

Smart Surveillance System for Dynamic Attendance

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ABSTRACT : The administration of the attendance can be a great liability on the teachers if it is done by hand. Smart and auto attendance management system is used to resolve this problem. One of the biometric approaches for developing this program is facial detection. Being a key feature of biometric authentication, facial recognition is used vastly in several applications, like video observing and CCTV footage system. The system is planned using PYTHON using IDE (Anaconda navigator). The proposed system uses Haar Cascade algorithm which is based on eigenface approach. This algorithm relates the test image and training image, thereby determining the students who are present and absent. The attendance record is retained in an excel sheet which is updated repeatedly in the system.

KEYWORDS : face recognition, surveillance system, dynamic attendance system, haar cascade algorithm.

I. INTRODUCTION

In recent years, the educational institutions are processing to promote the existing system to the advanced level with the existing system to the advanced level with the new developing technologies. Various teaching modes constantly introduced such as “flip classroom” and other teaching modes continue to develop. The main purpose of adopting new technologies is to solve the problem of the classrooms and to increase the efficiency of teaching. One such factor that affects the efficiency of teaching is the “classroom attendance”. The big problem to be solved is how to improve the efficiency of classroom attendance.

The purpose of attendance in class is to count the number of students present, which improve the quality of teaching. There are two kinds of attendance system framework (i.e.) Manual Attendance System (MAS) and Automated Attendance System (AAS). In MAS, the staff has to keep the students record in classroom all the time, when the count of the students is high, it turns into an extremely dreary and tedious process to mark the attendance physically. Whereas AAS may decrease the managerial work of the staff. For an attendance system which embraces Human Face Recognition (HFR), it normally include the students different facial expression images captured at the time he/she enters the classroom or when everyone is present in the classroom for attendance.

The development in technologies replaced the manual attendance. There are different advance that are done during the process of the face recognition. Firstly, the image will be considered as an input of the system. The face identification process is trailed by face recognition process. Utilizing the faces and processing it by the algorithms, the student is recognized and by coordinating with the face database their attendance is marked.

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II. RELATED TECHNOLOGIES

a. Face detection technology :

Face detection is a computer technology that is used to recognize human faces in digital images in a variety of applications. Face detection also refers to the psychological process whereby human beings in a visual scene locate and attend to faces. Face detection can be viewed as an object-class detection specific case. In object-class detection, the task is to find in an image that belongs to a given class the positions and sizes of all objects. Face-detection algorithms concentrate on identifying human frontal faces. It is similar to image recognition, where a person's image is matched bit by bit. Image fits the data base image stores. Any facial feature changes in the database will invalidate the matching process.

b. Face recognition technology :

A facial recognition device is a technology that can recognize or validate a person from a video source's digital image or video frame. There are several ways in which facial recognition systems work, but typically, they work by matching chosen facial features from a given image with faces within a database. This is also defined as an application focused on Biometric Artificial Intelligence which can uniquely identify a person by analyzing patterns based on the facial textures and shape of the individual.

c. Machine learning :

Machine learning is an artificial intelligence (AI) application which provides systems with the ability to learn and develop automatically from experience without being explicitly programmed. Machine learning focuses on creating computer programs that can access data and use it to learn about themselves. The learning process starts with experiences or feedback, such as instances, direct experience or guidance, to check for data correlations to make better decisions in the future based on the examples we have. The primary objective is to allow computers to automatically learn without human intervention or assistance, and to adapt actions accordingly.

III. LITERATURE REVIEW

The main objective of this system is that , it maintains a database of every student with their picture in there. The system automatically provides a new enrolment number to every new registered student. Every time a faculty is going for a lecture then he has to register for that subject and then take attendance of students using our facedetection system.

- To implement an automated attendance management system for students of a class by making use of video-based face recognition technique.
- Assists in overcoming the chances of proxies and fake attendance.
- Aimed at producing the class room attendance system more efficient and stable.

i). **People Counting in Dense Crowd Images Using Sparse Head Detections** - MamoonaBirkhezShami, Salman Maqbool,et.al

This model proposed a novel algorithm for dense crowd estimation. The proposed method divides the image into small rectangular patches. Each patch undergoes a crowd/not-crowd SURF feature binary SVM classifier. These

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labels along with CNN-based head detections are then used to estimate head size in each patch. The count for patches with no head detection is estimated through weighted average of neighboring pixel counts. The approach has been evaluated on three challenging datasets. The results have showed that our approach gave low error rates on high and medium density crowd images.

