

ENHANCEMENT OF ATM SECURITY

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Abstract—Within the present scenario, the majority of the population uses the ATM system to withdraw cash. At the same time, there are countless ATM thefts and robberies that have occurred in many localities of the city, although Closed-circuit Television(CCTV) cameras are installed within the ATM center, there is no improvement in the reduction of atm thefts and robberies, therefore there is a need to enhance the present ATM system. A good way to abate these kinds of robberies is by means of the usage of smart and embellished technology. In the proposed system the face of the person seeking to withdraw the amount of cash is detected and is compared to the original cardholder with the help of face recognition algorithms like Local Binary Pattern Histogram(LBPH), Linear Discriminant Analysis(LDA), Speeded Up Robust Features(SURF), Principle Component Analysis(PCA). If the face is matched, the transaction is continued, or else a message or email along with the snap of the withdrawer is sent to the registered mobile number or email of the cardholder for confirmation and further procedures.

Keywords— ATM safety, FACE Recognition, FACE verification, camera, PCA, LBPH, LDA, SURF, Feature Extraction

I. INTRODUCTION

The Modern age is constantly changing and everything is at our fingertips because of constant up-gradation in technology. This technology is used from high medical demands to personal needs, one of the most effective usages is in ATM security to reduce ATM thefts and robberies

In the present ATM system, the use of the right PIN allows the user to withdraw the cash and have a successful transaction but when ATM cards are forgotten or stole, an unauthorized person can use the card, which increased the crime and illegal access of the ATM cards which has become a severe danger to both the finance zone and to humans. The robbery related to ATMs primarily based on unauthorized access has accelerated hugely in current years about 90 percent. [3] This leads to enhancement in ATM security to prevent crimes with the help of a method that allows the withdrawer to withdraw cash only after the card

holder's confirmation the cardholder receives confirmation in the form of a message in registered mobile number and email along with the withdrawers' face photo with the help of the Face recognition algorithm

Face recognition is a majorly used technology in many sectors because of its easy integrity and enhanced security, face recognition identifies the unique appearance of the human face after which it makes an analogy based totally on the present database of images. Sensors locate and perceive face shapes by the color of the iris, nostril form, and so on. figuring out the human face consists of focusing on certain particular functions, including the jaw, cheekbones, face shape, and so forth. Once the picture inside the database matches with the withdrawer's face, transaction is continued. In this paper we are applying facial recognition with four different algorithms LBPH, SURF, PCA, LDA. These techniques avoid human error and complete the algorithm in a few seconds making Face recognition successfully efficient.

II. LITERATURE REVIEW

A. "IOT based ATM surveillance machine" ,IEEE global convention on Computational Intelligence and Computing research 2017. in this proposed system a face spotting CCTV camera is used to capture bodily disturbances and is frequently used for physical thefts.the main purpose of our proposed machine is to ship an alert via social media like facebook, twitter, and Gmail the usage of IOT and GSM community. Liquidator chloroform is used to unfold the chloroform to make the thief unconscious. This device caters for realistic monitoring and manage. Maintaining the Integrity of the Specifications.

B. "Developing a LBPH-based Face reputation system for Visually Impaired human beings", IEEE 2021

This document represents a face recognition device with auditory output which may be useful for visually challenged human beings in recognizing recognized and unknown individuals the usage of LBPH set of rules. It has the capability to understand multiple humans from each the front and facet face. the general face popularity accuracy is ready ninety three%. apart from visually challenged human

beings, antique humans with Alzheimer’s disorder can also benefit from the usage of this system.

C. “Face recognition the use of SURF capabilities” SPIE - The worldwide Society for Optical Engineering-2009. This paper deals with using SURF functions in face popularity and offers exact comparisons with SIFT features. Experimental effects show that the SURF capabilities carry out only barely higher in reputation price than SIFT, but there's an obvious development on matching speed. therefore, SURF features are validated to be suitable for face reputation.

D. “Essential element evaluation” international magazine of superior research in pc and verbal exchange Engineering 2018 - in this paintings, we cognizance on the study of PCA methods. In subsequent we endorse a common framework for PCA strategies and pick out problems to be addressed, we convey out some novel PCA methods, which alleviate the issues faced by using both the prevailing PCA strategies and classical PCA techniques, we set up popular properties of PCA methods by acting a theoretical analysis and we increase our function partitioning ideas to cluster analysis and subspace type. primary element evaluation are beneficial as data discount but no longer for knowledge the structure of the statistics.

