Result Oriented Based Face Recognition using Neural Network with Erosion and Dilation Technique

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Abstract :-It has been observed that many face recognition algorithms fail to recognize faces after plastic surgery and wearing the spec/glasses which are the new challenge to automatic face recognition. Face detection is one of the challenging problems in the image processing. This seminar, introduce a face detection and recognition system to detect (finds) faces from database of known people.
To detect the face before trying to recognize it saves a lot of work, as only a restricted region of the image is analyzed, opposite to many algorithms which work considering the whole image. In This , we gives study on Face Recognition After Plastic Surgery (FRAPS)and after wearing the spec/glasses with careful analysis of the effects on face appearance and its challenges to face recognition.
To address FRAPS and wearing the spec/glasses problem, an ensemble of An Optimize Wait Selection By Genetic Algorithm For Training Artificial Neural Network Based On Image Erosion and Dilution Technology. Furthermore, with our impressive results, we suggest that face detection should be paid more attend to. To address this problem, we also used Edge detection method to detect i/p image properly or effectively. With this Edge Detection also used genetic algorithm to optimize weight using artificial neural network (ANN)and save that ANN file to database .And use that ANN file to compare face recognition in future

Index Terms—*FRAPS, EBGM, AAM, SVM, ANN,GA.*

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1. INTRODUCTION

In recent years, plastic surgery has become popular worldwide. People take facial plastic surgery to correct feature defects or improve attractiveness and condense [1]. According to the statistics from American Society for Aesthetic Plastic Surgery , from 1997 to 2011, there has been over 197% increase in the total number of cosmetic procedures.[2] The above statistical recognized lead to a practical requirement on identity authentication after plastic surgery. Especially, for face-based biometrics, plastic surgery poses a great challenge, because not only local skin texture but also face components such as eyelid and nose might be disturbed or reshaped in plastic surgery. Even the holistic appearance of face may greatly change because of the global face plastic surgery such as face lift or skin peeling[1].

Face recognition is one of the few biometric methods that possess the merits of both high accuracy and low intrusiveness[18]. It has the accuracy of a physiological approach without being intrusive .For this reason, since the early 70's (Kelly, 1970), face recognition has drawn the attention of researchers in fields from security, psychology, and image processing, to computer vision[18].

Biometric-based techniques have emerged as the most promising option for recognizing individuals in recent years since, instead of authenticating people and granting them access to physical and virtual domains based on passwords, PINs, smart cards, plastic cards, tokens, keys and so forth, these methods examine an individual's physiological and/or behavioral characteristics in order to determine and/or ascertain his identity[27]. Passwords and PINs are hard to remember and can be stolen or guessed; cards, tokens, keys and the like can be misplaced, forgotten, purloined or duplicated; magnetic cards can become corrupted and unreadable. However, an individual's biological traits cannot be misplaced, forgotten, stolen or forged. Biometric-based technologies include identification based on physiological characteristics (such as face, fingerprints, finger geometry, hand geometry, hand veins, palm, iris, retina, ear and voice) and behavioral traits (such as gait, signature and keystroke dynamics)[27] . Face recognition appears to offer several advantages over other biometric methods, a few of which are outlined here: Almost all these technologies require some voluntary action by the user, i.e., the user needs to place his hand on a hand-rest for fingerprinting or hand geometry detection and has to stand in a fixed position in front of a camera for iris or retina identification. However, face recognition can be done passively without any explicit action or participation on the part of the user since face images can be acquired from a distance by a camera. This is particularly beneficial for security and surveillance purposes[27]. Furthermore, data acquisition in general is fraught with problems for other biometrics: techniques that rely on hands and fingers can be rendered useless if the epidermis tissue is damaged in some way (i.e., bruised or cracked). Iris and retina identification require expensive equipment and are much too sensitive to any body motion. Voice recognition is susceptible to background noises in public places and auditory fluctuations on a phone line or tape recording[27]. Signatures can be modified or forged. However, facial images can be easily obtained with a couple of inexpensive fixed cameras. Good face recognition algorithms and appropriate preprocessing of the images can compensate for noise and slight variations in orientation, scale and illumination. Finally, technologies that require multiple individuals to use the same equipment

to capture their biological characteristics potentially expose the user to the transmission of germs and impurities from other users. However, face recognition is totally non-intrusive and does not carry any such health risks[27].

This is the face recognition system for a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial features from the image and a facial database [18].

Real time systems for identifying humans in a scene has a lot of importance in security and surveillance applications where automatic detection, recognition and tracking of known individuals is required for scenarios such as restricted entry into the high profile locations, tracking of an individual in a sensitive areas etc. Human identification can be done by extracting and classifying the biometric features such as face, fingerprints, ear, iris, palm, gait or speech and all of these biometric features are either used separately or combined together depending on the security application [28]. From a video scene, biometrics such as face, ear and gait biometrics will be more suitable as these just require the images captured from a surveillance camera. Identification of humans using faces is a challenging task as the facial features of an individual are prone to changes due to illumination, facial expression, head orientation and head pose [28].