They have used a pre-trained head detector trained on totally different data, we aim to train our own head detector on similar high-density crowd images. This would naturally lead to better detections, and thus better crowd count estimates. Similarly, a perspective aware head detector would also boost detection accuracy. Additionally, the time complexity of our algorithm is severely limited by using an R-CNN model for head detection.

Further considerations are, better semantic segmentation of the scene for crowd detection. The overlaying of the rectangular grid on the whole image does not take into account the image perspective information; the patch size can be modified as the distance from the camera increases to achieve better results. The SURF classifier can also be trained on less dense crowd images for better results.

ii). **Practical Automated Video Analytics for Crowd Monitoring and Counting** - kanghaocheong (member, IEEE), sandrapoeschmann, et al

They also found a variety of classical and CNN related object recognition approaches for real-time video analytics in this article. Real-world validation solution has been carried out with both controlled and non-controlled tests, and the results strongly indicate good accuracy of the SSD system, even in outdoor conditions.

They proposed automated video analytics for crowd monitoring and tracking will enable significant manpower savings, especially in key security-sensitive installations such as public transport facilities and protected areas, where CCTV monitoring is oftentimes performed by human operators. Data collection of crowd density and movement can be performed more consistently and with better accuracy than otherwise achievable with manual monitoring. It is noted that the software solution developed here can accept multiple video streams from a centralized storage location, suitable for operation in facilities management or public spaces with multiple installed security cameras. Other useful applications of the current framework may include utilization in factories to detect personnel in restricted places or unsafe proximity to equipment.

Further considerations are, facial identification on top of the current object recognition and tracking for enhanced surveillance capabilities, or to configure recognition for potentially dangerous items such as knives or firearms in the fight against terrorism, to enhance commuter safety and security.

iii). **Indoor Crowd Counting by Mixture of Gaussians Label Distribution Learning** - Miaogen Ling and XinGeng

In this paper, we propose a mixture of Gaussians label distribution learning method for indoor crowd counting. Since the label ambiguity is significantly affected by the crowd number, the standard deviation is adopted to generate the initial Gaussian label distribution for each frame. As crowd number variances of the adjacent frames are also considered, the mixture of Gaussians label distribution is used to represent each frame.

An alternative optimization method is adopted to obtain the best standard deviations and the weights for each

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Gaussian label distribution. The mixed norm is adopted to guarantee the structured sparsely among the adjacent weight matrices. Three new indoor video datasets are collected with crowd number annotations. In the experiments, we achieve promising results on seven indoordatasets.

Further considerations are, For indoor scenes with hundreds of persons, such as concert and sport scenes, our indoor feature extraction method still works. After that, crowd numbers could be divided into a series of consecutive groups (no overlapping) with the same gap of crowd numbers and assume that the crowd numbers in the same group have the same ambiguity degree.

iv). Crowd counting with limited labelling through submodular frame selection.

Qi Zhou, Junping Zhang, LingtuChe, Hongming Shan and James Z.Wang.

We suggest a submodular approach for choosing the most insightful frames from the crowds image sequences. In particular, the system selects the most representative images to ensure the coverage of the content, optimizing the similarity between the chosen image group and the image sequence.

Such frames are also chosen to avoid redundancies and to maintain diversity. Finally, our semi-supervised approach combines regularization of the Laplacian graph and spatiotemporal constraints. Extensive experiments on three benchmark data sets demonstrate that our proposed approach achieves higher accuracy compared with the state-of-the-art regression methods and competitive performance with deep convolutional models, especially Where the number of data labelled is exceptionally small.

Further considerations are, the proposed submodular method can be integrated with other regression methods, and has the potential to be incorporated into other applications, for intelligent transportation systems and beyond.

v).A study on video surveillance system for object detection and tracking.

Pawan Kumar Mishra ,G.P.Saroha

This paper describes the concept of object tracking that can be performed using various methods like point tracking, kernel tracking, color, edges and texture. Two approaches are used in tracking objects. First approach is contingent on matching correspondence and second approach is based on independent monitoring.

It also described about the multi-object tracking system that is divided into 3 parts :

Visual recording, online pattern instruction, follow management.

Further consideration of this paper is to design and develop algorithms for robust object detection and tracking. The main limitation is that , it is not useful for higherkey frame that are required for object detection, it is not suitable to track moving object for denser settings such as crowd of moving people.

vi).Multi-view face recognition via representation based classification.

