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Region Growing and Modified Neural Network Classifier Based Face Detection Technique from Video

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Abstract

Human face detection from video has become an interesting research area in recent years. Video surveillance has risen to its peak as security issues in various fields have increased. In the proposed method, an efficient method for multiple human face detection from any video input is developed with the aid of steps like segmentation, feature extraction and classification using modified neural network. The classification results show that the proposed method is more efficient in classifying the faces from video which is about 15 percent accurate than existing method.

Introduction

Ably assisted by various biometric methods such as finger print, iris, palm, gait and so forth, face recognition technologies have been one of most interesting fields up to recently [1].Face is one of the most commonly used by people to recognize each other. Over the course of its evolution, the human brain has developed highly specialized areas dedicated to the analysis of the facial images. In the past decades, face recognition has been an active research area and many types of algorithms and techniques have been proposed to equal this ability of human brain [7].The unobtrusiveness of face recognition on its users is one of the reasons why face recognition has been governing so much research attention over the past decades. This has resulted in various face recognition systems that demonstrates satisfactory and reliable performance under constrained environments e.g. uniform illumination and fixed frontal poses [8].Face recognition has become one of the most active research areas in pattern recognition. It plays an important role in many application areas, such as human machine interaction, authentication and surveillance. However, the wide-range variations of human face, due to pose, illumination, and expression, result in a highly complex distribution and deteriorate the recognition rate [2].

Real-world automatic face recognition systems are confronted with a number of sources of within-class variation, including pose, expression, and illumination, as well as occlusion or disguise. Several decades of intense study within the pattern recognition community have produced numerous methods for handling each of these factors individually [3].Robust face recognition under various illumination environments is not easy to achieve. It is now well known that variation of illumination conditions can change face appearance dramatically so that the variations between the images of the same face due to illumination can be larger than image variations due to change in face identity [4].It is believed by many that video-based face recognition systems hold promise in certain applications where motion can be used as a cue for face segmentation and tracking, and the presence of more data can increase recognition performance. However, these systems have their own challenges. They require tracking the video sequence, as well as recognition algorithms that are able to integrate information over the entire video [5].The ability of different approaches to cope with face pose and misalignment can be roughly determined by the amount of explicit geometric information they use in the face representations [6].

The main goal of face recognition system is to separate the characteristics of a face that are determined by the intrinsic shape and color of the facial surface from the random conditions of image generation [9].Various methods were used for the face recognition process like Diffusion-Based Face Selective Smoothing in DCT Domain where influence of illumination changes on different frequency subbands and propose a diffusion based image selective smoothing algorithm to remove the undesired effects of illumination variations [10] ,Illumination invariant in non sub-sampled contour let transform domain where which extract extract geometric structure without pseudo Gibbs phenomena around singularities and halo artifacts, which attributes to the properties of non subsampled contour let transform [11],Illumination Robust Dictionary-Based Face Recognition which is based on simultaneous sparse approximations under varying illumination. Here a dictionary is learned for each face class based on given training examples which minimizes the representation error with a sparseness constraint. Next a test image is projected onto the span of the atoms in each learned dictionary [13].

The rest of the paper is organized as follows. Section II explains the researches that are related to our proposed method. Section III shows our proposed method for detection of face from video using segmentation and classification. Section IV explains the result of the proposed methodology and finally Section V concludes our proposed method.

Literature Review

Recently, a number of researches were conducted on various systems with better results in facial recognition. Brief reviews of some of these researches are,

Lacey *et al.* [12] have described an Active Appearance Model (AAM) based system that can automatically detect the frames in video in which a patient was in pain. This pain dataset highlights the many challenges associated with spontaneous emotion detection, especially that of expression and head movement due to the

patient's reaction to pain. Here they showed that the AAM could deal with these movements and could achieve significant improvements in both AU and pain detection performance compared to the current-state-of-the-art approaches which utilize similarity-normalized appearance features only.

Chen *et al.* [14] have proposed a method for face recognition or authentication against pose, illumination, and expression (PIE) variation using modular face features. A sub-image in low-frequency sub-band was extracted by a wavelet transform (WT) to reduce the image dimensionality. It was partitioned into four parts for representing the local features and reducing the PIE effects, and the small image in a coarse scale was generated via the WT without losing the global face features. Five modular feature spaces were constructed. The most discriminative common vectors in each feature space were found, and a nearest feature space-based (NFS-based) distance was calculated for classification. The weighted summation was performed to fuse the five distances. Experiments were conducted to show that the proposed scheme was superior to other methods in terms of recognition and authentication rates.

Chen *et al.* [15] have proposed a local facial feature based framework for both still image and video-based face recognition. The evaluation was performed on a still image dataset LFW and a video sequence dataset MOBIO to compare 4 methods for operation on feature: feature averaging (Avg-Feature), Mutual Subspace Method (MSM), Manifold to Manifold Distance (MMS), and Affine Hull Method (AHM), and 4 methods for operation on distance on 3 different features. The experimental results showed that Multi-region Histogram (MRH) feature was more discriminative for face recognition compared to Local Binary Patterns (LBP) and raw pixel intensity. Under the limitation on a small number of images available per person, feature averaging was more reliable than MSM, MMD, and AHM and was much faster. The averaging MRH feature was more suitable for CCTV surveillance systems with constraints on the number of images and the speed of processing.