Scope of Face Recognition :-

The human face changes with respect to plastic surgery and wearing the spec/glasses. To achieve high accuracy, the recognition should be performed based on intrinsic properties, and the algorithms should be able to deal with unfavorable influences due to extrinsic factors and misalignment. It is typically used in security systems.

There are some scope which are as follows -

i. Passport and visa verification can also be done using face recognition technology.
ii. In defense ministry and all other important places the face technology can be deployed for better security.
iii. The technology can also be used effectively in various important examinations such as SSC, HSC, Medical, Engineering, MCA, MBA, B- Pharmacy, Nursing courses etc. The examinee can be identified and verified using Face Recognition Technique.
iv. In all government and private offices this system can be deployed for identification, verification and attendance.
v. It can also be deployed in police station to identify and verify the criminals.

2 . LITRATURE REVIEW

Face recognition is an important research problem spanning numerous fields and disciplines. This because face recognition, in additional to having numerous practical applications such as bankcard identification, access control, Mug shots searching, security monitoring, and surveillance system, is a fundamental human behavior that is essential for effective communications and interactions among people[27].

In the literatures, face recognition problem can be formulated as: given static (still) or video images of a scene, identify or verify one or more persons in the scene by comparing with faces stored in a database [28]. When comparing person verification to face recognition, there are several aspects which differ. First, a client – an authorized user of a personal identification system – is assumed to be co-operative and makes an identity claim. Computationally this means that it is not necessary to consult the complete set of database images (denoted model images below) in order to verify a claim. An incoming image (referred to as a probe image) is thus compared to a small number of model images of the person whose identity is claimed and not, as in the recognition scenario, with every image (or some descriptor of an image) in a potentially large database. Second, an automatic authentication system must operate in near-real time to be acceptable to users. Finally, in recognition experiments, only images of people from the training database are presented to the system, whereas the case of an imposter (most likely a previously unseen person) is outmost importance for authentication [28].

Face recognition is a biometric approach that employs automated methods to verify or recognize the identity of a living person based on his/her physiological characteristics [29]. In general, a biometric identification system makes use of either physiological characteristics (such as a fingerprint, iris pattern, or face) or behavior patterns (such as hand-writing, voice, or key-stroke pattern) to identify a person. Because of human inherent protectiveness of his/her eyes, some people are reluctant to use eye identification systems. Face recognition has the benefit of being a passive, non intrusive system to verify personal identity in a “natural” and friendly way[29].

The method for acquiring face images depends upon the underlying application. For instance, surveillance applications may best be served by capturing face images by means of a video camera while image database investigations may require static intensity images taken by a standard camera. Some other applications, such as access to top security domains, may even necessitate the forgoing of the non-intrusive quality of face recognition by requiring the user to stand in front of a 3D scanner or an infra-red sensor. Therefore, depending on the face data acquisition methodology, face recognition techniques can be broadly divided into three categories: methods that operate on intensity images, those that deal with video sequences, and those that require other sensory data such as 3D information or infra-red imagery[29].

Recently, human face detection algorithms based on color information have been reported. The face regions are initially segmented based on the characteristic of skin tone

colors. The color signal is usually separated into its luminance and chrominance components in an image or video. Experimental results show that the skin-like regions can be segmented by considering the chrominance components only. Although skin Colors differ from person to person, they are distributed over a very small area on the chrominance plane. However, human face detection and facial feature extraction in gray-level images may be more difficult because the characteristics of skin tone color are not available[4]. K.K. Sung proposed an example-based learning approach for locating vertical frontal views of human faces in complex scenes. A decision-making procedure is trained based on a sequence office and non-face examples. Six face clusters and six non-face clusters are obtained according to 4150 normalized frontal face patterns. The face regions are located by matching the window patterns at different image locations and scales against the distribution-base face model. T.S. Huang proposed a hierarchical knowledge-based method consisting of three levels for detecting the face region and then locating facial component in an unknown picture. Images of different resolutions are used in the two higher levels. Two sets of rules based on the characteristics of a human face region are applied to the images. At third level, the edge of facial components is extracted for the verification of face candidates. However, the computational requirements of these methods may be too high for some applications, which may be unable to detect and locate a tilted human face reliably. Extraction of facial features by evaluating the topographic gray-level relief has been introduced. Since the intensity is low for the facial components, the position of the facial features can be determined by checking the mean gray-level in each row and then in each column [30].

In facial detection based on the geometrical face model was proposed. The model is constructed based on the relationships among facial organs such as nose, eyes, and mouth. However, these methods can work properly only under well-lit conditions.

