

# MATLAB Based Realtime Face Recognition for Attendance Monitoring using PCA

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## Abstract

Face acknowledgment is a testing issue because of variety in demeanor, posture, brightening and maturing and so on. The presented paper basically deals with the working of face recognition system using Principal Component analysis (PCA). PCA is a quantifiable approach used for diminishing the quantity of factors in confront acknowledgement. In PCA, each photo in the planning set is considered as an immediate mix of weighted eigenvectors called eigenfaces. These eigenvectors are obtained from covariance lattice of an arrangement picture set. The weights are found in the way of picking a game plan of most noteworthy Eigenfaces. Affirmation is done by anticipating a test picture onto the subspace crossed by the eigenfaces and after that course of action is done by assessing the minimum Euclidean division.

**Keywords:** Eigenvectors, Eigenvalues, Covariance lattice and Euclidean distance.

## INTRODUCTION

Security and approval of a man is really a most important part in any industry. There are various methods used consequently. Face affirmation is an intense strategy for checking a man. The benefit of this approach is that, it engages us to perceive slight changes within the face case of a man to an obvious degree. The recognition structure can persevere through close-by assortments in the face disposition of a man. Hereafter, face an affirmation can be used as an enter factor in bad behavior acknowledgment basically to perceive offenders. There are a couple of approaches to manage defy an affirmation of which principal component analysis (PCA) is been used in our project. The build involves a database of a game plan of facial cases for every individual person. The trademark looks known 'eigenfaces' are expelled in the secured pictures using whichever the structure is set up for following recognition of latest pictures.

In, the course of the latest ten years or close, face an affirmation has transformed into a notable region of research in PC vision, and champion among the best employments of picture examination and cognizance. By virtue of the possibility of the issue, not simply programming designing experts are enthusiastic about it, yet neuroscientists and clinicians as well. It is the general feeling that advances in PC vision research will give accommodating bits of information to neuroscientists and clinicians into how human cerebrum capacities, and the different way. The main objective is to realize the structure (illustrate) of every single face and remember it from a considerable various of set away faces with any steady assortments also. It gives us beneficial way to deal with find the lower dimensional space. The point of this exploration paper is to examine and build up a productive MATLAB program for confront an acknowledgment utilizing

chief segment examination and to perform test for program enhancement and precision. This approach is favored because of its effortlessness, speed and learning ability.

### LITERATURE SURVEY

Face recognition winds up a champion among the most biometrics approval frameworks from the past couple of years. Face recognition is a charming and productive utilization of case affirmation and picture examination. Face recognition structure has two central assignments: verification and validation. Verification infers a 1:1 match and that ponders a face pictures against a format stand up to pictures whose identity being ensured. Face validation confirmation implies a 1: N issue that takes a gander at a request stand up to picture against all photos arranges in a face database. Machine affirmation of faces is well ordered ending up basic in light of its broad assortment of business and law necessity applications, which consolidate legitimate unmistakable evidence, get the opportunity to control, periphery perception and human affiliations and availability of straightforwardness recording contraptions. Diverse biometric features can be used with the true objective of human affirmation like one of a kind check, palm print, hand geometry, iris, stand up to, talk, steps, mark etc. The issue with one of a kind check, iris palm print, talk, steps are they require dynamic joint effort of individual while defy affirmation is a method does not require dynamic investment of a man so without preparing the individual can see the person. Thus, go up against affirmation is generously all the braver diverged from various biometrics. Face affirmation has a high conspicuous confirmation or affirmation rate of more noticeable than 90% for gigantic face databases with all around controlled stance and illumination conditions. Face

recognition biometrics will be the investigation of programming a PC to see a individual face.

There are 2 sorts of pictures for confront acknowledgment method: still picture and video picture (still picture arrangement). In any case, we discovered a few issues in confront acknowledgment framework, for example, (1) posture issue: due to can't control confront picture for catching and have numerous stance variety will be change without fail. (2) Illumination issue: because of source picture have light condition or diverse lighting and review varieties (3) Environment issue: because of for testing. In future work, we propose a novel system for stand up to affirmation by blend approach merges 3D face and face aura.