A.H.Yu ,H.Bai , B.P.Hou , G.Li

The proposed method presents a new fully automatic multi-view face recognition method via synthesized dictionary RC. The proposed approach which consists of three main modules:

(i) face detection.

(ii) facefrontalization and synthesized dictionary generation.

(iii) RC process base on optimized ADLBP feature.

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The system consists of different features preprocess (I(referred as face image), LBP, down-sampled LBP (DLBP),ADLBP) and various RC classifiers (SRC, Wlearning for, LRC and>NNLRC).

Further consideration of the proposed paper is the accuracy of the result because accuracy only compares performance on the test set and does not report how well an algorithm rejects distractor faces.

vii).Automatic video-based human motion analyzer for consumer surveillance system.

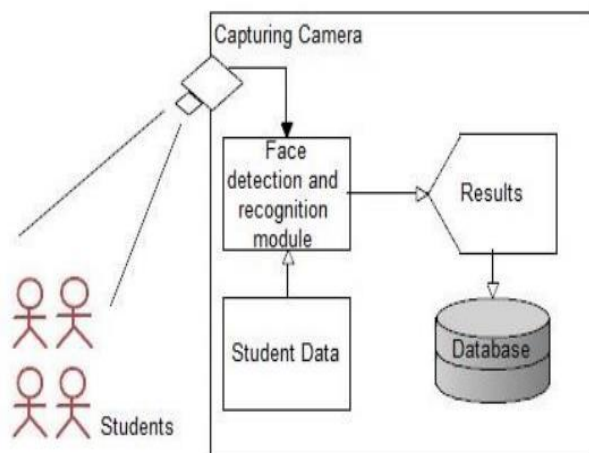
Weilun Lao, Jungong Han and Peter H.N.de , et.al

This paper proposed a layered framework that enables multilevel human motion analysis. This architecture may be the basis for a home-use human surveillance system.This system can be applied for detecting special events such as recording a burglary, or monitoring healthcare problems for elderly or sick people, thereby contributing to the safety of people in the home. The system captures the human gesture, classifies its pose, infers the semantic case that abuses the simulation of experiences, and performs the reconstruction of the 3D scene. Our proposed HV-PCA descriptor with temporal simulation achieves an accuracy rate of about 86 percent for posture-recognition and outperforms other current propositions. As our human motion scheme is effective and achieves good efficiency (6-8 frames / second), it enables practical deployment of a monitoring system, or further study of human behavior.

Further consideration are, improving the effective modeling of multi-personinteraction, in order to obtain a probability-based inference engine. At the current level the question of occlusion is not yet completely discussed. To further counter the occlusion issue, multiple cameras will be used to capture the same scene from different angles and we plan to incorporate an appropriate module for occlusion-treatment, which has been documented to enhance the robustness of motion-analysis.

IV.PROPOSED SYSTEM

i).ARCHITECTURE DIAGRAM



Figure(1) represents the simple architecture of automated attendance system.

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It consists of two databases. one is student database and the other one is attendance database. The student database is to store the different face images of the student in a particular class, whereas the attendance database is for marking and maintaining the attendance records of students attending a particular lecture.

For this, the system will use high-definition camera installed in the classroom. Facial detection and Facial recognition algorithm will be applied to both camera to analyze the face and mark their attendance.

ii). METHODOLOGY

The proposed system is divided into different modules to complete the task successfully. The System's multiple modules are,

1. Acquisition module
2. Preprocessing module
3. Classification module
4. Database entry module

a). ACQUISITION MODULE :

It is the module which presents to the machine the face under consideration. The user is planning to show a facial picture to facial module recognition. It can request a face image from several different environments: the face can be image file from files or captured by video. Haar-cascade algorithm is being used in this module.

HAAR-CASCADE ALGORITHM :

This is a machine-based learning technique, in which a cascade function is learned from both positive and negative images. This is then used on other images to track artifacts.

The algorithm has four stages:

1. Haar Feature Selection
2. Creating Integral Images
3. Adaboost Training
4. Cascading Classifiers

It is well known to recognize faces and parts of the body in an image, but can be trained to identify almost any object.

b). PREPROCESSING MODULE :

It's uniform face and expectations, they're improved to increase recognition system efficiency. Feature Extraction Module: The uniform face picture is introduced to the feature extraction module after any pre-processing (if necessary) to determine the main features to be used for classification. This module, in other words, is responsible for constructing a function vector that is well enough to represent the image of the face.