Ajay *et al.* [16] have compared the performance of various combinations of edge operators and linear subspace methods to determine the best combination for pose classification. To evaluate the performance, they have carried out experiments on CMU-PIE database which contains images with wide variation in illumination and pose. They found that the performance of pose classification depends on the choice of edge operator and linear subspace method. The best classification accuracy was obtained with Prewitt edge operator and Eigen feature regularization method. In order to handle illumination variation, they used adaptive histogram equalization as a preprocessing step resulting into significant improvement in performance except for Roberts operator.

S. Muruganantham. [17] have proposed a method that offers an up-to-date evaluation of major human face recognition research. They presented a summary of face recognition and its applications. Then, a literature review of the predominantly used face recognition techniques was offered. Clarification and restrictions of face databases which were used to test the performance of these face recognition algorithms were given. The most important factors distressing the face recognition system was pose illumination, identity, occlusion and expression. Here they projected a vital assessment of the current researches associated with the face recognition

process. They presented a wide review of major researches on face recognition process based on various conditions. In addition, a summarizing description of Face recognition process along with the techniques connected with the various factors that affect the face recognition process.

Arindam *et al.* [18] have proposed a technique for automatic face recognition using integrated peaks of the Hough transformed significant blocks of the binary gradient image. In this approach firstly the gradient of an image was calculated and a threshold was set to obtain a binary gradient image, which was less sensitive to noise and illumination changes. Secondly, significant blocks were extracted from the absolute gradient image, to extract pertinent information with the idea of dimension reduction. Finally the best fitted Hough peaks were extracted from the Hough transformed significant blocks for efficient face recognition. Then these Hough peaks were concatenated together, which were used as feature in classification process.

Manish Choudhary *et al.*[19] have proposed a method to label a Self-Organizing Map (SOM) to measure image similarity. To manage this goal, they feed Facial images associated to the regions of interest into the neural network. At the end of the learning step, each neural unit was tuned to a particular Facial image prototype. Facial recognition was then performed by a probabilistic decision rule. This scheme offers very promising results for face identification dealing with illumination variation and facial poses and expressions. The SOM method was trained on images from one database. A facial recognition system was a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. It was typically used in security systems and could be compared to other biometrics such as fingerprint or eye iris recognition systems.

Proposed Method For Detection of Face From Video

In recent years, the face detection from the video is gaining more importance as the authentications of personal information have to be made more secure. The detection of face from video is a tedious job and it has been an interesting research topic in the recent past. The face detection can provide better authentication in security measures as well as can be utilized in various other identification scenarios. In this paper, a unique face detection process which can be used to classify the face images based on similarities is proposed. The proposed method can be divided into three phases. In the first phase, human face from the video are extracted using segmentation technique. Here, region growing algorithm is used for segmentation purpose. The second phase in the method is the feature extraction procedure. The color feature is extracted using the histogram technique and shape feature is detected with the help of differential edge detection technique with threshold technique to extract the shape feature vector. The edge detection technique is better in extracting shape features than various other methods. Morphological operations are used inorder to reserve the shape features and eliminate irrelevant factors from the extracted shape feature. The third phase is to classify the face based on the similarity of the input image. The classification is done with the help of modified neural network. The general flow diagram of the proposed method is given in fig 1 below,

Image Segmentation

Segmentation is defined as the partitioning of an image into different sets of pixels. It is basically used to identify the objects or boundaries in an image. The result of the segmentation is a set of segments that usually cover the entire area of the image. Generally segmentation is the method that elucidates spatially close parts in the images as an object. Hence segmentation is an important module in any such image processing application. Segmentation approach is equivalent to pattern recognition process. In this proposed method we have utilized the method of Region growing for segmentation of the images.

Region Growing Technique

Region growing is a simple image segmentation method based on the region [21]. It is also classified as a pixel-based image segmentation method since it involves the selection of initial seed points. This approach to segmentation examines the neighboring pixels of initial "seed points" and determines whether the pixel neighbours should be added to the region or not based on certain conditions.

