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ATTENDANCE MARKING IOT: BASED RFID TAG AND FACE RECOGNITION ALGORITHMS

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Abstract

Attendance is System is pretty Old Technology to call the names of the Students Manually. Proxy Attendance is quiet comfortably happening in it. RFID system is used to monitor the student attendance but has some drawbacks. The modification are, the student shows RFID tag which initiates the camera and a face is captured and recognized so that attendance is marked. Then, during the class hours Ultrasonic sensor is activated. If a student leaves in between the class hours or comes late to the class, Ultrasonic sensor is triggers the camera is initiated, which captures the Image and it will be sent to the server. Misbehaved Student (who came out of the class) information is updated in the Records by the Department Incharge & SMS Alert is triggered to the Parent's Mobile. Parents can view the Photo of the Misbehaved Student through their Android Application. Identification with an encrypted RFID tag for token based authentication. Its performance in terms of the ratio between false acceptance rate and false rejection rate and its terms of authentication time. RFID tag needed individual bio-metrics information of the user.

Index Terms: Face recognition algorithms, RFID tag, Ultrasonic and android application.

1. INTRODUCTION

Face recognition is a well developed technology; it had been applied to person authentication. Challenges in face recognition include illumination, pose, facial expression, aging, hair and glasses. Radio-frequency identification (RFID) tags contain electronically stored information has widely used for access control system. However, traditional RFID-based access control system identifies people only by RFID card. Anyone presents a registered RFID card will pass the authentication even he/she is not the card holder. To avoid this problem, face recognition was involved in the RFID-based access control system. The proposed access control system is implemented and performed in a multinational enterprise. The purpose of this system is used to inspect who has the permission to enter the factory for work. All the operations will be recorded with time. HR manager could check the records from the database. Experimental results show that the proposed access control system has strong ability to reject the person presents others RFID card. First, employees are required to present his/her RFID card. Only the person presents a registered RFID card will undergo the face recognition. In face recognition, a face detection technology is applied to extract faces. The normalization process is used to adjust the size and intensity of the extracted faces. The SURF algorithm is then performed to align the extracted and registered faces.

Finally, the CW-SSIM is adopted to calculate the similarity of the extracted and registered faces. *A. Face detection* -Robust Real-Time Face Detection is a powerful facedetection technology with high accuracy. The algorithm consists of three major methods includes integral image, AdaBoost, and cascade detection. In this paper, the RobustReal-Time Face Detection is used to detect faces. *B. Face Extraction*- Since the background and hair significantly affectrecognition, background and hairstyle of detected faces areremoved. Only the "inner face" is used to identify the cardholder in the proposed method.

2. RELATED WORK

A general and efficient design approach using a radial basis function (RBF) neural classifier to cope with small training sets of high dimension, which is a problem frequently encountered in face recognition, is presented in this paper. In order to avoid over fitting and reduce the computational burden, face features are first extracted by the principal component analysis (PCA) method. Then, the resulting features are further processed by the Fisher's linear discriminant (FLD) technique to acquire lower-dimensional discriminant patterns. A novel paradigm is proposed whereby data information is encapsulated in determining the structure and initial parameters of the RBF neural classifier before learning takes place. A hybrid learning algorithm is used to train the RBF neural networks so that the dimension of the search space is drastically reduced in the gradient paradigm. Simulation results conducted on the ORL database show that the system achieves excellent performance both in terms of error rates classification and learning efficiency.

LBP is really a very powerful method to explain the texture and model of a digital image. Therefore it was ideal for feature extraction in face recognition systems. A face image is first split into small regions that LBP histograms are extracted and then concatenated in to a single feature vector. This vector forms an efficient representation of the face area and can be used to measure similarities between images. Automatic facial expression analysis is a fascinating and challenging problem, and impacts important applications in several areas such as human– computer interaction and data-driven animation. Deriving a facial representation from original face images is an essential step for successful facial expression recognition method. In this paper, we evaluate facial representation predicated on statistical local features, Local Binary Patterns, for facial expression recognition. Various machine learning methods are systematically examined on several databases. Broad experiments illustrate that LBP features are effective and efficient for facial expression recognition.