Facial recognition systems are commonly used for security purposes but are increasingly being used in a variety of other applications. The Kinect motion gaming system, for example, uses facial recognition to differentiate among players.[32]

Most current facial recognition systems work with numeric codes called faceprints. Such systems identify 80 nodal points on a human face. In this context, nodal points are end points used to measure variables of a person's face, such as the length or width of the nose, the depth of the eye sockets and the shape of the cheekbones. These systems work by capturing data for nodal points on a digital image of an individual's face and storing the resulting data as a face print. The face print can then be used as a basis for comparison with data captured from faces in an image or video[32].

Facial recognition systems based on face prints can quickly and accurately identify target individuals when the conditions are favorable. However, if the subject's face is partially obscured or in profile rather than facing forward, or if the light is insufficient, the software is less reliable. Nevertheless, the technology is evolving quickly and there are several emerging approaches, such as 3D modeling, that may overcome current problems with the systems. According to the National Institute of Standards and Technology (NIST), the incidence of false positives in facial recognition systems has been halved every two years since 1993 and, as of the end of 2011, was just .003%[32].

Face positioning is required for almost all the face recognition techniques, especially the accurate positioning of eyes, and this is because the variation of light or facial expression has the slightest influence on the distance between eyes. So it often used as the standard of geometrical feature or image size normalization. To determine the optimal thresholds and segregate eyes and face from complex backgrounds is the first step of eye positioning[31].

Currently, a lot of facial recognition development is focused on smart phone applications. Smartphone facial recognition capacities include image tagging and other social networking integration purposes as well as personalized marketing. A research team at Carnegie Mellon has developed a proof-of-concept iPhone app that can take a picture of an individual and -- within seconds -- return the individual's name, date of birth and social security number[31].

Facebook uses facial recognition software to help automate user tagging in photographs. Here's how facial recognition works in Facebook: Each time an individual is tagged in a photograph, the software application stores information about that person's facial characteristics. When enough data has been collected about a person to identify them, the system uses that information to identify the same face in different photographs, and will subsequently suggest tagging those pictures with that person's name[30,31].

Facial recognition software also enhances marketing personalization. For example, billboards have been developed with integrated software that identifies the gender, ethnicity and approximate age of passersby to deliver targeted advertising.

2.1 FACE RECOGNITION

A facial recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial features from the image and a facial database. It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. Among the different biometric techniques, facial recognition may not be the most reliable and efficient [17] .

There are many algorithms for face recognition which are as follows:-

1) PCA

Derived from Karhunen-Loeve's transformation. Given an s-dimensional vector representation of each face in a training set of images, Principal Component Analysis (PCA) tends to find a t-dimensional subspace whose basis vectors correspond to the maximum variance direction in the original image space. This new subspace is normally lower dimensional (t<<s). If the image elements are considered as random variables, the PCA basis vectors are defined as eigenvectors of the scatter matrix.

2) ICA

Independent Component Analysis (ICA) minimizes both second-order and higher-order dependencies in the input data and attempts to find the basis along which the data (when projected onto them) are - statistically independent . Bartlett et al. provided two architectures of ICA for face recognition task: Architecture I - statistically independent basis images, and Architecture II - factorial code representation.

3) LDA

Linear Discriminant Analysis (LDA) finds the vectors in the underlying space that best discriminate among classes. For all samples of all classes the between-class scatter matrix SB and the within-class scatter matrix SW are defined. The goal is to maximize SB while minimizing SW, in other words, maximize the ratio det|SB|/det|SW| . This ratio is maximized when the column vectors of the projection matrix are the eigenvectors of (SW^-1 × SB).

4) EP

An eigenspace-based adaptive approach that searches for the best set of projection axes in order to maximize a fitness function, measuring at the same time the classification accuracy and generalization ability of the system. Because the dimension of the solution space of this problem is too big, it is solved using a specific kind of genetic algorithm called Evolutionary Pursuit (EP).

5) EBGM

Elastic Bunch Graph Matching (EBGM). All human faces share a similar topological structure. Faces are represented as graphs, with nodes positioned at fiducial points. (exes, nose...) and edges labeled with 2-D distance vectors. Each node contains a set of 40 complex Gabor wavelet coefficients at different scales and orientations (phase, amplitude). They are called "jets". Recognition is based on labeled graphs. A labeled graph is a set of nodes connected by edges, nodes are labeled with jets, edges are labeled with distances.

6) Kernel Methods

The face manifold in subspace need not be linear. Kernel methods are a generalization of linear methods. Direct non-linear manifold schemes are explored to learn this non-linear manifold.

7) Trace Transform

The Trace transform, a generalization of the Radon transform, is a new tool for image processing which can be used for recognizing objects under transformations, e.g. rotation, translation and scaling. To produce the Trace transform one computes a functional along tracing lines of an image. Different Trace transforms can be produced from an image using different trace functionals.