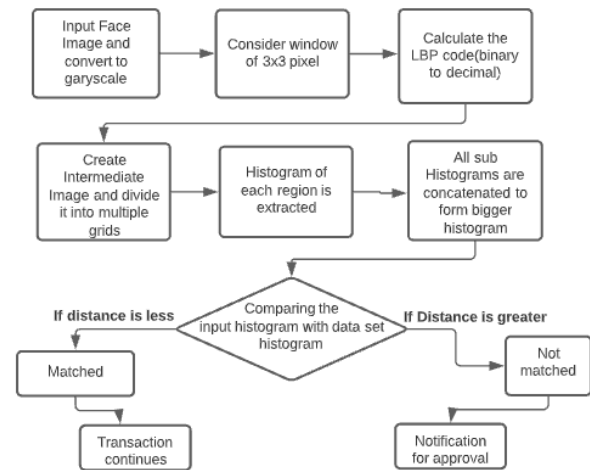
III. PROPOSED SYSTEM

Within the proposed system the face of the user looking to withdraw cash is detected and is compared to the face of the cardholder if matched then transaction is continued, a message is dispatched to the card holder for confirmation using a face recognition algorithm. From comparative study of different algorithms like LBPH, SURF, LDA and PCA we are proposing to use the LBPH face recognition algorithm as it is easy to implement and also has a high accuracy rate compared to other algorithms.

Face detection is a way of locating the faces (place and length) in a photo and probably extracting them to be utilized by the face recognition algorithm.

Feature extraction: After detecting the face in a picture, the features of the face which include eyes, nostril, and mouth are extracted, this is referred to as feature extraction. Feature extraction can be performed in diverse methods. Feature extraction is the most critical and initial step to recognize a face.

Face recognition: with the facial pixel already extracted, cropped, resized and usually converted to grayscale, the face recognition uses a set of rules for finding traits which exceptionally describe the photograph.



IV. ALGORITHMS

1) LBPH (local Binary Pattern Histogram):

LBPH (Local Binary pattern Histogram) algorithm is totally based on the nearby binary operator which was first brought by Ojala et al. designed to be a texture analysis for the grey-scale photograph. LBPH is a combination of LBP and Histogram of oriented Gradients (HOG). It is a well-organized texture operator that labels the pixels of a photo.

The first task is to teach the algorithm the usage of a dataset with the facial pictures of the humans we need to recognize. To do so, we need to set an ID for each photo, so that the algorithm will use this data to recognize input images and will come up with an output. Photographs of the same person must have the same id.

[6]The main task of LBPH is to create an intermediate image that describes the original one much more efficiently, by showing facial characteristics. To accomplish that, the LBPH makes use of parameters like radius and neighbors. Initially, (refer to Fig.1) the input image is captured and converted into gray-scale. The part of a photograph that is in gray-scale is taken as 3x3 window size where each pixel is in comparison to its 8 closest neighbor pixels. ‘0’ value is been assigned to the pixel if value of that pixel is less than the central pixel. ‘1’ value is been assigned to the pixel if value of that pixel is greater than the central pixel. An eight-bit binary wide variety is formed by merging the bit values together. The obtained binary range may be translated into a decimal cost, known as the pixel LBP value, in a range between 0-255. This new pixel cost for the photo offers tons of better properties than the authentic photo.

The photograph generated within the ultimate step is divided into multiple grids to extract the histogram. The

histogram is created by calculating the number of appearances of all the LBP values in that vicinity. The obtained histograms of all the regions are concatenated to create a new and larger histogram. The final histogram represents the traits of the authentic image. So, to locate the photograph that fits the input photograph we just need to evaluate the histogram of the input image with the images having the nearest histogram.

To evaluate the histograms, we need to calculate the gap among histograms, which can be done via Euclidean distance [2]. Calculated distance may be used as a 'confidence' measurement. Less the confidence level, less is the space among histograms i.e. the set of rules has effectively recognized the individual. Output of the algorithm: i) ID of the photo with the nearest histogram ii) calculated distance i.e. confidence measurement.

2) SURF (Speeded up strong characteristic):

The SURF approach (speeded up sturdy capabilities) is a quick and sturdy method for neighborhood, similarity invariant representation and assessment of photos. SURF became first published via Herbert Bay, Tinne Tuytelaars, and Luc Van Gool, and supplied on the 2006 eu conference on pc imaginative and prescient. The characteristic extraction method for interest factor detection makes use of a completely primary Hessian matrix approximation. Surf makes use of the Hessian matrix due to its precise performance in computation time and accuracy.

The creation of the SURF feature descriptor takes area in steps. Step one includes fixing a reproducible orientation based totally on records from a circular area around the key factor. Then, we construct a square area aligned to the chosen orientation and extract the SURF descriptor from it.

Hobby factor Detection is the detection that is executed using the usage of Hessian matrix primarily based degree to come across hobby factors in an photo which are invariant to scale and rotation. Interest factor Descriptor is a distribution of Haar-wavelet responses within a local place is used as a descriptor.

