RESEARCH ARTICLE

A THREE DIMENSIONAL MODAL TO PERFORM FACE AREA (ROI) IDENTIFICATION

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Abstract: To perform the accurate object recognition, it is required to identify the object ROI over the image. The accurate object identification over the image improves the accuracy and efficiency of recognition process and associated other application. Because of this, object identification is considered as the primary step of recognition process. The complexity of object recognition increases, when the region is having multiple objects with rigid boundaries. In this present work, facial object recognition is defined for multi-face images. The work has presented a hybrid model the combined the different kind of mathematical functions and operators to identify the object ROI and its boundarization so that object separation will be identified. The analysis of the object is defined here in terms of number of object images identified over the multi-face images. The obtained results show the significant improvement in existing approaches.

Keywords: Facial Object Identification, Multi Face Images, Mathematical Operators, ROI

I.   INTRODUCTION

Image segmentation is one of the primary processes for any image processing application used to acquire the information from the images. This information can be in terms of feature extraction, object extract or some hidden information associated with the image itself. There is different kind of information associated with the object images depending on the application. Some of such information is associated internally with the object or some are defined the object feature explicitly. Some information is hidden itself in object features. To extract these all kind of information, the image segmentation is used as the primary step for image processing. Image segmentation is used as an individual application as well as the primary stage to many of image processing application. The significance of image segmentation vary depending on the application type, aspect type and the object type. To extract this kind of information from Feature, the feature extraction is applied over the Feature[1][2][3]. There are different methods to retrieve the information from Feature under different aspects, applications and Feature types. Some of such information representation or extraction approaches includes the segmentation, Object Identification etc. The information retrieval process from Feature is shown in figure 1
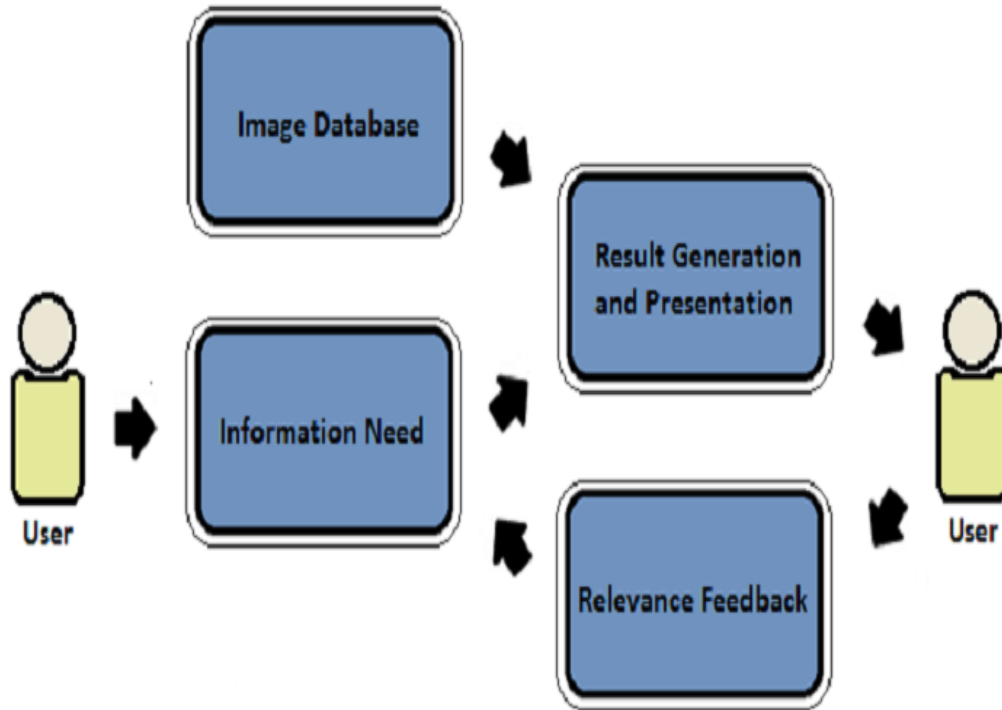

