International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 4 Issue: 4 886 - 889

Security Surveillance System

Security Through Image Processing

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***Abstract*—**Automatic recognition of people is a challenging problem which has received much attention during recent years due to its many applications in different fields. Face recognition is one of those challenging problems and up to date, there is no technique that provides a robust solution to all situations. This paper presents a technique for human face recognition. A self-organizing program is used to identify if the subject in the input image is "present" or "not present" in the image database. Face recognition with Eigen values is carried out by classifying Eigen values in both images. The main advantage of this technique is its high-speed processing capability and low computational requirements, in terms of both speed, accuracy and memory utilization. The goal is to implement the system for a particular face and distinguish it from a large number of stored faces with some real-time variations as well. The Eigen face approach uses Principal Component Analysis (PCA) algorithm for the recognition of the faces.

***Keywords*—** *Face recognition, eigen values, low computational requirements*

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I. . INTRODUCTION

FACE acknowledgment has turned into an exceptionally dynamic region of exploration lately for the most part because of expanding security requests and its potential business and law implementation applications. Portable control remote transmitting gadget has a universally useful of television the picture that could be seen on the Mobile Phone. This have a remote camera based on it for transmitting the pictures to the Mobile. The progression in the field of remote correspondence and picture handling has captivated us in doing this anticipate. In spite of the fact that a minor assignment for the human cerebrum, face acknowledgment has turned out to be amazingly hard to impersonate misleadingly, since despite the fact that shared characteristics do exist between confronts, they shift significantly regarding age, skin, shading.

The problem is further complicated by differing image qualities, facial expressions, facial furniture, background, and illumination conditions[3]. A generic representation of a face recognition system is shown in Fig. 1.

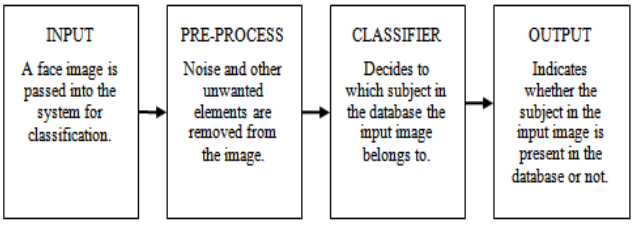

Fig. 1. Generic representation of a face recognition system

At the point when camera catches picture consequently, and recognize the present face then that caught face picture is checked in Data Base of framework. On the off chance that that individual is as of now present in database then framework won't make any move. Be that as it may, in the event that it doesn't coordinate then live video will be caught and it will naturally send to Mobile. This is the best a portion of Our Security Surveillance System.

II. METHOD

Now, we will see procedure in detail by sectoring it into two sections.

1. FACE INITIALIZATION

1. Acquire an initial set of face images (Data Base)
2. Calculate the Eigen faces from the training set, keeping only the M images that correspond to the highest eigenvalues. These M images define the face space. As new faces are experienced, the Eigen faces can be updated or recalculated
3. Calculate the corresponding distribution in M-dimensional weight space for each known individual, by projecting their face images onto the "face space."

In this we compare two images, one is newly captured and another which is already provided to the database.

2. FACE RECOGNITION

1. Calculate a set of weights based on the input image and the M Eigen faces by projecting the input image onto each of the Eigen faces.
2. Determine if the image is a face at all by checking to see if the image is sufficiently close to "face space." which is provided into database of system.
3. Check/Compare the Eigen Values of the new face image a And the face image which is already provided in database.
4. If the Eigen values of the captured image matches with the Eigen values of image which is already stored then we can say that Recognition process is completed.

Face space creation

Accurate reconstruction of the acquired face is not required here so we deplete the quality of the selected picture i.e from M to M'. M' Eigen faces are selected which have largest associated Eigen values. As dimensions are reduced the computational time is also reduced.