8) AAM

An Active Appearance Model (AAM) is an integrated statistical model which combines a model of shape variation with a model of the appearance variations in a shape-normalized frame. An AAM contains a statistical model if the shape and gray-level appearance of the object of interest which can generalize to almost any valid example. Matching to an image involves finding model parameters which minimize the difference between the image and a synthesized model example projected into the image.

2.2 EADGE DETECTION

Edge detection is a type of image segmentation techniques which determines the presence of an edge or line in an image and outlines them in an appropriate way[16]. The main purpose of edge detection is to simplify the image data in order to minimize the amount of data to be processed [15] .

Computerized human face recognition has been an active research area for the last 20 years. It has many practical applications, such as bankcard identification, aces control, mug shots searching, security monitoring, and surveillance systems. Face recognition is used to identify one or more persons from still images or a video image sequence of a scene by comparing input images with faces stored in a database. It is a biometric system that employs automated methods to verity or recognizes the identity of person based on his/her physiological characteristic. In general, a biometric identification system makes use of either physiological characteristics or behavior patterns to identify a person. Because of human inherent protectiveness of his/her eyes, some people are reluctant to use eye identification systems. Face recognition has the benefit of being a passive, nonintrusive system to verify personal identity in a “natural” and friendly way.

The purpose of detecting sharp changes in image brightness is to capture important events and changes in properties of the world. It can be shown that under rather general assumptions for an image formation model, discontinuities in image brightness are likely to correspond[23,24]

An edge in an image is a contour across which the brightness of the image changes abruptly. In image processing, an edge is often interpreted as one class of singularities. In a function, singularities can be characterized easily as discontinuities where the gradient approaches infinity. However, image data is discrete, so edges in an image often are defined as the local maxima of the gradient. Edge detection is an important task in image processing. It is a main tool in pattern recognition, image segmentation, and

scene analysis. An edge detector is basically a high pass filter that can be applied to extract the edge points in an image[30].

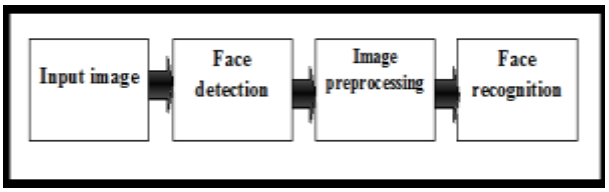

Fig 1: Functional Diagram

The software section is completely based on MATLAB. In our interface we have used MATLAB for face recognition. We have used it in such a way that it matches the face from the predefined database and generates an event. This event is used to control the device by giving the controller input to control the output and thus control controls the door[31].

An edge in an image is a contour across which the brightness of the image changes abruptly. In image processing, an edge is often interpreted as one class of singularities[9]. In a function, singularities can be characterized easily as discontinuities where the gradient approaches infinity. However, image data is discrete, so edges in an image often are defined as the local maxima of the gradient. Edge detection is an important task in image processing. It is a main tool in pattern recognition, image segmentation, and scene analysis. An edge detector is basically a high pass filter that can be applied to extract the edge points in an image.

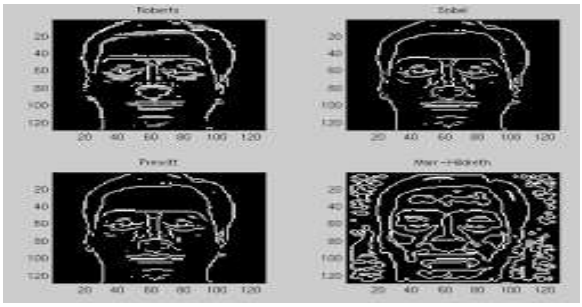

Fig 2: Edge Detection

The detected face is then identified as individual by matching it with the faces in the images stored in the database of the system[30]. The computational cost at this stage is quite reduced as compared to that in the first stage since only a small number of faces are involved in the recognition process. This allows us to execute more complex computation for verification and identification.[30] Therefore, any false positives detected in the first stage can be eliminated by this operation. A number of face detection algorithms such as Eigen faces methods, SVM, component – based detection, neural network etc. are available In these algorithms, however, a large amount of numerical computation is required. This makes the processing extremely time - consuming. Therefore, it is not feasible to build real-time systems by software running on general-purpose computers. But the proposed algorithm called Canny edge detection algorithm requires minimum numerical computations. Good edge detector must satisfy following parameters:

i) Good detection: The false edges should be minimum in number. Generally, edges are detected after threshold operation. The high threshold leads to less false edges, but also reduces the number of true edges detected.

ii) Noise sensitivity: The Edge detector should either remove or reduce the noise to some acceptable level.

iii) Good localization: The location of edge detected must be as close as possible to the correct position called edge localization accuracy (ELA).

iv) Orientation sensitivity: The edge detector should not only detect edge magnitude, but it should also detect edge orientation correctly. Orientation can be used in post processing to connect edge segments, reject noise and suppress non maximum edge magnitude.

v) Speed and efficiency: The algorithm should be faster to be used in an image processing system. An algorithm that allows recursive implementation improves efficiency.