Figure 1 : Information Retrieval Process

Object segmentation is actually to apply some tag or annotation to the object feature based on the feature level analysis. The identification process of object over the image is performed based on the arbitrary features of the object. This kind of object identification can be domain specific. In this present work, the facial objects are defined as the information object. This kind of object identification is effective for biometric recognition and identification process, identification of human activity, hand symbol recognition, body gesture recognition etc[4][5][6]. There are number of approaches to perform the recognition or the segmentation. The basic model of object recognition and identification process is shown in figure 2.
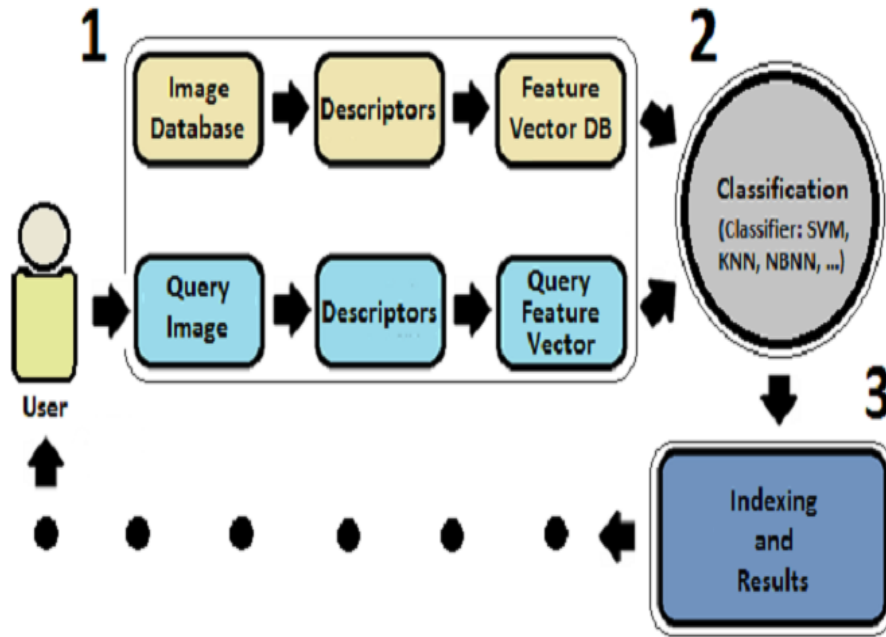
Figure 2 : Object Recognition Model

As shown in the figure, the recognition model is having the dataset of some defined feature object. These are the actual recognized objects defined along with descriptor. This image dataset is trained at the earlier stage and these descriptor are extracted and the feature vector is generated[11][12][13]. To generate the feature vector, the segmentation approach is applied over the images. Once the feature is extracted, the next work is to use this feature dataset as the primary dataset on which the recognition process will be applied. Now the user will accept some raw image as input that will used as the query image to the system. The same descriptor analysis and the query feature analysis is defined over the image. The feature obtained from this image is then compared with dataset image features. To perform this recognition there are number of supervised and unsupervised recognition approaches[8][9]. The object to which the maximum feature matched is identified as the main object.

In this paper, a primary stage of biometric recognition system is defined called facial object detection and identification. This facial object segmentation is here defined using hybrid model. In this section, the basic introduction to the image segmentation and the feature extraction is defined. The section also described the model for object identification and recognition in generic way. In section II, the work defined by the earlier researchers is discussed. In section III, the proposed research methodology is presented. In section IV, the results obtained from the work are discussed. In section V, the conclusion obtained from the work is presented.