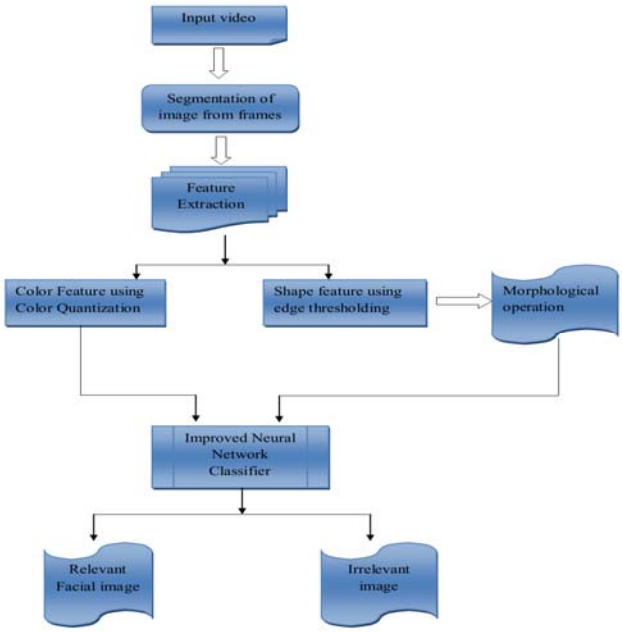


Figure 1: Flow Diagram of Our Proposed Method

The process is iterated to yield different regions. In a normal region growing technique, the neighbor pixels are examined by only the "intensity" constrain. For this, a threshold level for intensity value is set and those neighbor pixels that satisfy this threshold is selected for region growing. The region growing is a process which uses the size of the particular growth as the seed point. In our proposed technique each of the nodules is treated separately to which the region growing technique is applied. The initial step in region growing for the nodule formed is to select a seed

point. The initial region begins as the exact location of the seed. Here we have carried out histogram analysis to find out the seed point.

In the proposed method, the seed point is selected based on the maximum area present in the face image. Let the image be p.The seed point helps to segment the face by growing the particular area.

$$\mathrm{P_s} = \max H(a) \tag{1}$$

where,

$\mathrm{P_s}$ is the seed point in the image.

$H(a)$ is the maximum area chosen.

Eqn 1 given above is used to find out the seed point. After finding out the seed point, the region is grown from it. Here the neighbouring pixels are compared with the seed point and if the neighbour pixel satisfies constrains, then the region is grown else it is not grown to that pixel. Constrains for our proposed region growing is the "intensity". For the intensity constraint, an intensity threshold is also set in-order to check if the neighbour pixel satisfies the condition. Intensity threshold defines the maximum value by the neighbour pixel value can differ from the pixel in consideration. Suppose the pixel is having the intensity value $\mathrm{I_m}$, and the neighbouring pixel has the value $\mathrm{I_k}$ and the intensity threshold is set as $\mathrm{T_i}$, then if $\| \mathrm{I_m} - I_k \| \leq T_i$, then intensity constrain is met and satisfied.

When the intensity constraint is satisfied by a neighbouring pixel, then the region is grown to the neighbour pixel and the region grows. That is if $| \mathrm{I_m} - I_k \| \leq T_i$ then the neighbour pixel is added to the region.

Feature Extraction

When the key in information to an algorithm is too large to be processed and it is expected to be disgracefully redundant next the key in data will be changed into a reduced representation set of characteristics. Feature extraction is the change of input information into a set of features [22]. Extortion of image features and employ of these features to signify image visual content is usually termed as feature extraction. Feature extraction engages reducing the amount of resources necessary to explain a large set of data precisely.

Color feature extraction using color quantization

Using the color quantization technique, the color feature is extorted where histograms of meticulous images are being extracted. The histogram is described as the frequencies of the pixels in grayscale image. The quantization is a procedure in which the histogram is separated into levels or bins [23]. Computation cost for the feature extraction in these 256 levels will be high as grayscale image contains 256 levels. To decrease the computation cost, the histogram of image is diminished to dissimilar bins. The histogram is next quantized into N bins as shown in eqn 2, such that

$$H_s = \{h_s(d_1), h_s(d_2), ..., h_s(d_N)\} \tag{2}$$

where $h_s(d_i)$ is the frequency of pixel values in bin d_i and H_s is the histogram of N bins.

The color features are employed for recovery of the same images. The data about the intensity level distribution of an image is offered by these color features. With the assist of intensity levels, the mean and the standard deviation can be prepared in the histogram bins. The mean and the standard deviation can be computed with the assist of the beneath expressions in eqn 3 and eqn 4,

$$Mean, \mu_i = \frac{1}{Q}\sum_{k=1}^{Q} p_{ik} \tag{3}$$

$$SD, \sigma_i = \sqrt{\frac{1}{Q}\sum_{k=1}^{Q}(p_{ik} - \mu_i)^2} \tag{4}$$

The feature vectors of the values is erected as

$$F_v = \{\mu_1, \mu_2, ..., \mu_K \ , \sigma_1, \sigma_2, ..., \sigma_K\} \tag{5}$$

These feature vectors of the complete images are erected and accumulated in database.

Shape Feature:

The shape feature extraction plays a major role in detecting the face of a person in facial detection process. The shape of the particular object can be extracted by dividing the image into 8x8 blocks and by considering the two neighboring blocks. Here inorder to extract the shape feature, the edge elements from the object i.e.) face are extracted with the help of thresholding technique. The edges detection can be done in two steps. First, the gradient of the image is calculated. Second, edge elements are extracted for the gradient values higher than the threshold which is being assigned.