These all conditions are satisfied by canny edge detection technique[30].

An edge is a point in a digital image at which the brightness changes abruptly or sharply.

Edges are organized into a set of curved line segments. In image processing, an edge is generally interpreted as one class of singularities. In a function, singularities are referred as discontinuities in the intensity values where the gradient approaches infinity. However, image data is discrete, so edges in an image often are defined as the local maxima of the gradient[30]. Edge detection is a crucial task in image processing. It is a mathematical tool in pattern recognition, image segmentation, scene analysis and hence in face recognition . When an edge detection algorithm is applied to a digital image, it reduces the amount of data to be processed further to the greater extent and therefore filters out information that is less relevant, without the important structural properties being lost. An edge detector is a filter which is used to extract the edge points in an image[30].

2.3 GENETIC ALGORITHM

Genetic Algorithms (GAs) are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics. As such they represent an intelligent exploitation of a random search used to solve optimization problems. Although randomized, GAs are by no means random, instead they exploit historical information to direct the search into the region of better performance within the search space. The basic techniques of the GAs are designed to simulate processes in natural systems necessary for evolution, especially those follow the principles first laid down by Charles Darwin of "survival of the fittest.". Since in nature, competition among individuals for scanty

resources results in the fittest individuals dominating over the weaker ones[23].

Genetic Algorithms are used for a number of different application areas. An example of this would be multidimensional optimization problems in which the character string of the chromosome can be used to encode the values for the different parameters being optimized[23].

When the genetic algorithm is implemented it is usually done in a manner that involves the following cycle: evaluate the fitness of all of the individuals in the population. create a new population by performing operations such as crossover, fitness-proportionate reproduction and mutation on the individuals whose fitness has just been measured. discard the old population and iterate using the new population.

One iteration of this loop is referred to as a generation. There is no theoretical reason for this as an implementation model. Indeed, we do not see this punctuated behavior in populations in nature as a whole, but it is a convenient implementation model[23]

2.4 ANN

Face recognition is a visual pattern recognition problem. In detail, a face recognition system with the input of an arbitrary image will search in database to output people's identification in the input image. Face detection segments the face areas from the background. In the case of video, the detected faces may need to be tracked using a face tracking component[5]. Face alignment aims at achieving more accurate localization and at normalizing faces thereby, whereas face detection provides coarse estimates of the location and scale of each detected face.[20] Facial components, such as eyes, nose, and mouth and facial outline, are located; based on the location points, the input face image is normalized with respect to geometrical properties, such as size and pose, using geometrical transforms or morphing. The face is usually further normalized with respect to photometrical properties such illumination and gray scale. After a face is normalized geometrically and photo metrically, feature extraction is performed to provide effective information that is useful for distinguishing between faces of different persons and stable with respect to the geometrical and photometrical variations. For face matching, the extracted feature vector of the input face is matched against those of enrolled faces in the database; it outputs the identity of the face when a match is found with sufficient confidence or indicates an unknown face otherwise. Artificial neural networks were successfully applied for solving signal processing problems in 20 years. Researchers proposed many different models of artificial neural networks. A challenge is to identify the most appropriate neural network model which can work reliably for solving realistic problem[24].

A neural network for the face detection task is challenging because of the difficulty in characterizing prototypical "nonface" images. Unlike face recognition, in which the classes to be discriminated are different faces, the two classes to be discriminated in face detection are "images containing faces" and "images not containing faces". It is easy to get a representative sample of images which contain faces, but much harder to get a representative sample of those which do not. We avoid the problem of using a huge training set for nonfaces by selectively adding images to the training set as training progresses This "bootstrap" method reduces the size of the training set needed. The use of arbitration between multiple networks and heuristics to clean up the results significantly improves the accuracy of the detector[25].

A neural network for face recognition is defined by a set of input neurons which may be activated by the pixels of an input image. After being weighted and transformed by a function (determined by the network's designer), the activations of these neurons are then passed on to other neurons. This process is repeated until finally, an output neuron is activated. This determines which character was read[19].