### PROBLEM FORMULATION

The difficulties of face acknowledgment are the fast and precise ID or grouping of an inquiry picture. There are a few challenges in confront acknowledgment are recognizing comparable appearances (between class similitude) and intra-class fluctuation as head posture, brightening condition, outward appearance and maturing impact. The execution of a face acknowledgment procedure ought to have the capacity to deliver the outcomes inside a sensible time. In human-robot connection, constant reaction time is basic. In addition, it likewise empowers PC frameworks to perceive outward appearances and deduce feelings from them progressively.

### EXISTING METHOD

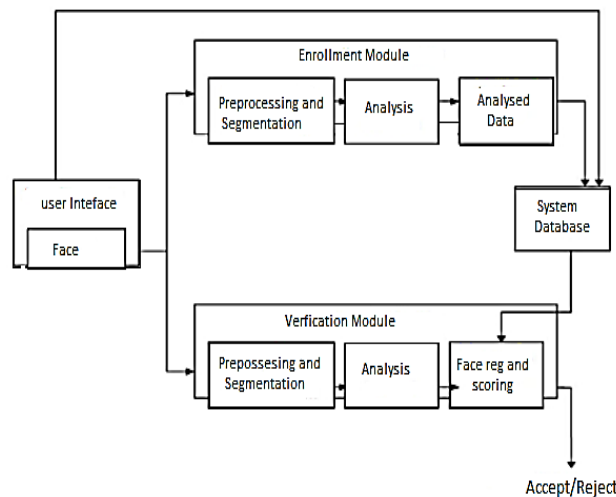
Face acknowledgment technique of identifying the individual from the stored database. At the point when a man is enlisted in a face acknowledgment framework, a camcorder takes a progression of depictions of the face and afterward speaks to it by a special

comprehensive code. When somebody has their face to be confirmed by the PC, it catches their present appearance and contrasts it and the facial codes as of now put away in the framework. On the off chance that the face is coordinated, the individual gets approval; generally, the individual won't be recognized. The current face acknowledgment framework distinguishes just static face pictures that recognizes relatively coordinating pictures put away in the database.

**PROPOSED METHOD**

The proposed confront acknowledgment framework conquers certain confinements of the current face acknowledgment framework. It depends on separating the

commanding highlights of an arrangement of human appearances put away in the database and performing scientific tasks on the qualities comparing to them. Consequently when another picture is encouraged into the framework for acknowledgment the principle highlights are extricated and processed to discover the separation between the information picture and the put away pictures. In this manner, a few varieties within the new face picture to be perceived could be endured. At the point when the current picture of a man differs from the pictures of that individual put stored in the database, the framework will have the capacity to identify the new face and distinguish who the person is.



*Fig 1: Face Recognition Process*

**Eigen values and Eigen vectors**

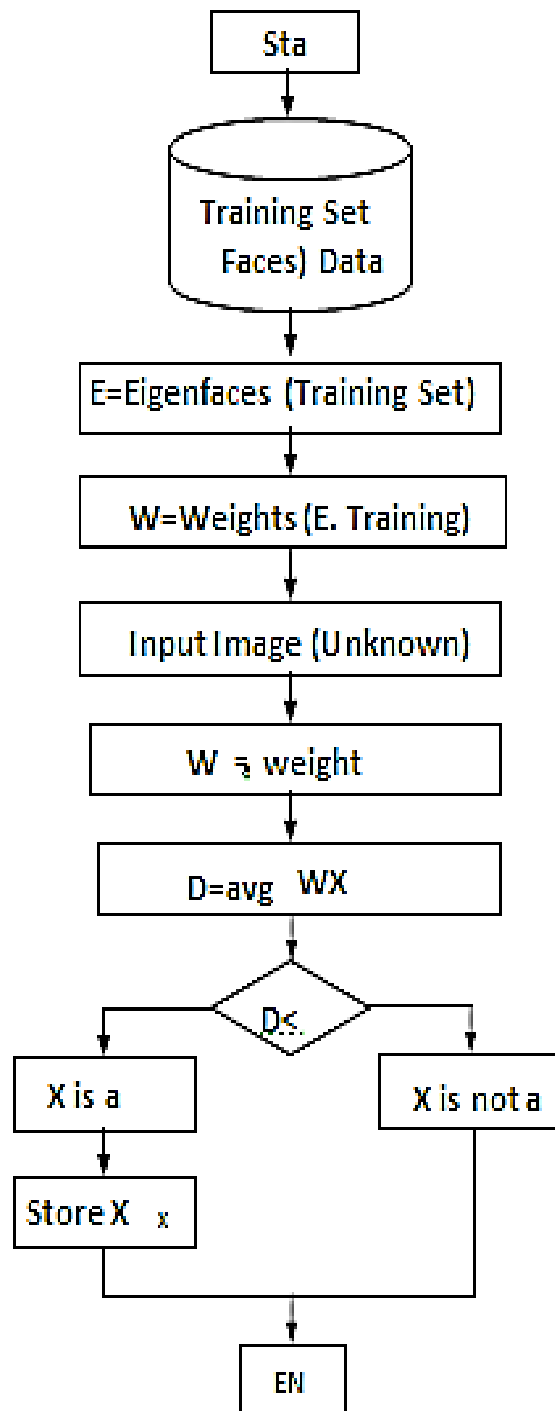
Huge systems can be exorbitant, to the degree computational time, to utilize. Clearing lattices may must be iterated many number of times for an estimation. Similarly, the lead of frameworks would be difficult to analyze without crucial intelligent instruments. One numerical instrument, which has applications for Linear Algebra and furthermore for differential conditions, math, and different various areas, is the likelihood of eigenvalues and eigenvectors. The words