FISHERFACE ALGORITHM

Fisherface algorithm considers the ratio between the variation of one person and that of another person. That is to say, it maximizes the determinant of between-class scatter matrix simultaneously, minimizing the determinant of within-class scatter matrix.

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Fisherface procedure is as the following. Let there be total N images and total c persons. Suppose the number of images from one person is K. From PCA, we can get N-1 eigenfaces. To minimize the determinant of within-class scatter matrix and maximize that of between-class scatter matrix, we constitute the S_w 's, matrix and get Fisherfaces. The definition of S_w and S_b is as following;

$$S_w = \sum_{i=1}^c \sum_{j=1}^K (y_j - M_i)(y_j - M_i)^T$$

$$S_b = \sum_{i=1}^c (M_i - M)(M_i - M)^T$$

Where M_i is the mean vector of ith class and M is the mean vector of all classes. The c-1 dimensional feature vectors are obtained by projecting feature vectors of PCA onto the Fisherface matrix. And then, we recognize face by using predetermined feature vectors .

c).CLASSIFICATION MODULE

In this section, extracted facet image features are compared with those stored in a face library or face database with the aid of the pattern classifier. Face picture after this contrast is marked as either known or unknown. Training Set: The training sets are used in supervised face classifiers during the "learning step" of the face recognition process. The extraction function and the modules for classification make direct use of the face library.

d).DATABASE ENTRY MODULE

In this module, with the help of the information from the Classification Module corresponding attendance for the student is marked in Database(Excel Sheet). This helps us to maintain a record of the attendance of students in a Dynamic manner.

V.EXPERIMENTAL RESULTS

Fig.1(a) represents the registration process , (b) represents the data stored in the database after the registration process , (c) represents the face recognition process, (d) represents the attendance marked after the face has been recognized .

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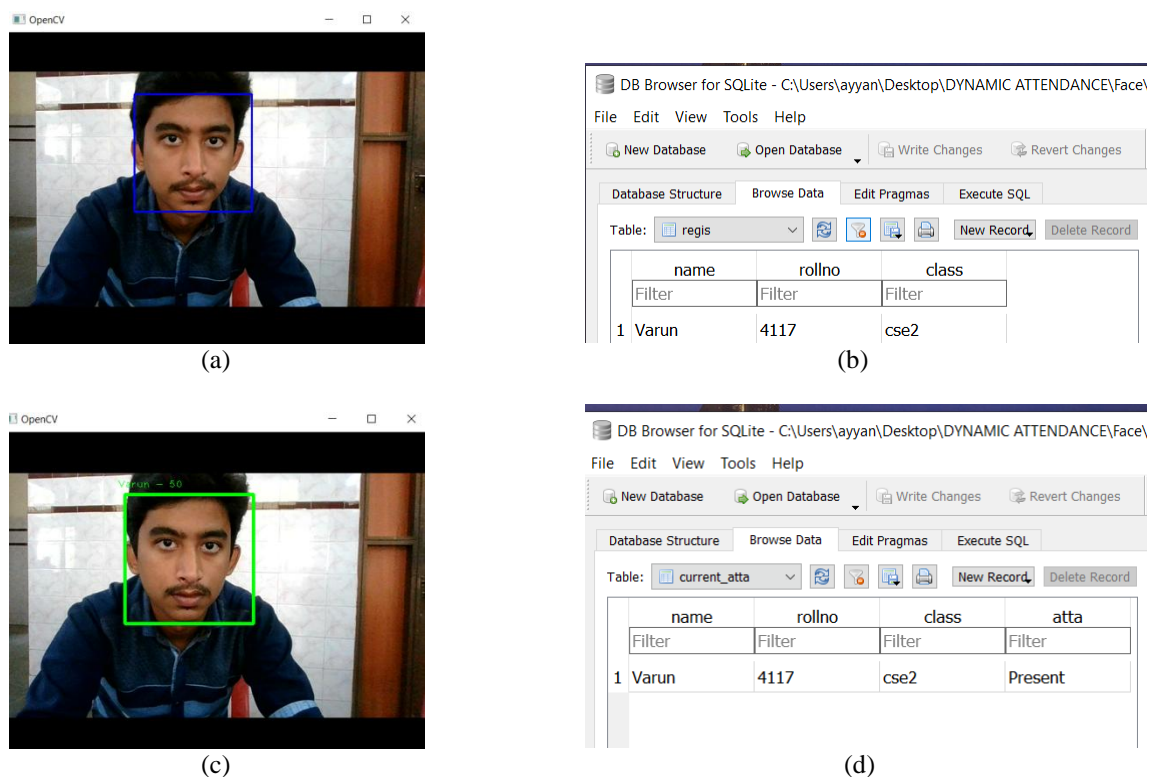