II.   RELATED WORK

Lot of work is already defined by different researchers in the area of image feature identification and object extraction over the images. There are number of algorithmic approaches applied by the earlier researchers for image segmentation and video segmentation for object detection and recognition. The presented work is focused on the same. In this section, the work defined by the earlier researchers in same area is discussed. Johannes Schels [1] has defined a new approach to perform the view point based analysis over the images so that the multiple objects will be identified over the image. Author defined the individual object detection so that the object and object parts will be extracted from the image. Author defined the view point based analysis so that the effective object identification and object segmentation will be performed. Author defined the characteristic mapping to perform effective recognition of object image. Same kind of work based on the characteristic analysis on object images is defined by KeGAo[2]. Author defined the affline analysis on object images under sample analysis and expansion. Author defined the work to analyze the object characteristics and

its mining so that the object detection and recognition will be effective. There are number of defined stability model so that the accurate object detection and recognition will be performed.

Author[3] defined a feature based analysis to identify the object area over the multiple object images. Author defined the multi class object detection. The feature analysis is here performed under the complex images and the segmentation based approach is applied to identify the image areas. The work is defined to cover the local patches and to extract the image feature under these patches so that the effective object recognition will be performed. Author defined the object analysis based approach under object area identification so that the object recognition and generation will be done effectively. Author defined the patch image analysis under the local feature object identification with accurate boundary analysis. Author defined the work to analyze and identify the object area over the images. Another work on object detection and object feature extraction was proposed by Yuli Gao[4]. Author has defined a feature selection based approach over the multi object images. Author defined a frame work to separate different kind of object over different classes and to perform the object observation and image observation over the object images. Author defined the hybrid system to perform the feature level analysis and diversity analysis over the image.

A work on object detection and feature analysis on video frames is defined by the author[5]. Author defined a statistical analysis on sequence frames to identify the object position based on variation analysis over the video frames. Author defined the pyramid based matching so that the object will be identified over the plane. A work on color images and video analysis based on thresholding approach was defined by Mehndi Mani[6]. Author defined the color level analysis over the images and performs the redistribution of algorithm to improve the detection robustness over the images. Author defined the work on real time videos so that the adaptive image analysis and recognition will be performed over the images. Author defined the work to improve the robustness under different lighting condition and for different data values. Author presented the adaptive thresholding in significant environment. Author[7] defined the vehicle object analysis over the traffic images on road. Author defined the dimension reduction approach to identify the information analysis over the images and to recognize the object so that the effective object recognition over the images will be done. Author defined a learning classifier approach for effective object recognition and tracking so that the recognition will be improved. Author defined the object detection and tracking approach for videos so that the recognition rate over the object images will be improved. Author also defined the approaches for blob creation and tracking.

A work on the object detection over the video sequence is suggested by Zhenke Yang. Author defined the work on video sequence analysis and performed the separation of background and foreground to perform effective object recognition over the images. Author defined the local feature analysis approach for object recognition for real time videos. Author defined a local feature analysis approach for object detection and recognition so that the error rate in object tracking will be minimum. Shashak Prasad[9] process the segmentation approach on real time videos. Author defined the local feature analysis approach for object detection and recognition. Author defined a salient point based approach for object recognition and identification over the scene. Author[10] defined the analysis over the objects so that the effective recognition will be obtained. Chengli Xie has presented a template based matching approach for images as well as video frame. This approach is based on the video frame instance analysis under the frame variation analysis to perform effective object recognition.