In the thresholding process, based on the particular threshold value being selected, the pixels in the image are marked as the object pixel if the value of the pixel is greater than the selected threshold value as shown in eqn 6,

For each pixel *(a, b),*

$$E(a,b) = \begin{cases} 1 & for \ g(a,b) > T(a,b) \\ 0 & for \ g(a,b) \le T(a,b) \end{cases} \tag{6}$$

where '$E(a,b)$' is the input binary image in which 'a' is the row and 'b' is the column, '$g(a,b)$' is the gradient image for which the value is '1' if $g(a,b)$ is the edge pixel else '0' and '$T(a,b)$' is the selected threshold value for processing. Here $T(a,b)$ is the threshold at pixel (a,b) and can be found out using the relation shown in eqn 7,

$$T(a,b) = \rho th(a,b,r(a,b)) \tag{7}$$

where $r(a,b)$ denotes the set of features at pixel (a,b). Thus the shape feature of the object is determined and these feature help in exact detection of facial image. To

reserve the particular shape feature and to eliminate irrelevant factors from the extracted shape feature, we employ morphological operation which refines the feature values for further processing.

Morphological Operation

Once the shape features are extracted from the image I morphological operation is performed on the image. Morphological operations invariably affect the appearance, structure or shape of an object. They are used in pre or post processing or for getting a representation or description of the shape of objects/regions. A set of functions that are valuable for processing and decomposition of shapes in arbitrary dimensions is provided by the mathematical morphology. Set-theoretic operations like union and intersection are used to define morphological operations. The two inputs given to morphological operation are binary image and structuring element. After adjusting the contrast and intensity of the image I , the image is converted to the binary form I_b. Then, by applying eqn (8) an enhanced image is obtained through the morphological operation 'imdilate' that utilizes the structuring element S .

$$I_b \oplus S = \bigcup_{j \in s} A_{-j} \qquad (8)$$

The above expression is used for calculating the dilate function. By using these morphological operation maximum intensity pixels of the image alone is selected. After applying dilation operation, the unwanted small segments like holes and other noises are still presented in the image. In order to remove it, area of all the unwanted segments will be identified usi region props matlab trivial function. Here, through region props function given mat lab, the area is found out, and then it is filled with white pixels. These images are then applied to the classifier section where the facial images are classified based on the query images.

Training In Neural Network

Once the features extraction is made the feature are recognized by comparing the feature vector of the input image with the base image. The extracted feature values are used to the neural network. Commonly the neural networks are trained such that the input has to send a particular output. The neural network has superior compatibility with the classification procedure. In the suggested method, the Feed Forward Neural Network is used for training. The feature values are compared with the data offered to the neural network while training. There are three layers namely input layer, hidden layer and output layer in a neural network. The fig 2 given beneath shows the fundamental diagram for feed forward neural network.

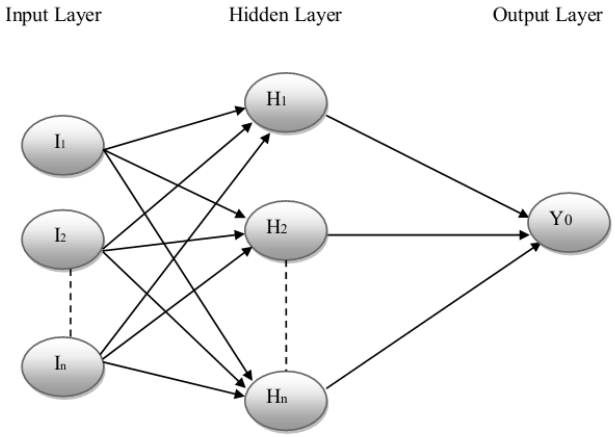


Figure 2: General Feed Forward Neural Network Architecture

We have included optimization algorithm i.e.) ABC in the suggested method for assigning the weights for the neural network in order to choose comparative weights.

Proposed Artificial Bee Colony for Optimization of weights in Neural Network:
The aim of bees in the ABC model is to discover the best solution, the position of a food source signifies a feasible solution to the optimization problem and the nectar amount of a food source corresponds to the quality (fitness) of the related solution [25]. Every employed bee goes to the food source area visited by her at the earlier cycle after sharing their information with onlookers because that food source lives in her memory, and then selects a novel food source by means of visual information in the neighborhood of the one in her memory and assesses its nectar amount [24].

Employee Bee Phase
The colony of artificial bees encloses three groups of bees: employed bees, onlookers and scouts. A bee waiting on the dance area for making decision to select a food source is called an onlooker and a bee going to the food source visited by it formerly is named an employed bee. A bee carrying out arbitrary search is called a scout. First half of the colony contains employed artificial bees and the second half comprises the onlookers. For every food source, there is only one employed bee. The number of employed bees is identical to the number of food sources around the hive in other words.

A set of food source positions are arbitrarily chosen by the employed bees at the initialization stage and their nectar amounts are found out. After that, these bees come into the hive and share the nectar information of the sources with the onlooker bees waiting on the dance area inside the hive. At first, ABC produces an arbitrarily distributed initial population signified by p_i having n solutions where each solution is the food source position and S_p is the population size. Each solution is represented by $h_i, where\ 1 \le i \le n$ is a N-dimensional vector, where N is the number of

optimization parameters taken into consideration. After initialization, the population of the positions is subjected to replicate cycles of the search processes of the employed bees, the onlooker bees, and scout bees.

