Bank Locker Security System Using Machine Learning with Face and Liveness Detection

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Abstract: In this Paper we implemented and design Face recognition play a vital role in variety of applications from biometrics, surveillance, security, identification to the authentication. In this paper we design and implement a Bank locker security system where access people whose faces are available in the training database. First, we are going to detect the face by detecting the human motion. Then face recognition is performed to determine the authority of the person to enter the sensitive area. At the same time, we track the coordinate of detected motion. Failing to recognize the face finally passes the estimated coordinate to anesthetic gun for targeting the intruder automatically. Experimental results demonstrate the effectiveness of proposed Bank locker security system in order to restrict the unauthorized access and enhanced reliability by use of Liveness face recognition.

Keywords: Face Detection, Feature Extraction, Tracking, Machine Learning.

I. INTRODUCTION

Human face detection is the most promising field of image processing that has a vast area of research oriented real life applications. In the real world the concept is widely used for the content annotation, access control, profiling and potential discrimination in the web world. There is always constructive scope of new inventions in the field of technology which is as vast as galaxy on its own. This leads to the better future. There has been a supportive development in the field of technology by the humans since the beginning of mankind. The motive was in rapid development and also in the advancement of technology to ensure the minimization of risk that is prone along with the new inventions which would make life easier, better and much faster. The main intention of face detection is to find out the human face in the given input. The Psychological process of locating the human face in the visual frame is also possible. It is also categorized as a special case of object class detection. The Eigen face approach is considered as a promising technique of face detection. In the field of marketing the facial image detection is playing a role of huge interest for the users. It has always been an issue of personal authentication that needs to be fixed for the purpose of access control of the info-security in the wider context via physical security.Researchers found that the face detection is an issue that needs to be taken into consideration. In terms of appearance, human face has high degree of variability,making it a dynamic object of study.   Application of face detection is found in crowd surveillance, video conferencing, biometrics etc. The concept of human face detection makes it difficult for computer vision. Detected face is stored with high level of secrecy and certainty. Assuring that the data is safe, is the most important aspect under discussion. The image data consists of properties associated with, such as high level of redundancy, bulk capabilities and also high correlation between the pixels.

II.MOTIVATION

Automatic face recognition has been a challenging task for the research community. It has been extensively adopted by the applications including biometrics ,surveillance, security, identification, and authentication. Face recognition usually exploit high-dimensional information which makes it computationally intensive.

III.PROBLEM DEFINITION

We build and implement Bank locker security system using machine learning with face and liveness detection.

IV. RELATED WORK

In this section, we briefly review the related work on Face Recognition and their different techniques. The work presents the study of various famous and unique techniques used for facial feature extraction and Face Recognition. Various algorithms of facial expressions research are compared over the performance parameters like recognition accuracy, number of emotions found, Database used for experimentation, classifer used etc [1]. This work proposes a system that will automatically identify the facial expression from the face image and classify emotions for fnal decision. The system uses a simplifed technique called 'Viola Jones Face Detection' technique for face localization.

The diferent feature vectors are club together using a subset feature selection technique to improve the performance of recognition and classifcation process. Finally the combined features are trained and classifed using SVM, Random Forest and KNN classifer technique [2].

The proposed technique use three steps face detection using Haar cascade, features extraction using Active shape Model (ASM) and Adaboost classifer technique for classifcation of five emotions anger, disgust, happiness, neutral [3].

In this work implement an effcient technique to create face and emotion feature database and then this will be used for face and emotion recognition of the person. For detecting face from the input image we are using Viola-Jones face detection technique and to evaluate the face and emotion detection KNN classifer technique is used [4].

This paper objective is to display needs and applications of facial expression recognition. Between Verbal Non-Verbal form of communication facial expression is form of non-verbal connection but it plays pivotal role. It expresses human related or flling his or her mental situation [5].