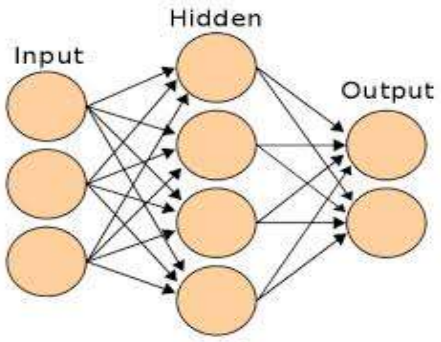

Fig 3: ANN

ANN is the term on the method to solve problems by simulating neuron's activities. In detail, ANNs can be most adequately characterized as "computational models" with particular properties such as the ability to adapt or learn, to generalize, or to cluster or organize data, and which operation is based on parallel processing. However, many of the previously mentioned properties can be attributed to non neural models. A hybrid approach combining AdaBoost and ANN is proposed to detect faces with the purpose of decreasing the performance time but still achieving the desired faces detecting rate[33].

In the recent years, different architectures and models of ANN were used for face detection and recognition. ANN can be used in face detection and recognition because these models can simulate the way neurons work in the human brain. This is the main reason for its role in face recognition. This research includes summery review of the researches related to face detection based on ANN[34].

3. PROPOSED METHODOLOGY

3.1 Introduction to EROSION and DILATION Technique

Erosion is one of two fundamental operations (the other being dilation) in morphological image processing from which all other morphological operations are based. It

was originally defined for binary images. The basic idea in binary morphology is to examine (probe) an image with a simple, pre-defined shape, drawing conclusions on how this shape fits or misses the shapes in the image. This simple "probe" is called structuring element, and is itself a binary image (i.e., a subset of the space or grid).

Dilation is , In computer graphics, the process of improving the quality of a digitally stored image by manipulating the image with software. It is quite easy, for example, to make an image lighter or darker, or to increase or decrease contrast. Advanced image enhancement software also supports many filters for altering images in various ways. Programs specialized for image enhancements are sometimes called image editors.

Algorithm used for erosion and dilation on method:-

```
// start with an input image

        // crop eye section

                {if i/p image ware
spec/glass}

//enhance crop eye section

                //dilute eye section

// paste that dilated section in original i/p
image.

        end ;
```

Fig 4: Algorithm used for Erosion and Dilation Technique

3.2 Design

In this dissertation, here we roughly design how this project will work properly for face recognition. Firstly we give any i/p image for detecting face .After that if any face has noisy part on the face then we will apply multipoint cropping .Using multipoint cropping we crop eye section and then with using the erosion and dilation technique enhance that face for accurate recognition. Then whatever image we get this image will paste on original image i.e. diluted eye section paste on original image which shown in following figure. In this way this dissertation will work on face recognition.

Proposed diagram of this project:-

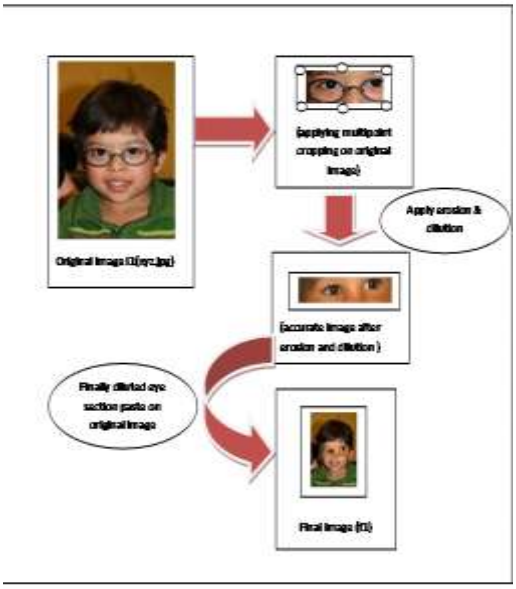

Fig 5: Proposed diagram of face recognition using Erosion and Dilation Technique

Following flowchart shows how exactly will do this project :