Onlooker Bee Phase

In this stage, selection of the food sources by the onlookers after receiving the information of employed bees and generation of novel solution is performed. The onlooker bee desires a food source area depending on the nectar information allocated by the employed bees on the dance area. As the nectar amount of a food source enhances, the possibility with which that food source is selected by an onlooker increases, too. Therefore, the dance of employed bees carrying higher nectar recruits the onlookers for the food source areas with higher nectar amount.

An onlooker bee selects a food source depending on the possibility value related with that food source (P_i) specified by the expression as given in eqn 9:

$$P_i = \frac{f_i}{\sum_{a=1}^{n} f_a} \tag{9}$$

Where,

f_i is the fitness value of the solution

n is the number of food sources which is equal to the number of employed bees.

After incoming at the chosen area, onlooker selects a novel food source in the neighborhood of the one in the memory depending on visual information. Visual information is based on the relationship of food source positions. When the nectar of a food source is discarded by the bees, a novel food source is arbitrarily found out by a scout bee and substituted with the discarded one. An artificial onlooker bee probabilistically generates a modification on the position (solution) in her memory for finding a novel food source and checks the nectar amount (fitness value) of the novel source (new solution).

Let the old position be represented by $x_{i,a}$ and the new position is represented by $q_{i,a}$, which is defined in the eqn 10,

$$x_{i,a} = q_{i,a} + \sigma_{i,a}(q_{i,a} - q_{j,a}),\ i \neq j \tag{10}$$

Where,

$j = \{1,2,...,n\}$

$a = \{1,2,...,N\}$

$\sigma_{i,a}$ is a random number in the range[−1, 1].

The position update equation shows that as the difference between the parameters of the $q_{i,a}$ and $q_{j,a}$ decreases, the perturbation on the position $q_{i,a}$ also decreases, too. Thus, as the search approaches to the optimum solution in the search space, the step length is adaptively reduced.

Rearranging the position updating step as in eqn 11, we have:

$$x_{i,a} - q_{i,a} = \sigma_{i,a}(q_{i,a} - q_{j,a}) \tag{11}$$

As $x_{i,a}$ is the position update from $q_{i,a}$ in the previous step, representing in the time domain, the can write $q_{i,a}$ as z_T when $x_{i,a}$ is taken as z_{T+1} . Its shown in eqn 12 below:

$$z_{T+1} - z_T = \sigma_{i,a}(q_{i,a} - q_{j,a}) \tag{12}$$

The left side $z_{t+1} - z_t$ is the discrete version of the derivative of order $\alpha = 1$. Hence the have:

$$W^{\alpha}[z_{T+1}] = \sigma_{i,a}(q_{i,a} - q_{j,a}) \tag{13}$$

Scout Bee phase:

The employed bee whose food source is tired out by the employed and onlooker bees turns into a scout and it carries out arbitrary search. The food source whose nectar is discarded by the bees is substituted with a novel food source by the scouts. This is replicated by arbitrarily producing a position and replacing it with the discarded one. Now, if a position can never be enhanced further through a predetermined number of cycles called limit after that that food source is supposed to be discarded. In the classic ABC algorithm a scout explores the vicinity of the hive in an arbitrary way. This searching feature of scout can be helpful in the first iterations; though executing a wholly arbitrary movement in the final iterations may not be efficient. Hence in this strategy, a scout looks at the search space globally in the first iterations and locally in the concluding iterations. As in the final iterations improvement of the best food source may not occur, therefore it may be chosen as a scout and removed from the population.

As a result the ABC assists to find the correct the weight factors for each node in the neural network thus enhancing the classification process. The fig 3 given below shows the general block diagram of classification process using neural network. The inputs to the neural network are the feature extracted values and it is compared with the trained dataset and the resultant classified image is obtained at the neural network output.

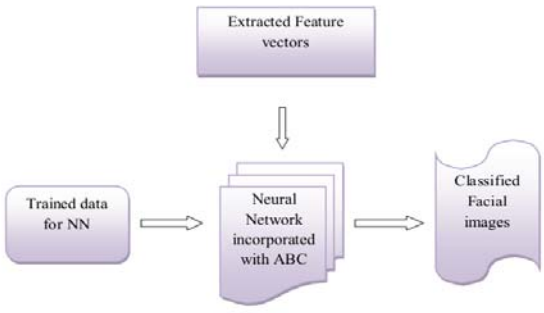


Figure 3: Classification Process In The Proposed Method

Results and Discussions

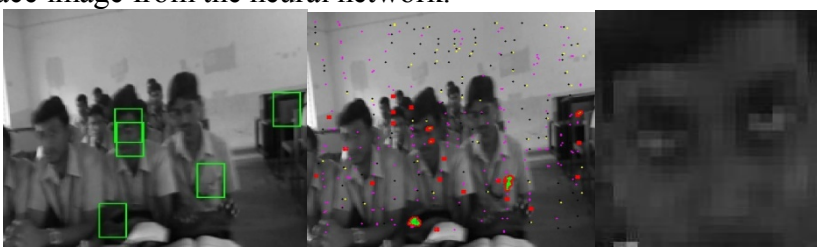
The proposed method is implemented in the working platform of MATLAB (version 2012b). The face detection is done through different techniques starting with segmentation. Here we have utilized region growing for segmentation. The segmentation is then followed by feature extraction where color and shape features are extracted. The final stage is the classification of face images from the entire images obtained.