Sr. No	Title of paper	Year	Author	Advantage	Limitation	Scope Of Improvement
1	Autonomous FaceDetection System from Real-time Video Streaming for Ensuringthe Intelligence Security System	2020	Tanvir Ahmed , Al Amin , Mohammad Ashraful Hoque	Multiple faces detection	In this system, video quality absolutely depends on the camera.	Tedious Work will Be handle
2	Enhancing bank security system using Face Recognition, Iris Scanner and PalmVein Technology	2018	Raj Gusain , Hemant Jain , Shivendra Pratap	Vascular Patternthinning is highspeed and compact technique	In this system, video quality absolutely depends on the camera.	Palm Vein Technology can be used in future covering security systems login control and in banking and financial sectors.
3	Design of Face Detection and Recognition System for Smart Home Security Application	2017	Dwi Ana Ratna Wati ,Dika Abadianto	In this face detection has good performance in thevariation of light source distance position as well as angle position.	The use histrogram as a feature is considered to have poor accuracy.	Resolve the distance between the person and the camera which is less than 240 cm
4	Deep Learning based Face Liveness Detection in Videos	2017	Yaman AKBULUT, Sami	The obtained results show that the LRF-ELM method produced more accurate results	Snoffing attacks are not effectively handled	Algorithm lies in its extension to constraints propagation

TABLE I

n this work, a new technique for facial emotion recognition is found. The proposal involves the use Haar transform technique and adaptive AdaBoost technique for face identifcation and Principal Component Analysis (PCA) technique in conjunction with minimum distance classifer for face recognition. Two techniques have been investigated for facial expression recognition. The former relies on the use PCA and K-nearest neighbour (KNN) classifcation technique, while the latter advocates the use of Negative Matrix Factorization technique [6].

V.SYSTEM ANALYSIS

A.Existing system :
The existing system protects vaults through simple lock and keys. Each locker consists of two keys, one key is the master key which is with the bank manager the other one is with the customer. And the vault room key will be with the bank manager and a spare key will be left with the cashier. Every time a customer has to manually sign a record before entering the vault room for accessing his vault. Certain but limited private banks have evolved to use code combinations or fingerprint.

B.Disadvantages of Existing System :
The present system is less efficient in many ways. The records of the customers accessing the vaults maybe lost or ruined by some external source. Similarly a customer's fingerprint can be easily forged. The existing system can also allow the intruders to break in easily due to it's pure security mechanism.

C.Proposed System
In this proposed system it is attention on the human face for recognizing expression. Many techniques are available to recognize the face image. This technique can be adapted to real time system very easily. The system briefly displays the schemes of capturing the image from web cam, detecting the face, processing the image to recognize few results.

D.Advantages of Proposed System
•   System used for locker security.
•   Security against vulnerabilities such as spoofing, tampering, masquerade attack etc.
•   There is no retention of the template or image.
•   Improved authentication, security assurance. Maintaining Privacy and secrecy.
•   It can be implemented in large scale application and public domain with required authorization.

E. Hardware Requirements:
•   Processor - Pentium 4
•   Speed - 1.1 GHz
•   RAM - 256 MB(min)
•   Hard Disk - 20 GB
•   Monitor – SVG

F.Software Requirements:
•   Operating System - Windows
•   Front End - JDK 1.7
•   Database - My SQL 5.0
•   IDE - Eclipse

VI. System Design

A.System Architecture:
A system architecture is the conceptual model that defines the structure,behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system
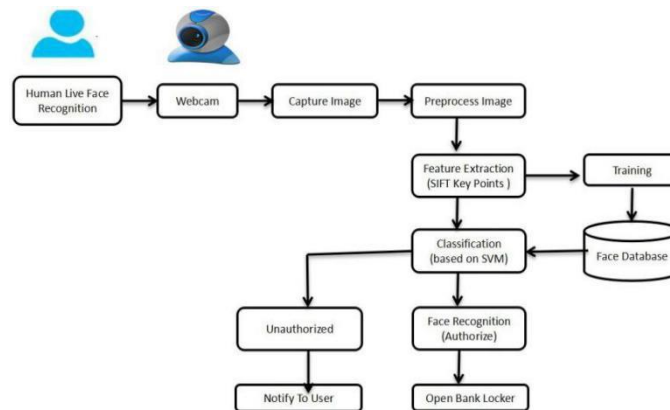
Fig- SYSTEM ARCHITECTURE

B.SIFT(Scale Invariant feature Transform)
The SIFT is an algorithm used to detect and describe local features in digital images. It locates certain key points and then furnishes them with quantitative information (so called as descriptors) which can for example be used for object recognition.
Steps involved in SIFT
- Feature point(also called keypoint) detection
- Feature point localization
- Orientation assignment
- Feature descriptor generation.

VII.CONCLUSION

The authentic face detection for security assurance is the method implemented that generalizes the privacy concerns of the confidential data that requires secrecy conviction. The proposed method can be improved in terms of security assurance i.e. working in the area of face recognition for high level data authentication and security.

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