III.   RESARCH METHODOLOGY

In this present work, a hybrid model is defined to extract the facial area over the face image. In this work, Three Dimensional Mathematical Model is presented to perform the facial area detection. The dimensions of this mathematical model are convolutional filters, morphological filters and watershed algorithm. This mathematical model is divided in three main stages. These stages include facial structure identification, ROI identification and the facial area detection. At the earlier stage of this presented model, preprocessing is defined. The presented model is shown in figure 3.
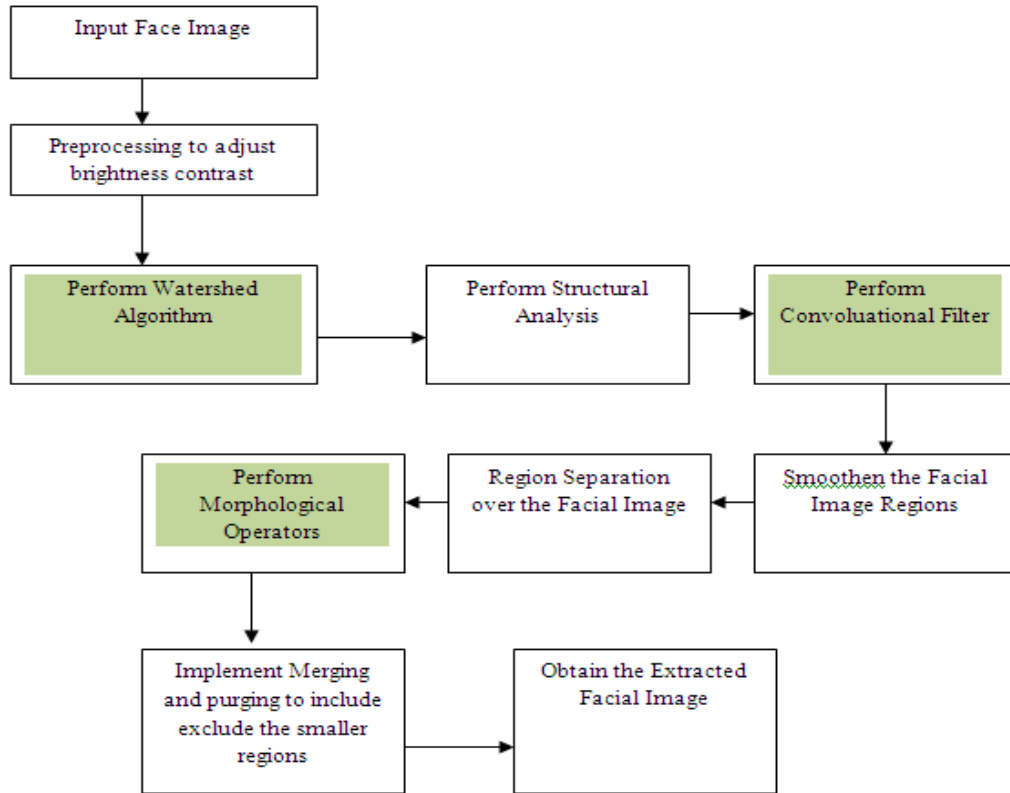
Figure 3 : Proposed Model

The preprocessing is about to enhance the image features in terms of brightness and contrast. Once the normalized image is obtained, the next work is to identify the image structure analysis. To perform the extraction of facial structure and to enhance the facial features watershed algorithm will be used. During this stage, the facial boundaries will be identified and the facial structure will be obtained. The stage is about to perform the convolutional filter to smoothen the image area under the color based analysis. The filter will also be used for the region identification and extraction over the facial image. After this stage, all the regions over the image will be separated clearly. This stage will perform the ROI detection and the broader facial area will be identified. At the final stage, morphological operator will be used to perform the facial area merging and purging. The merging is to identify the closer boundaries that can be facial region and the purging is about to discard the extract facial regions over the facial image. This stage will also identify.

A)   Morphological Operators

Mathematical morphology (MM) is a theory and technique for the analysis and processing of geometrical structures, based on set theory, lattice theory, topology, and random functions. MM is most commonly applied to digital images, but it can be employed as well on graphs, surface meshes, solids, and many other spatial structures. Topological and geometrical continuous-space concepts such as size, shape, convexity, connectivity, and geodesic distance, can be characterized by MM on both continuous and discrete spaces. MM is also the foundation of morphological image processing, which consists of a set of operators that transform images according to the above characterizations.