eigenvalue and eigenvector are gotten from the German word "Eigen" which signifies "fitting" or "trademark." An eigenvalue of a square framework is a scalar that is usually tended to by the Greek letter  $\lambda$  and an eigenvector is a non-zero vector appeared by the little letter  $x$ . For a given square structure, an, all eigenvalues and eigenvectors fulfill the condition  $Ax = \lambda x$ .

Since each eigenvector is associated with an eigenvalue, we reliably propose a  $x$  and

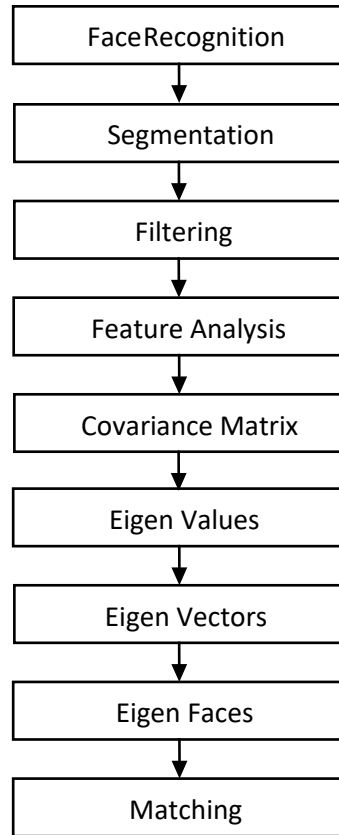
$\lambda$  that stand out from each extraordinary as an eigenpair. An eigenspace is a space containing all eigenvectors which have a tantamount eigenvalue. These eigenvectors are gotten from the covariance matrix of

the likelihood course of the high-dimensional vector space of conceivable appearances of people and subsequently eigenfaces are an arrangement of eigenvectors.



*Fig 2: Flowchart of Eigen face algorithm*

**Principal Component Analysis**



*Fig. 3. Flow Chart of PCA Algorithm*

**STEP 1: Prepare the Data**

The initial step is to obtain a set S with M face images. Each image is transformed into a vector of size N and placed into the set.

$$S = \{ \Gamma_1, \Gamma_2, \Gamma_3, \dots, \Gamma_M \}$$

**STEP 2: Obtain the Mean**

Later obtaining the set, the mean image  $\Psi$  has to be obtained as,

$$\Psi = \frac{1}{M} \sum_{n=1}^M \Gamma_n$$

**STEP 3: Subtract the Mean from Original Image**

The difference between the input image and the mean image has to be calculated and the result is stored in  $\Phi$ .

$$\Phi_i = \Gamma_i - \Psi$$

**STEP 4: Calculate the Covariance Matrix**

The covariance lattice C is calculated in the following manner

$$C = \frac{1}{M} \sum_{n=1}^M \Phi_n \Phi_n^T$$

$$= AA^T$$

$$A = \{ \Phi_1, \Phi_2, \Phi_3, \dots, \Phi_n \}$$

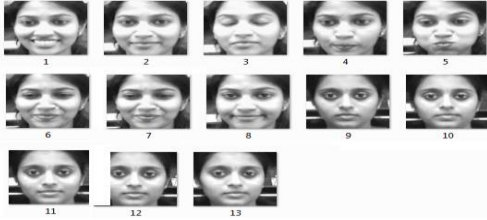
**STEP 5: Compute the Eigenvectors and Eigenvalues of the Covariance lattice and Select the Principal Components.**

**STEP 1: Transform the New Face** The new face is changed into its eigenface segments and the subsequent weights frame the weight vectors.