Fig 2(a), represents the identification of registered and unknown faces of student

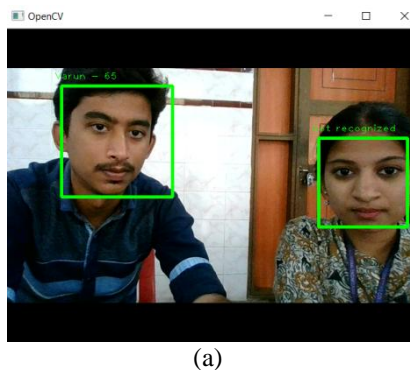


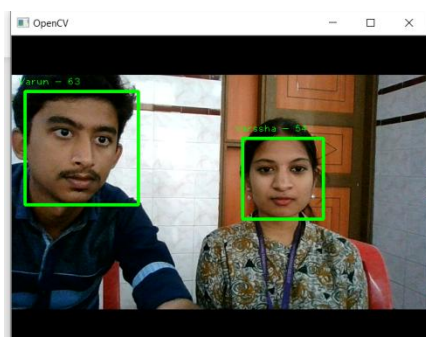
Fig 3(a), represents the detection of multiple faces in front of the camera, (b) represents the attendance marked for the identified candidates in the database, (c) represents the presence of only one registered candidate, (d) shows that empty has been marked in the absence of candidate.

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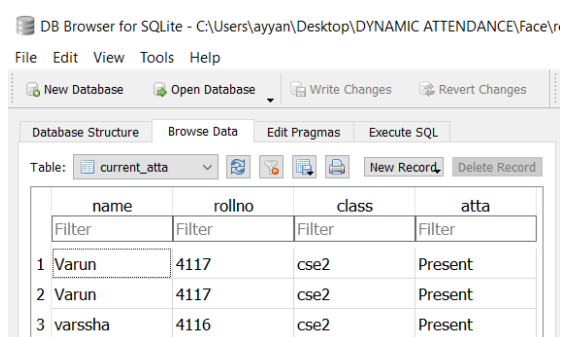
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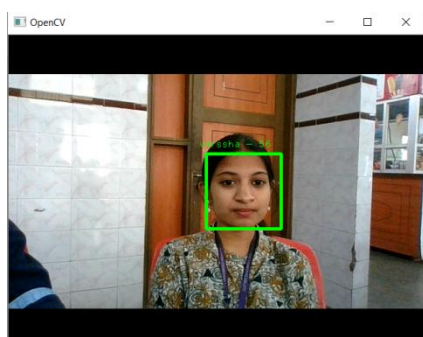


(a)

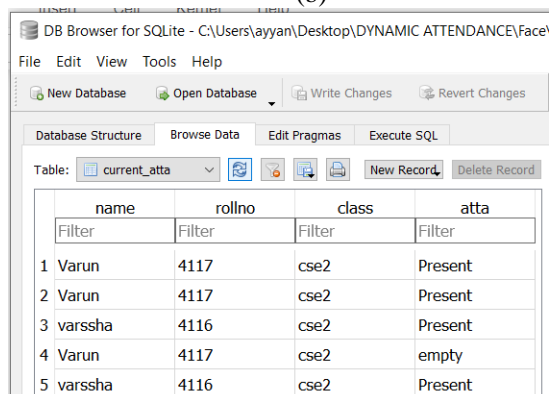


	name	rollno	class	atta
1	Varun	4117	cse2	Present
2	Varun	4117	cse2	Present
3	varssha	4116	cse2	Present

(b)



(c)



	name	rollno	class	atta
1	Varun	4117	cse2	Present
2	Varun	4117	cse2	Present
3	varssha	4116	cse2	Present
4	Varun	4117	cse2	empty
5	varssha	4116	cse2	Present

(d)

VI.CONCLUSION

In this system we have introduced a lecture, section or laboratory attendance method in which lecturer or teaching assistant can monitor attendance of students. Especially if it is a lecture with a large amount of students, it saves time and energy. For the intention of reducing the disadvantages of the conventional (manual) method, automatic attendance method was envisaged. This attendance method illustrates how machine learning methods are used in classrooms. Not only can this program assist with the attendance program but it can also boost an institution's reputation.

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