3. AUTOMATED ATTENDANCE MARKING SYSTEM

In the proposed system, RFID system is used to monitor the student attendance but has some drawbacks. The student shows RFID tag which initiates the camera and a face is captured and recognized so that attendance is marked. Then, during the class hours Ultrasonic sensor is activated. If a student leaves in between the class hours or comes late to the class, Ultrasonic sensor is triggers the camera is initiated, which captures the Image and it will be sent to the server. Misbehaved Student (who came out of the class) information is updated in the Records by the Department Incharge & SMS Alert is triggered to the Parent's Mobile. Parents can view the Photo of the Misbehaved Student through their Android

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Application. The student enters the class by showing RFID tag in front of camera the face of the student is captured. Captured face will be verified and attendance is marked. Ultrasonic sensor will observe the movement during class hours. If student leaves the class ultrasonic will trigger the camera. The student image will be forward to concern child then the student behavior will be controlled

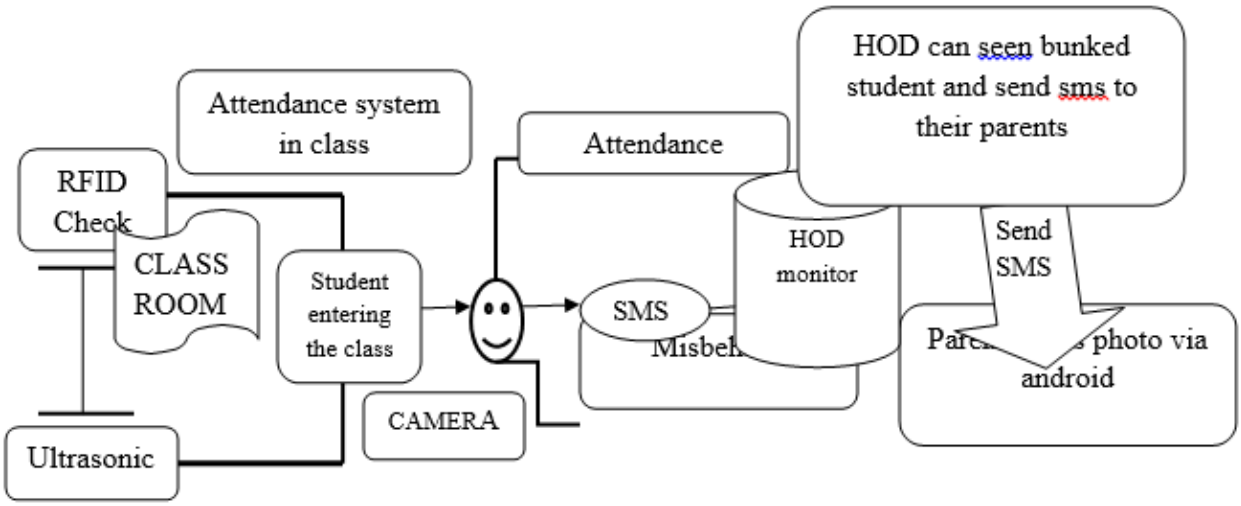

Fig 1: Diagram For Automatic Attendance Marking And Sensing Student Behavior

4. FUNCTION RIDE

1. REGISTRATION

In this module we are going to create an User application by which the User is allowed to access the data from the Server of the Service Provider. Here first the User want to create an account and then only they are allowed to access the Network. Once the User create an account, they are to login into their account and request the Job from the Service Provider. Based on the User's request, the Service Provider will process the User requested Job and respond to them. All the User details will be stored in the Database of the Service Provider.

In this Project, we will design the User Interface Frame to Communicate with the Server through Network Coding using the programming Languages like Java/ .Net. By sending the request to Server Provider, the User can access the requested data if they authenticated by the Service Provider. Register to the RFID Card and face recognition.