The fig 4 given below shows the result obtained from our proposed method. Fig 4(a) shows the tracked face image after segmentation for the 10 th frame of the video input. Fig 4(b) shows the feature points that is extracted like color which is given by different color dots and fig 4(c) shows the final classified face image from the neural network

(a) **(b)** **(c)**

Figure 4: Processed Output From 10 Th Frame of Input Video

The fig 5 given below shows the result obtained from our proposed method. Fig 5(a) shows the tracked face image after segmentation for the 10 th frame of the video input. Fig 5(b) shows the feature points that are extracted and fig 5(c) shows the final classified face image from the neural network.



(a) **(b)** **(c)**

Figure 5: Processed Output From 25 Th Frame of Input Video

The fig 6 given below shows the result obtained from our proposed method. Fig 6(a) shows the tracked face image after segmentation for the 10 th frame of the video input. Fig 6(b) shows the feature points that are extracted and fig 6(c) shows the final classified face image from the neural network. The above process is repeated for various frames and the classification accuracy is estimated.

(a) **(b)** **(c)**

Figure 6: Processed output from 50 th frame of input video

The neural network classifies the face images from the database based on the feature values extracted and these can result in some irrelevant image classification as well. The neural network employed in our proposed method is an improved version of neural network which utilizes ABC which is an optimization algorithm inorder to optimize the weight used in the neural network. The fig 7 given below shows the classified results that are obtained from our proposed method

Input image	**Classification**
	 *Correctly classified*
	 *Irrelevant image*

Figure 7: Classification of Images Using Modified Neural Network

The fig 7 shows the classified output from the neural network. The relevant image represents the exactly classified face image and the irrelevant image represents those images that are incorrectly classified. The Performance evaluation of our proposed

method is estimated by measuring the classification accuracy and the failure rate obtained while classification is performed. The results are then compared with the existing methods inorder to prove the effectiveness of our proposed method over the current techniques.

The table 1 given below shows the accuracy and error values of the proposed method and existing method. The existing work is Dual Linear Regression Based Classification for Face Cluster Recognition [26] where two methods like LRC+NN and SR+NN are compared.SR is the sparse representation and LRC is the longitudinal redundancy check algorithm. The error rate is calculated on the basis of exact classification of the face images from the database. Percentage values of wrongly classified images are considered as error.

Table 1: Accuracy and Error Rate For Proposed and Existing Methods

Methods		**Accuracy (%)**	**Error rate (%)**
Proposed method		15	8
Existing Method (26)	LRC+NN	13.24	16.13
	SR+NN	10.29	11.29

The graphical representation of accuracy values for proposed and existing methods are shown in the fig 8 given below,

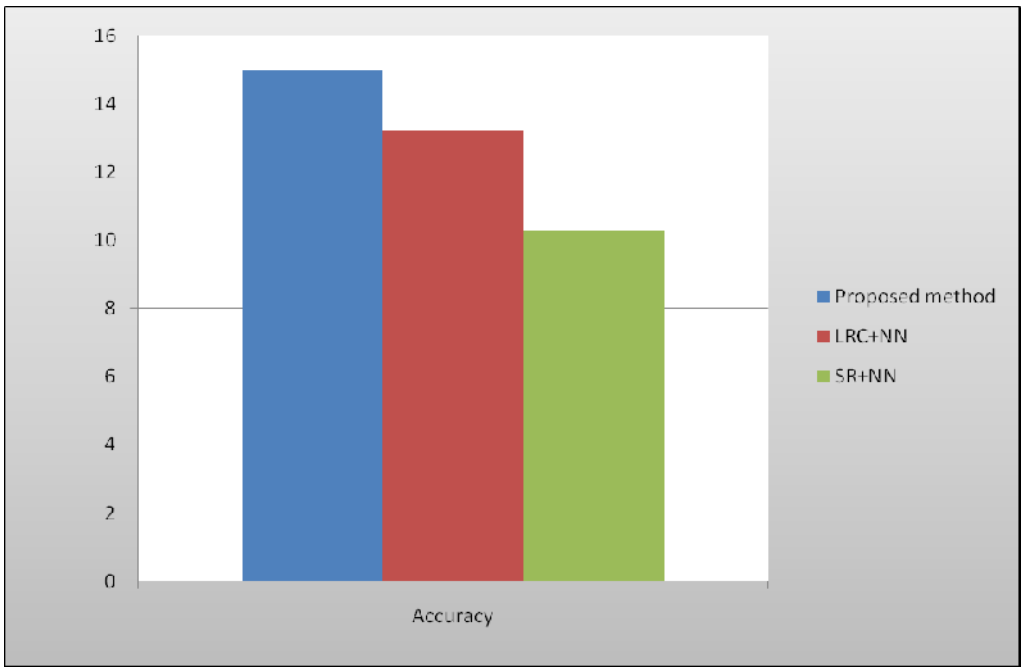


Figure 8: Graphical Representation of Accuracy For Proposed And Existing Method

The graphical representation of error rate values for proposed and existing methods are shown in the fig 9 given below,