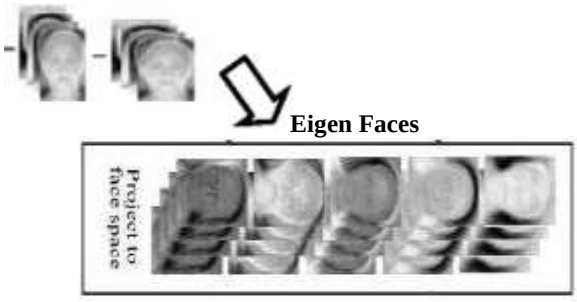

Fig.2 Sum of Eigen Faces

Fig-2 depicts about Eigen faces. To recreate the first picture from the Eigen confronts, one needs to construct a sort of comparable total of all Eigen confronts (Face Space). That is, the recreated unique picture is equivalent to a total of all Eigen faces, with each eigenface having a specific weight. This weight determines, to what degree the particular element (eigenface) is available in the first picture. On the off chance that somebody utilizes all the Eigen faces removed from unique pictures, then he can recreate the first pictures from the eigenfaces precisely. Be that as it may, he can likewise utilize just a part of the eigenfaces. At that point the recreated picture is an estimate of the first picture. In any case, he can guarantee that misfortunes because of overlooking a portion of the eigenfaces can be minimized. This happens by picking just the most critical components (eigenfaces) .

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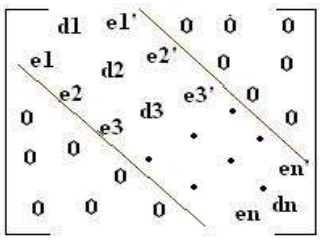
Calculation of Eigen Values

Two algorithms called TRED2 () & QL algorithm are used for calculating Eigen Values. In TRED2 algorithm, Covariance Matrix is given as a input. Here Covariance Matrix is converted into Tri-diagonalised form except Upper, Lower & main diagonal elements all other elements are made zero. Consider an example:



Where e1, e2...en are the Lower corner to corner components and e1', e2'… en' are the Upper inclining components. This calculation utilizes Householder Vector structure which is n x m network (This is a method for Tri-diagonalising the Matrix.). It acknowledges just symmetric framework as information. Working of QL calculation: According to the biggest worth it moves the components in a framework among themselves. (That implies Upper and Lower slanting components are moved as for principle askew elements).Hence the quantity of movements gives the Eigenvalues. Higher the Eigen values higher the property of that picture and corner to corner components will be in a sorted request. Standardization: It takes max Eigen estimation of the Eigen Vector and partitions every Eigen esteem by max Eigen esteem.

Face matching system

A new image T is transformed into its eigenface components (projected into 'face space') by a simple operation,

$$Wk = ukT (T - \psi)$$

Here k = 1, 2….M'. The weights obtained as above form a vector ΩT= [w1, w2, w3… wM'] that describes the contribution of each eigenface in representing the input face image. The vector may then be used in a standard pattern recognition algorithm to find out which of a number of predefined face class, if any, best describes the face. The face class can be calculated by averaging the weight vectors for the images of one individual. The face classes to be made depend on the classification to be made like a face class can be made of all the images where subject has the spectacles. With this face class, classification can be made if the subject has spectacles or not. The Euclidean distance of the weight vector of the new image from the face class weight vector can be calculated as follows,

$$\varepsilon k = || \Omega - \Omega k||$$

Where Ωk is a vector describing the kth face class? Euclidean distance formula can be found in [2]. The face is classified as belonging to class k when the distance skis below some threshold value θε. Otherwise the face is classified as unknown. Also it can be found whether an image is a face image or not by simply finding the squared distance between the mean adjusted input image and its projection onto the face space.

$$\varepsilon 2 = || \Phi - \Phi f ||$$

Where Φf is the face space and Φ = Ti – Ψ is the mean adjusted input. **With this we can classify the image as known face image, unknown face image and not a face image.**

III. PROCESS

Presently we will utilize this hypothesis in MATLAB programming. MATLAB (framework research facility) is a multi-worldview numerical processing environment and fourth-era programming dialect. A restrictive programming dialect created by Math Works, MATLAB permits grid controls, plotting of capacities and information, execution of calculations, making of client interfaces, and interfacing with projects written in different dialects, including C, C++, Java, Fortran and Python.

Android software development (ADK) is the procedure by which new applications are made for the Android working framework. Applications are typically created in Java programming dialect utilizing the Android software development kit (SDK), yet other improvement situations are additionally accessible.

 ISSN: 2321-8169
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Keeping in mind the end goal to build the adaptability of our Security Surveillance System the camera is utilized with the Night Vision.

Night vision is the capacity to find in low light conditions. Whether by natural or innovative means, night vision is made conceivable by a blend of two methodologies: adequate unearthly range, and adequate power range. People have poor night vision contrasted with numerous creatures, to a limited extent on the grounds that the human eye does not have a tapetum lucidum.

These 3 substances are exceptionally fundamental in our framework. MATLAB is utilized for Image handling coding. Android Development Kit is utilized to get the live video on portable. Night vision amplifies the adaptability of framework, with the goal that it can work in night too.

