Face Recognition-Based Attendance Management System

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Abstract- *Study hall participation check is a contributing variable to understudy interest and the last accomplishment in the courses. Gauging participation by getting out names or going around a participation sheet are both tedious, and particularly the last is available to simple misrepresentation. As another option, RFID, remote, unique finger impression, and iris and face acknowledgment based techniques have been tried and created for this reason. Despite the fact that these techniques have a few professionals, high framework establishment costs are the principle weakness. The current paper means to propose a face acknowledgment based versatile programmed study hall participation the executives framework requiring no additional hardware. To this end, a separating framework dependent on Euclidean separations determined by three face acknowledgment strategies, to be specific Eigenfaces, Fisherfaces and Local Binary Pattern, has been created for face acknowledgment. The proposed framework incorporates three distinctive versatile applications for educators, understudies, and guardians to be introduced on their advanced mobile phones to oversee and play out the ongoing participation taking procedure. The proposed framework was tried among understudies at Ankara University, and the outcomes acquired were good.*

Keywords- face discovery, face acknowledgment, eigenfaces, fisherfaces, neighborhood parallel example, participation the board framework, versatile application, precision

I. INTRODUCTION

Most instructive establishments are worried about understudies' investment in courses since understudy support in the study hall prompts compelling learning and builds achievement rates [1]. Likewise, a high support rate in the study hall is a propelling component for educators and adds to an appropriate situation for all the more willing and instructive educating [2]. The most widely recognized practice known to build participation in a course is gauging participation consistently. There are two basic approaches to make participation information. A few educators like to call names and put marks for nonattendance or nearness. Different educators like to go around a paper marking sheet. Subsequent to get-together the participation information through both of these two techniques, educators physically enter the information into the current framework. Be that as it may, those non-innovative techniques are not productive ways since they are tedious and inclined to botches/extortion. The current paper intends to propose a participation taking procedure through the current innovative framework with certain upgrades. A face acknowledgment based portable programmed homeroom participation the executives framework has been proposed with a face acknowledgment foundation permitting the utilization of keen cell phones. In this degree, a sifting framework dependent on Euclidean separations determined by three face acknowledgment methods, to be specific Eigenfaces, Fisherfaces, and Local Binary Pattern (LBP), has been created for face acknowledgment. The proposed framework incorporates three distinct applications for instructors, understudies, and guardians to be introduced on their advanced mobile phones to oversee and play out an ongoing surveying process, information following, and revealing. The information is put away in a cloud server and open from wherever whenever. Web administrations are a mainstream method for correspondence for online frameworks, and RESTful is an ideal case of web administrations for portable online frameworks [3]. In the proposed framework, RESTful web administrations were utilized for correspondence among instructor, understudy, and parent applications and the cloud server. Participation results are put away in a database and open by the educator, understudy and parent versatile applications.

The paper is composed as follows. Area II gives a short writing overview. Segment III presents the proposed framework, and area IV follows by usage and results. The last area gives the primary ends.

II. LITERATURE SURVEY

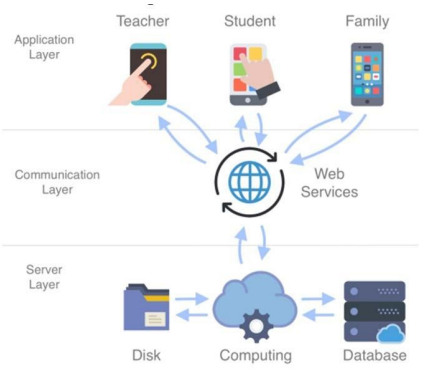
Unique finger impression perusing frameworks have high establishment costs. Besides, just a single understudy at a time can utilize a versatile finger acknowledgment gadget, which makes it a tedious procedure [4]. On account of a fixed finger acknowledgment gadget at the passageway of the homeroom, participation taking ought to be done under the

