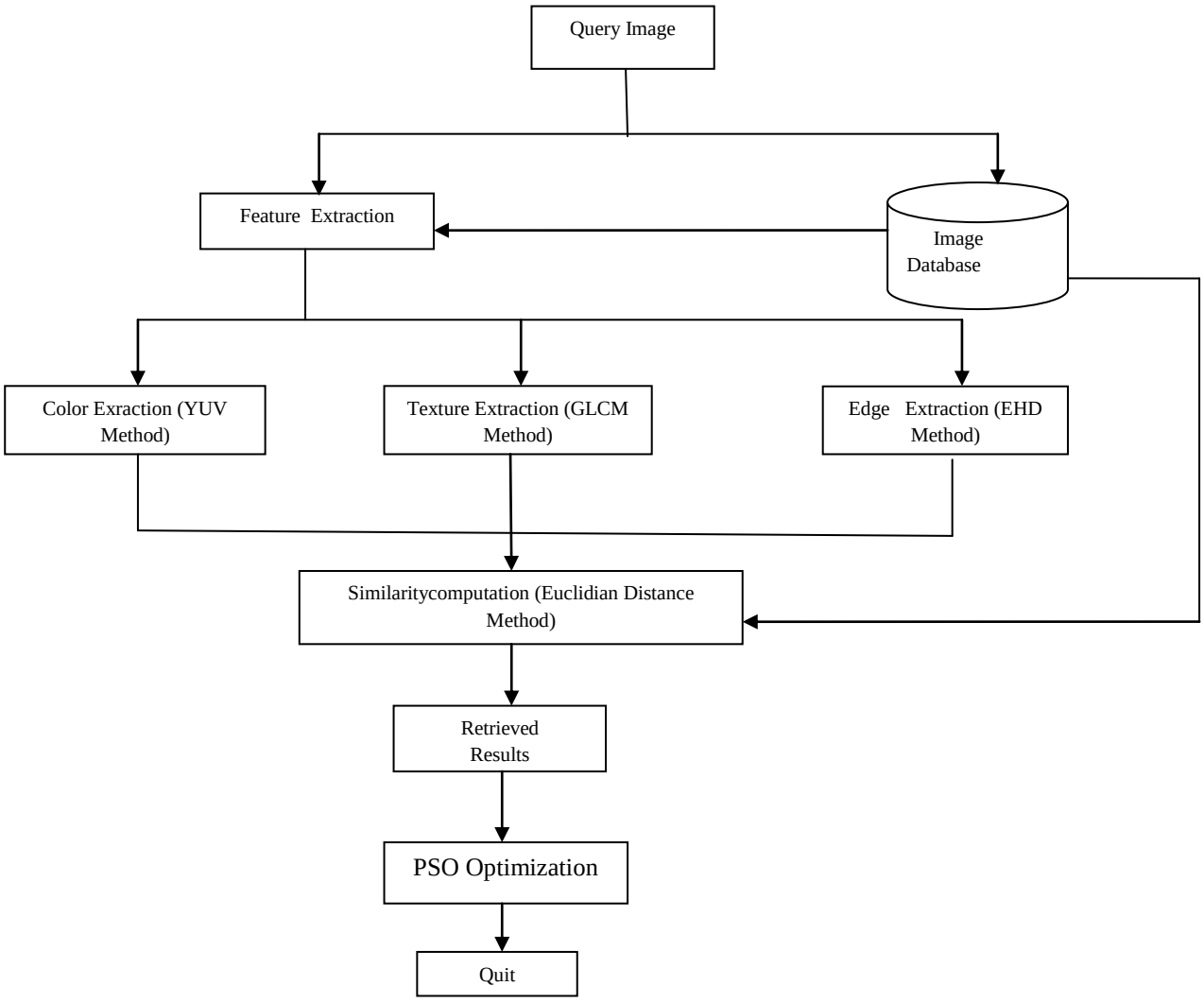

Figure 1: Block Diagram of Proposed Methodology

A.Color Feature Extraction

YUV color space is used to extract the color feature from the image as well as in the database. After extraction mean and standard deviation is also calculated for YUV image.

Mean of pixel color states the principal color of the image. The formula is given by

$$\bar{X} = \frac{\sum X}{N}$$

Where $\sum X$ is sum of all data values

N is the number of data items

Standard deviation of pixel colors is used to depict the variation of pixel colors.

$$S = \sqrt{\frac{\sum(X1-X2)^2}{n-1}}$$

Color image is converted into RGB and then into YUV For each row and column constant matrix value is multiplied with RGB matrix values to get YUV components of an image. The formula is given by

$$\begin{pmatrix} Y \\ U \\ V \end{pmatrix} = \begin{pmatrix} 0.30 & 0.59 & 0.11 \\ -0.15 & -0.29 & -0.44 \\ 0.62 & -0.51 & 0.10 \end{pmatrix} \begin{pmatrix} R \\ G \\ B \end{pmatrix}$$

B. Texture Feature Extraction

Grey Level Co-occurrence matrix method is used to extract the texture feature from an image. The texture feature such as energy which is used to compute the energy of grey scale images, entropy which is used to capture the textural information in an image, auto-correlation, and homogeneity are extracted from the image.