Picture honing and reclamation alludes here to process pictures that have been caught from the present day camera to improve them a picture or to control those pictures in approach to accomplish craved result. It alludes to do what Photoshop normally does. This incorporates Zooming, obscuring, honing, dim scale to shading change, distinguishing edges and the other way around, Image recovery and Image acknowledgment**.**

IV. APPLICATIONS

1. It can be used in High Sensitive areas.

2. To stop terrorism Security Surveillance System can play a crucial role.

3. To reduce the danger to Human life.

4. Image sharpening and restoration.

5. Medical field.

6. Remote sensing.

7. Transmission and encoding.

8. Robot vision.

9. Color processing.

10. Pattern recognition.

11. Video processing.

12. Microscopic Imaging.

13. Machine vision.

V. FLOWCHART

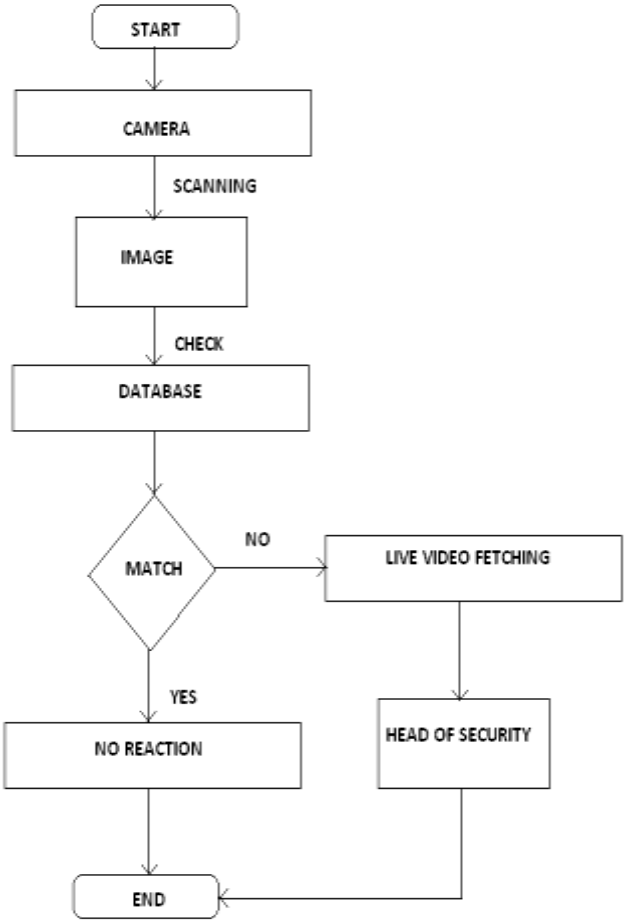

Fig.3 Flow Chart of Image Recognition & Process

VI. FURTHER ISSUES & CONCLUSION

We are currently extending the system to deal with a range of aspects (other than front view) by defining a small number of face classes for each known person corresponding to characteristic views. Because of the speed of recognition, the system has many chances with a few seconds to attempt to recognize many slightly different views, at least one of which is likely to fall close to one of the characteristic views.

Along with the views the atmosphere, whether condition can play an important role. We have to overcome such problems by creating a smart device.

Till now we are able to recognize the same faces which are stored in data base n occurred at present time. We can see the result,

 ISSN: 2321-8169
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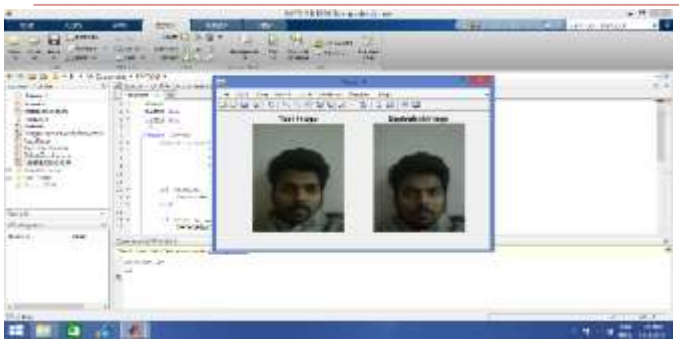

Fig 4. Simulation Result

Thus we have studied The MATLAB software along with that we have learned Recognition of face using Eigen Values. Which can be used for High Security purpose. We have designed our SSS structure such a way that if any unknown person enters the vicinity where our system is installed, instantly it would be clarified as a threat.

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