educator's management with the goal that understudies don't leave after the finger acknowledgment, which makes the procedure tedious for both the instructor and the understudies. If there should arise an occurrence of RFID card understanding frameworks, participation taking is accessible by means of the cards dispersed to understudies [5]. In such frameworks, understudies may depend on false techniques by perusing their companions' cards. Likewise, if an understudy overlooks his/her card, a non-genuine nonappearance might be spared in the framework. The drawback of the study hall filtering frameworks with Bluetooth or guide techniques is that every understudy must convey a gadget. Since the field furthest reaches of the Bluetooth Low Energy (BLE) framework can't be resolved, understudies who are not in the study hall right now yet are inside the Bluetooth territory cutoff points may have all the earmarks of being available in the participation framework [6]. There are various strategies for study hall participation checking utilizing face acknowledgment innovation. One of these is a camera put at the study hall entrance and the understudies entering the homeroom are enlisted into the framework by face acknowledgment [7]. Be that as it may, in this framework understudies' countenances could be perceived, despite the fact that understudies can leave the study hall a short time later, and mistakes can happen in the surveying data. Another strategy is the perception done with a camera put in the study hall and the homeroom picture taken during the course. For this situation, the cameras utilized in the framework should be changed every now and again to continue delivering better quality pictures. Along these lines, this framework isn't valuable and can turn out to be exorbitant. Notwithstanding all the previously mentioned inconveniences, the most widely recognized disservice is that every one of these techniques need additional gear. The proposed framework has been created to address these weaknesses. The principle points of interest of the proposed framework are adaptable use, no gear costs, no sat around, and simple openness.

III. PROPOSED SYSTEM

A. Architecture of the Proposed System

The proposed system's architecture based on mobility and flexibility is shown in Fig.1



The system consists of three layers: Application Layer, Communication Layer, and Server Layer.

1) Application Layer:

In the application layer, there are three versatile applications associated with the cloud server by web administrations. a) Teacher Application: The educator is the leader of the framework, so he/she has the benefit to get to all the information. By his/her brilliant cell phone, he/she can snap a picture of understudies in a study hall whenever. After the snapping the picture, the instructor can utilize this photograph to enroll participation. For this point, the photograph is sent to the cloud server for face identification and acknowledgment preparing. The outcomes are spared into a database together with all the reachable information. The educator gets a reaction by the versatile application and can promptly observe the outcomes. The educator can likewise make an understudy profile, include a photograph of every understudy, and add or evacuate an understudy to/from their group programs. He/she can also make and erase courses. Each course has a one of a kind six-character code. The educator can impart this code to his/her understudies so they can get to their participation results by means of the understudy application. The instructor can access to all information and results dependent on every understudy's perceived photograph stepped with a date. Moreover, an email message with participation information of a class in Excel organization can be mentioned, while the examination of the participation results is given in the application. b) Student Application: Students can sign in courses with the instructor's email address and the six-character course code. They can include their photographs by snapping a picture or a 3-second long video. If there should be an occurrence of blunders, their transferred photographs can be erased. Understudies can just observe restricted consequences of the participation taking procedure identified with their participation. To secure individual protection, the class photographs and identified representation photographs of every understudy can be gotten to just by the educator. In the event that understudies are not in

the homeroom when a participation check is performed, they are informed of the participation check. If there should arise an occurrence of blunders (if an understudy is available, however not recognized by the framework), he/she can advise the instructor so he/she can fix the issue. c) Family Application: Parents can see their youngsters' participation results for each class. Extra kids profiles can be included into the framework. Each parent is added to the understudy's application with name, family name, and email address. At the point when an understudy includes his/her folks, they are naturally ready to see the participation results. They are likewise advised when their kid isn't in the study hall.

2) Communication Layer:

RESTful web administrations are utilized to impart between the applications and server layers. Solicitations are sent by the POST strategy. Each solicitation is sent with an exceptional ID of the approved client of the meeting. Just the approved clients can get to and react the information to which they have option to get to. Because of its adaptability and quick execution, JSON is utilized as the information design for web administrations reaction [8]. With this theoretical web administration layer, the framework can without much of a stretch be utilized for another thing in the application layer, for example, site pages or another versatile working framework.

3) Server Layer:

The server layer is answerable for taking care of the solicitations and sending the outcomes to the customer. Face identification and acknowledgment calculations are acted in this layer and in excess of 30 diverse web administrations are made for dealing with various solicitations from versatile applications.