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2. CLASS ATTENDANCE

In this module we will create attendance system, in colleges attendance system is pretty old technology to call the names manually. Nowadays the technology improved day by day in other applications.We never consider about the simple application such as student attendance system. In this paper we are going to implement such a thing like student attendance system at the same time we are integrating student behavior monitoring system during the class session.

3. FACE RECOGNITION

In this module a new student tracking technology using ultrasonic sensor and RFID technology. The system is being developed for economic with respect to School and College point of view. RFID tag based Attendance System of every user is implemented with cheap cost. Two types of implementation are integrated here. First one is student will be showing RFID tag in front of the Door, which initiates the camera and Photo is Captured.

4. MISBEHAVIOR

In this module used to analyze the misbehavior student. During the class hours, Ultrasonic sensor which is placed in the above of the entrance detects any student movement. If someone leaves in between the class hours or someone comes late to the class, Ultrasonic is triggered and automatically camera is initiated which captures the image and sends it to the server. The Department Head or other department professors can view the list of students who bunked or came late using their android application. The application hits the server and the server replies with the list of students who bunked.

5. PARENTS NOTIFICATION:

The parents will download to the android application. Incase student leave the class hours or comes late to the class, the HOD can send an SMS to the particular student's parents about their behavior.

6. ANDROID APPLICATION FOR PARENTS

Develop an android application. We cannot store lot of data in a mobile due to limited memory. So, there is no space to store new files. Also we cannot delete the old files. However, loss is there. Mobile Client is an Android application which created and installed in the User's Android Mobile Phone. So that we can perform the activities. The Application First Page Consist of the User registration Process. We'll create the User Login Page by Button and Text Field Class in the Android. While creating the Android Application, we have to design the page by dragging the tools like Button, Text field, and Radio Button. Once we designed the page we have to write the codes for each. Once we create the full mobile application, it will generated as Android Platform Kit (APK) file. This APK file will be installed in the User's Mobile Phone an Application.

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5. TECHNICAL RIDE

1. FACE DETECTION

1.1. The Viola/Jones Face Detector Algorithm

It's a widely used method for real-time object detection. Training is slow, but detection is very fast. Training Data – 5000 faces, all frontal – 300 million non faces, 9400 non-face images. The cascade object detector uses the Viola-Jones algorithm to detect people's faces, noses, eyes, mouth, or upper body. The Viola-Jones algorithm uses Haar-like features, that is, a scalar product between the image and some Haar-like templates. More precisely, let I and P denote an image and a pattern, both of the same size N × N, The feature associated with pattern P of image I is defined by

$$\sum_{1\le i\le N}\sum_{1\le j\le N} I(i,j)1_{P(i,j)\text{ is white}} - \sum_{1\le i\le N}\sum_{1\le j\le N} I(i,j)1_{P(i,j)\text{ is black}}.$$

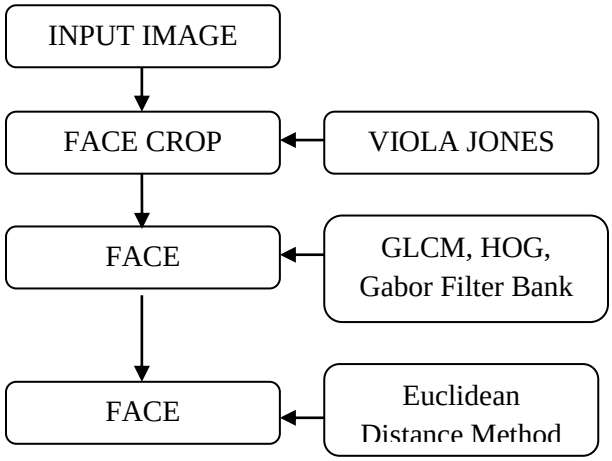

Fig.2.Matlab Face Recognition

2. FEATURE EXTRACTION

2.1. GLCM, HOG, Gabor Filter Bank

Feature extraction a type of dimensionality reduction that efficiently represents interesting parts of an image as a compact feature vector. This approach is useful when image sizes are large and a reduced feature representation is required to quickly complete tasks such as image matching and retrieval. Feature detection, feature extraction, and matching are often combined to solve common computer vision problem as object detection and recognition, content-based image retrieval, face detection and recognition, and texture classification.