In mathematics, the Hessian matrix or Hessian is a square matrix of second-order partial derivatives of a scalar-valued function, or scalar field. It describes the nearby curvature of a characteristic of many variables. In mathematics, the Haar wavelet is a sequence of rescaled "square-fashioned" functions which collectively shape a wavelet own family or foundation. Wavelet analysis is just like Fourier evaluation in that it allows a goal function over an c language to be represented in phrases of an orthonormal foundation.

SURF features provide obvious advantages of invariance of shifting, rotating and scaling, and partial invariance to illumination and affine transformation. SURF usually uses 64 dimensions in SURF to reduce the time cost for both feature matching and computation. SURF has three times

better performance as compared to SIFT. SURF is much faster than SIFT with respect to feature detection and feature extraction.

SURF set of rules mainly consists of the following steps :

- (1) Assemble Hessian matrix.
- (2) Scale space technology.
- (3) Using the non-maximal suppression to first of all decide the feature points and then appropriately discover the feature factors.
- (4) The use of the improved ft set of rules to locate all salient areas inside the photo.
- (5) Calculate the proportional weights of function factors outside the giant location.
- (6) Extract the SURF descriptor of the chosen key factor. [11]

3) LDA (Linear Discriminant Analysis) :

LDA is used to reduce the number of dimensions which makes it more efficient for data processing. Separation of classes is very important while reducing the dimensions. Each of the new dimensions generated is a linear aggregate of pixel values , which will shape a template. LDA cuts down the dimensions i.e. it reduces the number of dimensions inside the dataset accommodating as much essential information as possible.

Suppose we plotted the correlation within two variables. If we would like to reduce the dimensions to one, one way is to plot all the variables on X - axis, but if we do that any necessary data of another class is violated. Furthermore if we use LDA, it uses information from both the classes and plots the data on a different axis in such a way that it reduces variance and maximizes the separation between the means of 2 classes. It abides by the analytical properties of data computed for every class.

For an input variable for instance x it calculates its variance and mean of every class. These analytical properties are computed from data and substituted in LDA equations to make predictions.

Steps of LDA:

- 1) Calculate inside class and between class scatter matrices.
- 2) Calculate the eigenvalues and eigen vectors for corresponding scatter matrices.
- 3) Sort the eigenvalues and select top k.
- 4) Create a brand-new matrix containing eigenvectors that map to the k eigenvalues.
- 5) gain the brand-new capabilities (i.e. LDA components) by taking the dot fabricated from the information and the matrix from step four. [10]

4) Principle Issue Analysis:

One of the best Principle Component analysis procedures utilized in face recognition is referred to as the eigenface method. This technique converts faces into small set of essential traits, Recognition is completed by projecting a new picture in eigenface subspace, and then evaluating its features in the eigenface area with the recognized individuals. The benefit of this is in its simplicity, pace and inconsiderateness to small or steady changes at the face. The picture which is used should be vertical frontal perspectives of human faces.

PCA set of rules:

1. Creating a training set and loading it
2. Converting face image in Training set to face vector.
3. Normalizing face vectors. i. compute the avg face vector ii. Deduct avg face from each face vector to calculate eigenvectors iii. we need to calculate the covariance matrix
4. Dimensionality of the Training set reduced.
5. Eigenvectors are calculated from the covariance matrix.
6. Selecting best eigenfaces, such that it represents the complete data set.
7. Converting dimensional eigenvectors to original face dimensionality.
8. Constitute each face picture in a linear aggregate of all eigenvectors. a sum of weight of eigenfaces and mean face is calculated to refer each face from training set.
9. After that we find out the eigenfaces for the "M" Training pictures and choose a fixed most applicable Eigen faces, k weight vectors are designed and saved inside training set of each picture. [9]

V. COMPARISON BETWEEN EXISTING AND PROPOSED SYSTEM

One of the existing systems aims at preventing physical threats such as attack on the withdrawer using weapons such as knives, guns etc. A CCTV camera is installed in the ATM along with vibration sensors, if any unusual movements are detected by sensor or captured by camera, chloroform is released which makes the attacker unconscious and an alert message is sent through social media and Gmail using IoT and GSM network which makes the public aware of the attack happening in their vicinity so that preventive measures can be taken.

In the present system there are security concern so to overcome this we have proposed to apply face recognition

in enhancing atm security by using LBPH face recognition algorithm

VI. RESULT AND CONCLUSION

Hence, we have studied four distinctive face recognition algorithms i.e. LBPH, SURF, LDA and PCA for identifying and verifying the person from a digital picture in an ATM system to enhance its security. We are proposing to use the LBPH face recognition algorithm as it is easy and effective and the lowest accuracy rate is 98 percentage . This paper contributes to the ATM safety by recognizing whether or not the cash withdrawer is card holder or not with the aid of facial recognizer and thereby asking for approval from the card holder while retrieving cash and hence preventing the misuse of ATM card by unauthorized user.

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