B)   Thresholding

Thresholding is applied to the water filled regions in which edge detection is based on the amount and depth of water. Since the total amount of rainfall or water used in the waterShed process can change the regional characteristics, thresholding results vary depending on the amount of water poured on the inverted gradient magnitude image.

IV.   RESULTS

The presented work is defined to perform the facial object detection on multiple face images. The work is tested on many real time images. The results obtained from the work are presented and described in this section.

Figure 4 : Input Image

Here figure 4 is showing the high resolution multi face image on which the facial object recognition process is applied. The proposed model is implemented over it in the series of morphological operators, thresholding and convolutional filters. The segmented object result is shown in figure 5.
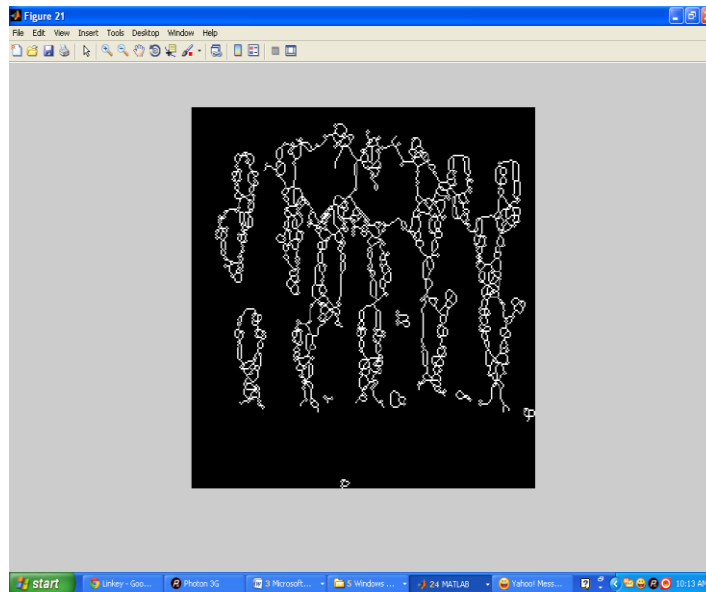

Figure 5 : Segmented Object Image

Here figure 5 is showing the actual extraction of facial boundary from the image. The figure is showing the thin bound over the image that cover the facial object as a region.

The analysis of work is here performed under position and false object detection over the images. The results is tested on 5 real time images, the results obtained from the work is shown here under
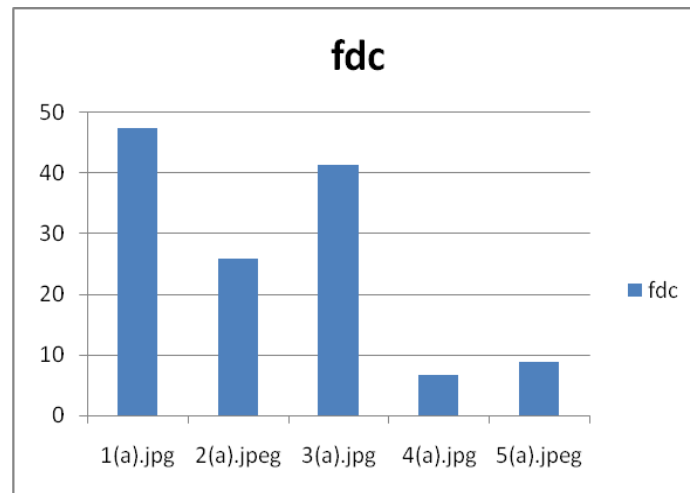
Figure 6 : FDC Analysis

Here figure 6 is showing the analysis of facial object detection on images. As shown in the figure, the effective detection of object values are obtained.

V.   CONCLUSION

In this paper, a hybrid model is presented to detect the facial objects over multiple face images. The model is defined using different mathematical operators. Obtained results show the effective object recognition and boundarization over the facial objects over the images.

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