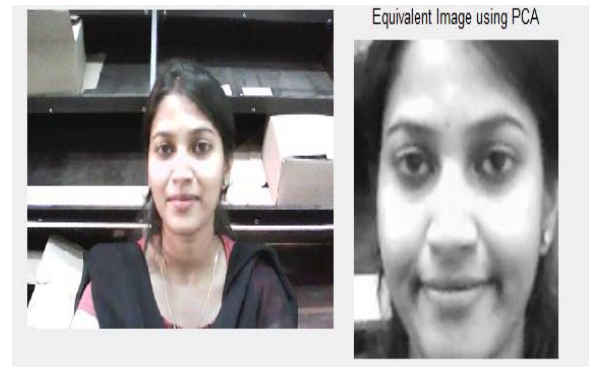
$$\omega_k = u_k^T (I' - \Psi)$$

where  $\omega$  = weight,  $\mu$  = eigenvector,  $\Gamma$  = new input image,  $\Psi$  = mean face  
The weight vector  $\Omega^T$  is given by,  
$$\Omega^T = [\omega_1, \omega_2, \dots, \omega_M]$$

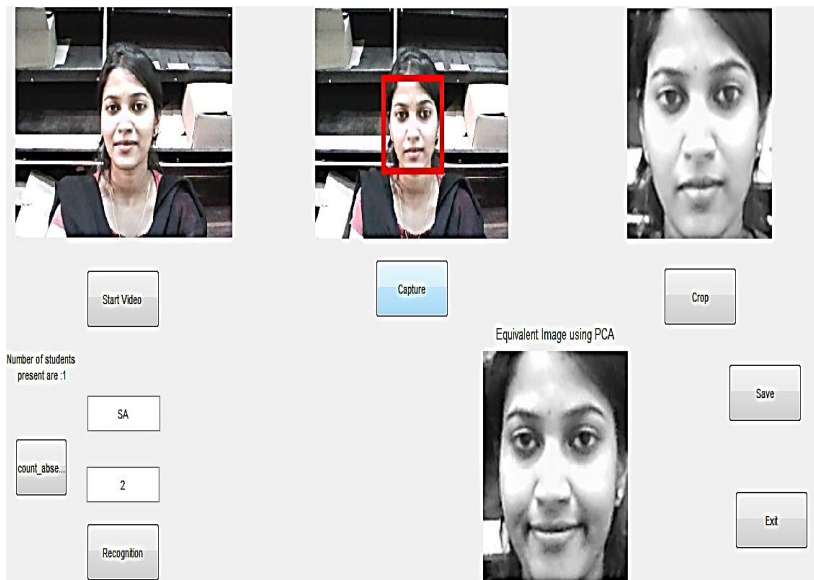
**EXPERIMENTAL RESULTS**



*Fig 4: Images from training database*



*Fig 5: Test image and recognized image from training database*



*Fig 6: Face recognition displayed on GUI window*

	Name	Registered	CLASS1	CLASS2	CLASS3	CLASS4	CLASS5	CLASS6	CLASS7	CLASS8	CLASS9	CLASS10	Percentage	VarName14	VarName15
4	student 1	178EC13001	1	1	1	1	1						100		
5	student 2	178EC13002	1	1	1								100		
6	student 3	178EC13003	1										100		
7	student 4	178EC13004	1										100		
8	student 5	178EC13005	1										100		
9	student 6	178EC13006	0										0		

*Fig. 7: Attendance marked for present students in excel sheet*



## CONCLUSION

The acknowledgment framework can endure nearby varieties in the face demeanor of a person. Subsequently confront acknowledgment can be utilized as a key factor in participation observing mostly when understudy changes articulations. There are a few ways to deal with confront acknowledgment of which Principal Component Analysis (PCA) have been joined in our undertaking.

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