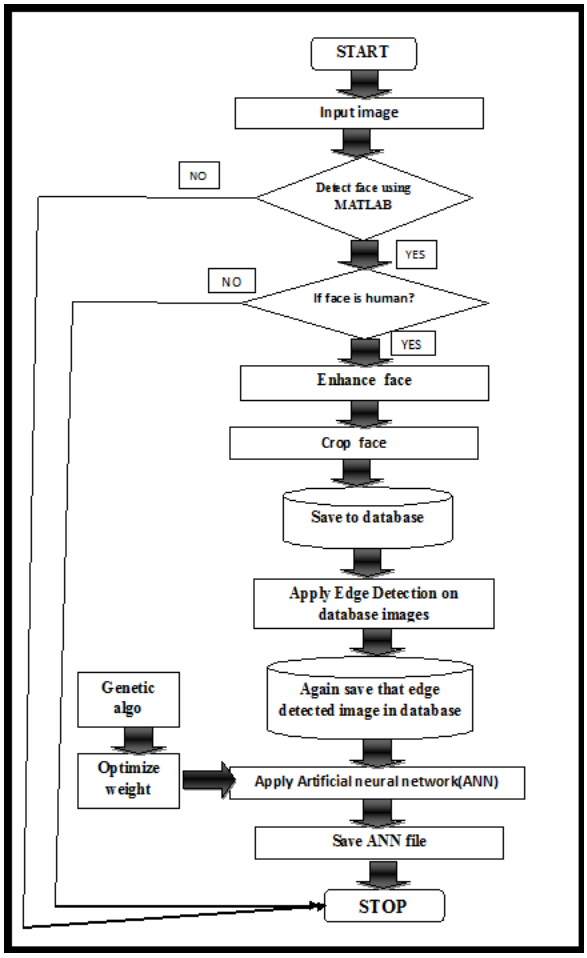

Figure 6: Propose work for Database Creation

In above figure, this is first part of this dissertation in that firstly we have to create database for recognition faces . so we need create database so that we will recognize face accurately. Firstly we give input as a image then detect face that face is human being or not if no then stop execution .and if yes then crop the face and enhance that face and save it to database . for accurate recognition we used genetic algorithm and ANN(artificial neural network) and then train ANN and save all files in database and stop execution .

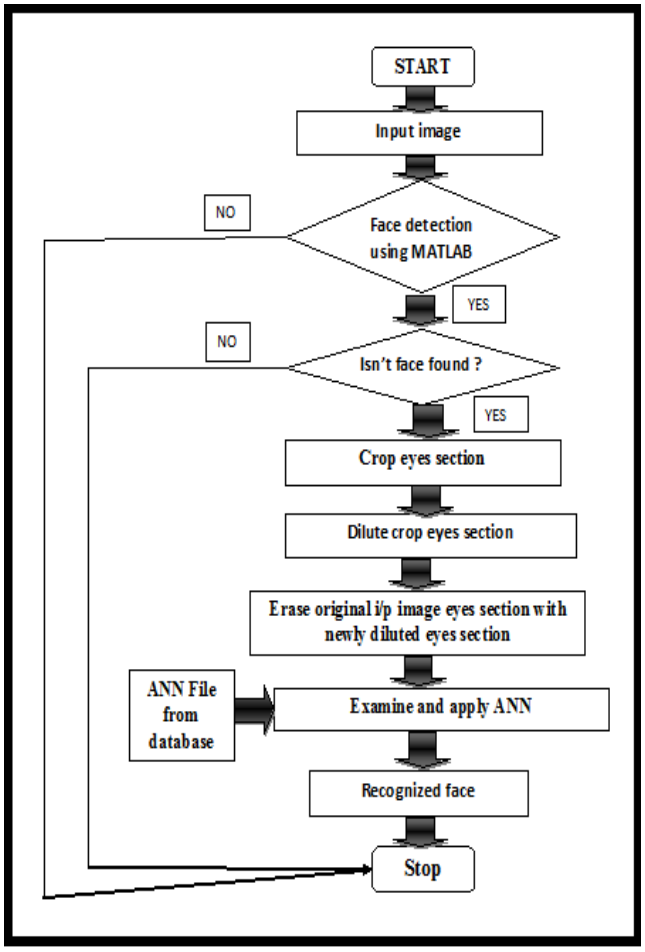

Figure 7: Propose work for Testing

Second part of this dissertation is testing .this is important part of that project. in that firstly we give input face then detect face if that face is human being face then crop that face and enhance face then crop .if anything noisiness on eyes section then crop eye section and dilute it .erase original input image eye section with newly diluted eye section .and finally examine and apply ANN which we already train in Database section .and now our face recognize accurately and stop execution and we will get accurate result that input face is present in database or not.

4. RESULT ANALYSIS

In result analysis , following table shows how face recognition work with diff types of figure and give different output with each different input figures.

The purpose of the experiment is to evaluate the performance of the face recognition system by applying the Erosion and Dilation techniques using ANN with Genetic Algorithm and Edge Detection methods. The face images are frontal face images, which are taken from our local face images database

1) Table for Input image

Sr.no.	Image Name	Dimension	Mean Intensity (sec.)	Entropy (sec.)
1	aa	471×591	0.61569	15.3935
2	ab	180×200	0.42353	17.7778
3	ac	180×200	0.40	17.56
4	ad	180×200	0.46	17.64
5	ae	183×276	0.5215	17.42
6	af	180×200	0.3921	17.72
7	ag	149×153	0.427	17.67
8	ah	151×173	0.55686	17.6647
9	ai	217×232	0.439	17.67
10	Aj	168×251	0.444	17.6544