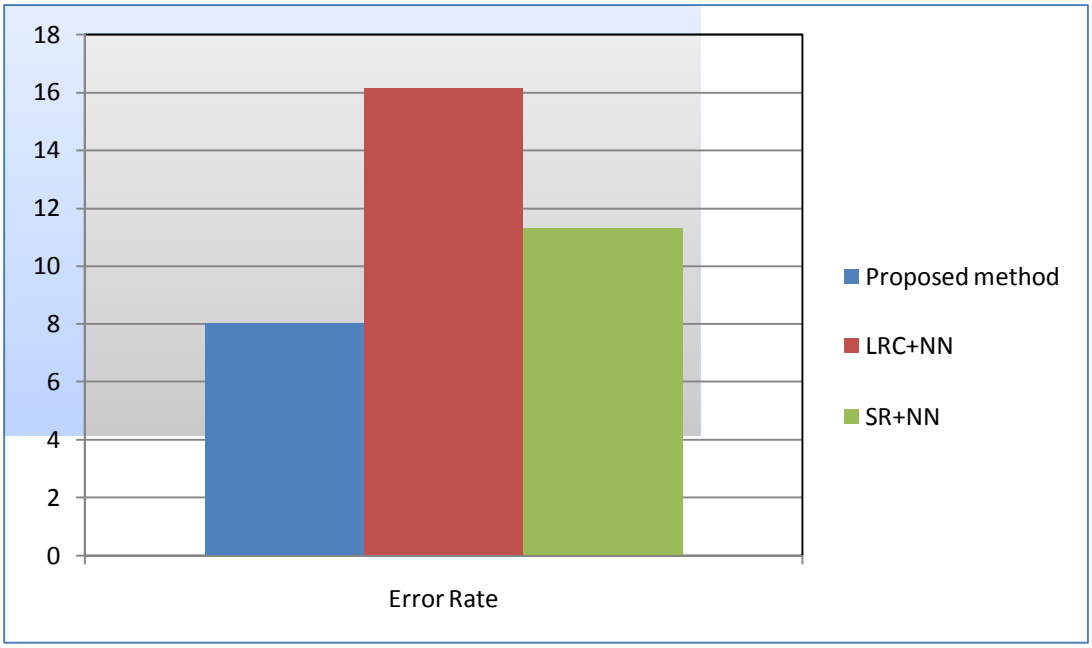


Figure 9: Graphical Representation of Error Rate For Proposed and Existing Method

Conclusion

In this paper a proficient method for analyzing the face from the video has been developed. The presented method is executed using three processes such as segmentation, feature extraction and classification. Currently, neural network is used for categorizing the face from the video frames. The neural network afforded improved categorization of the images which is further improved by incorporating the ABC algorithm. The cheering outcomes in terms of the accuracy and error rate of the epoch-making techniques is assessed and contrasted with those of peer approaches which have unambiguously upheld the supremacy of the innovative technique in efficiency over the parallel techniques.

Reference

[1] Sang-Woong Lee and Seong-Whan Lee," SVDD-Based Illumination Compensation for Face Recognition," Advances In Biometrics,Vol.4642, pp. 154-162,2007.

[2] Chao-Chun Liu ,Dao-Qing Dai and Hong Yan," Local Discriminant Wavelet Packet Coordinates for Face Recognition," Journal of Machine Learning Research, Vol. 8 , pp.1165-1195,2007.

[3] Zihan Zhou, Arvind Ganesh, John Wright, Shen-Fu Tsai, and Yi Ma,"Nearest-Subspace Patch Matching for Face Recognition Under Varying Pose and Illumination," In. proc. of 8th IEEE International

Conference on Automatic Face & Gesture Recognition,pp.1 - 8 , Amsterdam , 2008.

[4] Sanghoon Kim, Sun-Tae Chung, Souhwan Jung, and Seongwon Cho ,"An Improved Illumination Normalization based on Anisotropic Smoothing for Face Recognition," World Academy of Science, Engineering and Technology, Vol.37, pp.89-95, 2008.

[5] Yilei Xu, Amit Roy-Chowdhury, and Keyur Patel," Integrating Illumination, Motion, and Shape Models for Robust Face Recognition in Video," Journal on Advances in Signal Processing,Vol.2008, pp.1-13,2008.

[6] John Wright and Gang Hua," Implicit Elastic Matching with Random Projections for Pose-Variant Face Recognition," IEEE Conference on Computer Vision and Pattern Recognition,pp.1502 - 1509 , Miami, FL , 2009.