GLCM formula is given as follows

$$P(i,j;d,\theta) = \#\{(x1,y1)(x@,y2)|g(x1,y1)=i,g(x2,y2)=j, |(x1,y1)-(x2,y2)|=d,\angle((x1,y2)(x2,y2))=\theta\}$$

Where # - the number of occurrences

i and j – intensity levels of 1st and 2nd pixel at positions (x1,y1) and (x2,y2)

C. Edge Feature Extraction

This system adopt the edge histogram descriptor to describe edge distribution with a histogram based on local edge distribution in an image.It consist of following steps

1) An image is divided into 4 × 4 sub images

2) Each sub image is further divided into non overlapping image blocks with a small size.

3) The edges in each image block are classified into five types such as vertical, horizontal, 45◦ diagonal, 135◦ diagonal and non-directional edges.

4) After examining all the subimage, the five-bin values are normalized and quantized for the binary representation.

These steps constitute the EHD.

D. Similarity Computation

In this system, Euclidean Distance method is used which computes the similarity between the query image and database images according to the aforementioned low level visual features. This method retrieves and presents a sequence of images ranked in decreasing order of similarity. As a result this method help the user to find relevant images by getting top ranked images first.The Euclidean distance formula is given by

$$d(p,q) = \sqrt{\sum_{i=1}^{n}(q_i - p_i)^2}$$

where p and q are length of two pixel.

E. Optimization

The Artificial Bee Colony Algorithm (ABC) is a heuristic optimization method based on the foraging behavior of honey bees. It has been confirmed that this algorithm has good ability to search for the global optimum, but it suffers due to the fact that the global best solution is not used in direct manner, but the ABC maintains at each iteration, unlike the particle swarm optimization (PSO) that can directly use the global best solution at each iteration. So the composite of artificial bee colony Algorithm (ABC) and PSO resolved the above mentioned problem problem.

The algorithm for the composite method is given by

Step 1:Initialize PSO and ABC

Step 2:Determine the gbest of PSO and best of ABC

Step 3: Apply the recombination Procedure for gbest and best

Step 4: Update the velocity of the particle and employed bee phase of ABC

Step 5: Update the position of the particle and onlooker bee phase of ABC

Step 6: Determine the personal best of the particle and scout bee phase of ABC

Step 7: Determine the gbest of the population

Step 8: Report the best

The numbers of employed bees and onlookers are set equally. Employed bees are for searching available food sources and gathering information. They also send their food information to onlookers. Onlookers then select good food source found by employed bees In the same time, the employed bee becomes a scout and start to search for another fresh food source. In ABC

algorithm, each food source represents a feasible solution of the optimization problem

III. RESULT

To show the effectiveness of the proposed system, some experiments will be reported. Selecting a suitable image database is a critical and important step in designing an image retrieval system. At the present time, there is not a standard image database for this purpose. Also, there is no agreement on the type and the number of images in the database. Since most image retrieval systems are intended for general databases, it is reasonable to include various semantic groups of images in the database. The database is partitioned into ten categories, including and village, beach, buses, dinosaurs, elephants, flowers, and, food, etc., and each category contains 20 images. Partitioning of the database into semantic categories is determined by the creators and reflects the human perception of image similarity.

Figure 2: Image Database

Fig 3:Query image

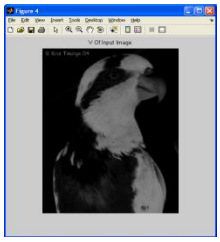

Fig 4:color extraction

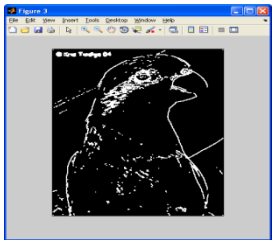

Fig 5:Edge Extraction

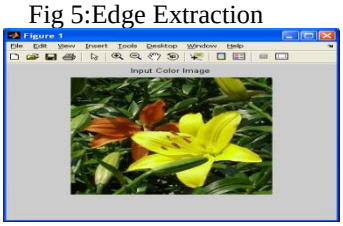

Fig 6: query image

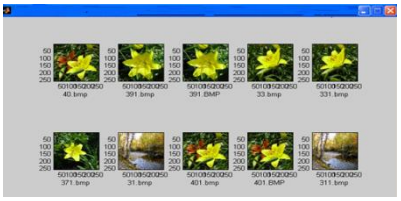

Fig 7: retrieved result using composite method

Query Image	Relevant images	Relevant images in database	Precision	Recall
TIGER	3	4	60%	75%
BIRD	7	10	70%	76%
FLOWER	8	10	80%	72%
ROAD	7	11	70%	74%

Table 1:Precision and Recall values for composite method

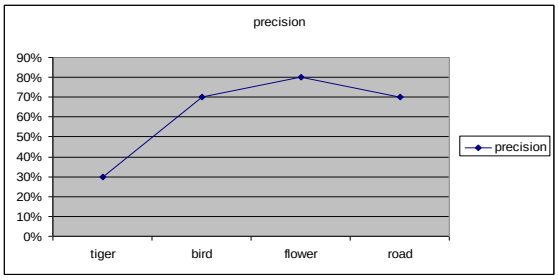

Fig 8: Retrieval average Precision

Fig 8: Retrieval average Recall

IV. *CONCLUSION*

Thus in proposed method color feature is extracted using YUV method. Texture feature is extracted using Grey level co-occurrence method.

These features are extracted both from the query image and the image from the database. Edge feature is extracted using Edge Histogram Method. Similarity is computed between the query image and the images from the database. Results are optimized using composite swarm intelligence technique which provides the better result compared to other optimization algorithms.

V. *FUTURE ENHANCEMENT*

The future enhancement include .Image based video retrieval can be implemented for efficient retrieval of videos.

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