2) Table for Face Detection

Sr. no	Image Name	Time for face detection (sec.)	Crop face			
			Adaptively		Manually	
			Mean intensity (sec.)	Entropy (sec.)	Mean intensity(sec.)	Entropy (sec.)
1	Aa	7.8868	0.58431	17.1346	-	-
2	Ab	2.7708	0.50196	17.8773	-	-
3	Ac	1.2030	0.43922	17.7454	0.439	17.745
4	Ad	1.9232	0.50588	17.8228	-	-
5	Ae	1.5018	0.4980	17.9319	-	-
6	Af	1.5018	0.4745	17.8259	0.474	17.823
7	Ag	0.6488	0.4784	17.7715	-	-
8	Ah	1.5688	0.5254	17.867	-	-
9	Ai	1.865	0.4745	17.567	0.474	17.5678
10	Aj	1.5499	0.4687	17.987	0.4687	17.987

3) Table for Erosion and Dilation

Sr. no.	Image name	Mean Intensity (sec.)	MSE(sec.)	Entropy (sec.)	PSNR(sec.)
1	Aa	0.70588	250.63	16.722	19.3692
2	Ab	0.876			
3	Ac	0.4941	149.98	17.563	21.5991
4	Ad	0.4784	167.02	17.685	21.1318
5	Ae	0.45882	516.13	17.559	16.232

6	Af	0.41176	133.06	17.571	22.118
7	ag	0.5372	569.35	17.378	15.8057
8	ah	0.6547	332.77	17.778	18.1381
9	ai	0.34583	422.44	17.877	18.443
10	aj	0.5343	522.18	17.594	16.181

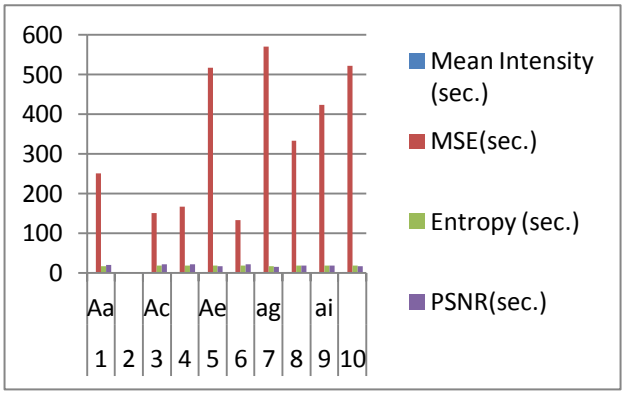

Fig : relationships between entropy and mean intensity of i/p figures

4) Table for total time for face recognized

Sr. no	Image name	Total Time for face Recognition (sec.)
1	aa	62.8238
2	ab	19.549
3	ac	11.8182
4	ad	15.7219
5	ae	31.679
6	af	17.244
7	ag	18.0501
8	ah	19.788
9	ai	20.578
10	aj	28.5402

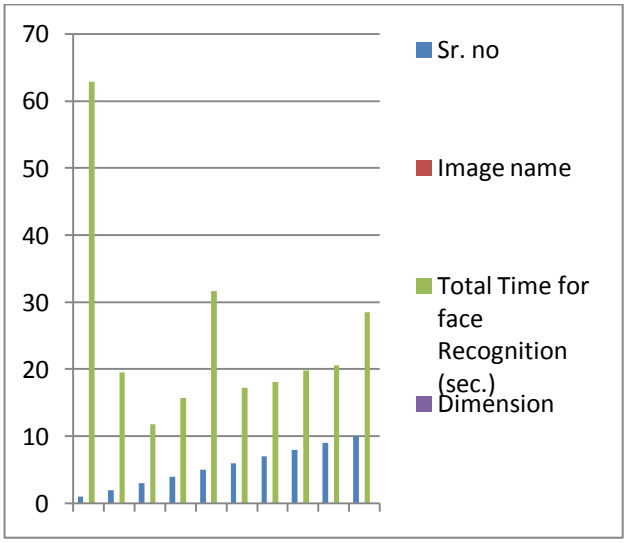

Fig : relationships between dimension and total time for face recognition

5. CONCLUSIONS

This project has attempted to review a significant number of papers to cover the recent development in the field of face recognition. Present study reveals that for enhanced face recognition. As now the research area of face recognition technology is much advanced. Face recognition is that it can be used in the different fields like identity authentication, access control, security and so on. Hence in this project we has attempted to survey on human face detection using erosion and dilation technique.

6. FUTURE SCOPE

The approach described in this dissertation is initially successful and encouraging in face recognition of noise faces but more research is to be done in the following domain:

i. Proposed system observed changes due to covariates; however the analysis does not attempt to explain the cause of the effect in detail. Answering the underline cause of the affects will assist in designing more robust face recognition algorithms and then based on their values the most effective algorithm would perform the matching. Alternatively the weighting of an algorithm response would change based on estimated covariates.

ii. Design and development of new algorithms to recognize face more accurately.

iii. In future , face recognition systems will recognize face in real-time system and in much less constrained situations.

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