[7] Mariusz Leszczynski," Image Preprocessing for Illumination Invariant Face Verification," Journal of telecommunication and information technology, Vol.4,pp.19-25, 2010.

[8] Sue Inn Chng, Kah-Phooi Seng and Li-MinnAng ,"Multiview-multiband Face Recognition System to Solve Illumination and Pose Variation," 3rd IEEE International Conference on Computer Science and Information Technology (ICCSIT),Vol. 5,pp.384 - 388 , 2010.

[9] Ramesha K, K B Raja, Venugopal K R and L M Patnaik ,"Template based Mole Detection for Face Recognition, "International Journal of Computer Theory and Engineering, Vol. 2, No. 5,pp.1793-8201, Oct 2010.

[10] Mehdi Ezoji and Karim Faez," Diffusion-Based Face Selective Smoothing in DCT Domain to Illumination Invariant Face Recognition,"20th International Conference on Pattern Recognition (ICPR),pp.1164 - 1167,Istanbul , 2010 .

[11] Yong Cheng ,YingkunHou , ChunxiaZhao , ZuoyongLi ,YongHu and Cailing Wang, " Robust face recognition based on illumination invariant in non subsampled contour let transform domain," Journal of Neuro computing ,Vol.73 , pp.2217–2224,2010.

[12] Patrick Lucey, Jeffrey F. Cohn, Iain Matthews, Simon Lucey, Sridha Sridharan, Jessica Howlett and Kenneth M. Prkachin, "Automatically Detecting Pain in Video Through Facial Action Units," IEEE Transaction Journal on Systems, Man, and Cybernetics, Vol. 41,No.3,pp. 664 - 674,2011.

[13] Vishal M. Patel, Tao Wu, Soma Biswas, P. Jonathon Phillips and Rama Chellappa, "Illumination Robust Dictionary-Based Face Recognition,"18th IEEE International Conference on Image Processing (ICIP),pp.777 - 780, Brussels, 2011.

[14] Ying-Nong Chen, Chin-Chuan Han, Cheng-Tzu Wang And Kuo-Chin Fan ,"A Novel Scheme for Face Recognition and Authentication Against Pose, Illumination and Expression Changes," Journal Of Information Science And Engineering, Vol. 27,pp. 369-380 ,2011.

[15] Shaokang Chen, Sandra Mau, Mehrtash T. Harandi, Conrad Sanderson, Abbas Bigdeli and Brian C. Lovell, "Face Recognition from Still Images to Video Sequences: A Local-Feature-Based Framework," Journal on Image and Video Processing, Vol. 2011, pp.1-14, 2011.

[16] Ajay Jaiswal, Nitin Kumar and R. K. Agrawal ," Illumination Invariant Facial Pose Classification," International Journal of Computer Applications ,Vol. 37,No.1,pp.0975 – 8887, Jan 2012.

[17] S. Muruganantham ,"A Comprehensive Review of Significant Researches on Face Recognition Based on Various Conditions," International Journal of Computer Theory and Engineering, Vol. 4, No. 1, Feb 2012.

[18] ArindamKar, Debotosh Bhattacharjee, Dipak Kumar Basu, MitaNasipuri and Mahantapas Kundu ,"Face Recognition using Hough Peaks extracted from the significant blocks of the Gradient Image," International Journal of Advanced Research in Computer Science and Software Engineering,Vol.2, No. 1, Jan 2012.

[19] Rakesh Rathi , Manish Choudhary and Bhuwan Chandra ,"An Application of Face Recognition System using Image Processing and Neural Networks," International journal of Computer, Technology and Applications, Vol .3 ,No.1,pp. 45-49,2012.

[20] YaChang , Changbo Hu , RogerioFeris and Matthew Turk," Manifold based analysis of facial expression," Journal of Image and Vision Computing, Vol. 24, pp.605–614, Jun 2006.

[21] W. K. Pratt, "Digital Image Processing" 4th Edition, John Wiley & Sons, Inc., Los Altos, California, 2007.

[22] J. Fernandeza, R. Guerreroa, N. Mirandaa and F. Piccolia ," Multi-Level Paralelism In Image Identification,"Mecanica Computational, Vol. 28, pp. 227-240, Argentina, Nov 2009.

[23] Kalpesh R Jadav, Prof.M.A.Lokhandwala and Prof.A.P.Gharge ,"Vision based moving object detection and tracking",National Conference on Recent Trends in Engineering & Technology,May 2011.

[24] Dervis Karaboga, Bahriye Akay, A comparative study of Artificial Bee Colony algorithm, Jthenal of Applied Mathematics and Computation, Vol. 214, Pp. 108–132, 2009.

[25] Dervis Karaboga and Celal Ozturk, Fuzzy clustering with artificial bee colony algorithm, Jthenal of Scientific Research and Essays, Vol. 5, No. 14, pp. 1899-1902, 2010.

[26] Liang Chen ,"Dual Linear Regression Based Classification for Face Cluster Recognition", Computer Vision and Pattern Recognition, 2013.

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