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2.2. GLCM (Gray Level Co-occurrence Matrix) Features

The GLCM is a well-established statistical device for extracting second order texture information from images. A GLCM is a matrix where the number of rows and columns is equal to the number of distinct gray levels or pixel values in the image of that surface. GLCM is a matrix that describes the frequency of one gray level appearing in a specified spatial linear relationship with another gray level within the area of investigation. Given an image, each with an intensity, the GLCM is a tabulation of how often different combinations of gray levels co-occur in an image or image section. Texture feature calculations use the contents of the GLCM to give a measure of the variation in intensity at the pixel of interest. Typically, the co-occurrence matrix is computed based on two parameters, which are the relative distance between the pixel pair d measured in pixel number and their relative orientation.

2.3. HOG (Histogram of Oriented Gradient)

Histogram of Oriented Gradients (HOG) features are a trending topic in object detection. HOG features are a robust way of describing local object appearances and shapes by their distribution of intensity gradients or edge directions, and have been used successfully as a low level feature in a number of object recognition tasks. Human faces are generally considered interesting and important to detect in many applications such as surveillance, recognition systems, biomedical, and video. HOG descriptors have been shown to significantly outperform existing feature sets for human detection.

2.4. Gabor Filter Bank

The Gabor filters (GF) are optimally localized in both space and spatial frequency and getting a set of filtered images which correspond to a specific scale and orientation component of the original texture. In this work 5 scales and 6 orientations are used in terms of Homogenous Texture Descriptor. The Gabor function defined for Gabor filter banks is written as

$$G_{p_{s,r}}(\omega,\theta) = \exp\left[\frac{-(\omega-\omega_s)^2}{2\sigma_{\omega_s}^2}\right] \times \exp\left[\frac{-(\theta-\theta_r)^2}{2\sigma_{\theta_r}^2}\right]$$

Where,

$Gp_{s,r}(\omega, \theta)$ is Gabor function at the s-th radial index and r-th angular index $\sigma_{\omega s}$ and $\sigma_{\theta r}$ are the standard deviations of the Gabor function in the radial direction and the angular direction, respectively.

6. FACE RECOGNITION

3.1. EUCLIDEAN DISTANCE METHOD

6. In image analysis, the distance transform measures the distance of each object point from the nearest boundary and is an important tool in computer vision, image processing and pattern recognition. In the distance transform, binary image specifies the distance from each pixel to the nearest non-zero

pixel. The euclidean distance is the straight-line distance between two pixels and is evaluated using the euclidean norm. The city block distance metric measures the path between the pixels based on a four connected neighbourhood and pixels whose edges touch are one unit apart and pixels diagonally touching are two units apart.

CONCLUSION

This paper presented RFaceID, a multifactor authentication system for access control of services and restricted areas, which combines face recognition and token-based authentication for the sake of improved accuracy, reliability, and privacy. The system was specifically devised to work with very low resolution images, thus allowing the storage of the sensitive biometrics user data (e.g., the face images) directly into the RFID tag, without the need for a centralized biometric database. To the best of our knowledge, RFaceID performs better, and with lower resolution face images, than the other approaches in the literature integrating RFID tags and biometric authentication. Moreover, thanks to its novel BestPoint model, RFaceID achieved better FAR/FRR ratio than other state-of-the-art algorithms, such as Gabor Disparity. Furthermore, despite the low execution times and the small amount of data available, RFaceID is able to ensure an acceptable recognition rate together with a low false acceptance rate even in presence of strong variations in the aspect of the authorized user due to illumination changes.

Future work will be aimed to improve the recognition rate on ExYaleB database without increasing the FAR, by using the preprocessor proposed in before the 2DPCA-stage or by using a novel 2DLDA-based first matcher devised to attenuate only the intra-class component of the large-scale band variations in the LDCT feature space.

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