B. Face Detection

Exact and proficient face discovery calculations improve the exactness level of the face acknowledgment frameworks. On the off chance that a face isn't recognized accurately, the framework will bomb its activity, quit preparing, and restart. Information based, highlight based, layout based, and insights based techniques are utilized for face location [9]. Since the study hall photograph is taken under the instructor's control, present varieties could be constrained to a little range. Viola-Jones face discovery technique with Ada-help preparing is appeared as the best decision for ongoing class participation frameworks [9, 10]. In the most essential sense, the ideal articles are right off the bat found and acquainted concurring with a specific calculation. A short time later, they are examined to discover matches with comparable shapes [11].

C. Face Recognition

There are two essential orders of face acknowledgment dependent on picture power: include based and appearance-based [12]. Highlight based methodologies attempt to speak to (surmised) the article as arrangements of various highlights, for instance, eyes, nose, jaw, and so on. Conversely, the appearance-based models just utilize the appearance caught by changed two-dimensional perspectives on the object-of-intrigue. Highlight based strategies are additional tedious than appearance-based methods. The constant participation the board framework requires low computational procedure time. In this manner, three appearance-based face acknowledgment procedures, for example, Eigenfaces, Fisherfaces and LBP are utilized in the tried framework. Fisherfaces and eigenfaces strategies have a shifting achievement rate, contingent upon various difficulties, similar to present variety, enlightenment, or outward appearance [13]. As per a few past examinations, face acknowledgment utilizing LBP strategy gives generally excellent outcomes seeing velocity and segregation execution just as in various lighting conditions [14, 15]. Euclidean separation is determined by discovering similitudes between pictures for face acknowledgment. A sifting framework dependent on Euclidean separations determined by Eigenfaces, Fisherfaces and LBP has been produced for face acknowledgment. As per the created framework, initially, least Euclidean separations of LBP, Fisherfaces and Eigenfaces calculations are assessed in characterized request. In the event that the Euclidean separation of LBP calculation is under 40; else if Euclidean separation of Fisherfaces calculation is under 250; else if Euclidean separation of Eigenfaces calculation is under 1500, perceived face is recorded as the correct match. Furthermore, if the determined Euclidean separations by the three techniques are more prominent than the base Euclidean separations, the second level Euclidean separations (40-50 (for LBP), 250-400 (for Fisherfaces), 1500-1800 (for Eigenfaces)) are assessed similarly. In the event that the subsequent level conditions are additionally not met, the channel restores an inappropriate match. Thirdly, if any two calculations give a similar match result, the match is recorded accurately. At last, if no conditions are met, the need is given to the LBP calculation and the match is recorded effectively. The framework's particular design focused on adaptability, portability, and minimal effort by requiring no additional hardware. Simultaneously, its goal was to give access to all clients whenever. The framework in this way offers a continuous participation the board framework to every one of its clients.

IV. IMPLEMENTATION AND RESULTS

The following platform was used. The cloud server has a 2.5 GHz with 4-core CPU, 8GB RAM, and 64-bit operating system capacity. Viola-Jones face detection algorithm and Eigenfaces, Fisherfaces and LBP face recognition algorithms were implemented based on OpenCV. Tests were done with both iOS and ANDROID. Forty different attendance monitoring tests were performed in a real classroom, including 11 students, and 264 students' faces were detected. Tables I, II, and III show detection and recognition accuracy of all three different types of tested algorithms related to the Euclidean distance.

Need requesting for 3 calculations was orchestrated by exactness rate for every interim. In test results, 123, 89, and 85 bogus acknowledgments were distinguished for Eigenfaces, Fisherfaces and LBP, individually. By the assistance of the created separating framework, the quantity of bogus acknowledgments diminished to 65. Out of 40 actualized participation observing tests, 10 were led with 1 face photograph of every understudy in database in Step-I, 20 were directed when the quantity of face photographs expanded up to 3 in Step-II, and 10 acknowledgment forms were led with in excess of 3 face photographs in database in Step-III. Table IV shows the acquired outcomes.

TABLE I.
ACCURACY RATE OF EIGENFACES ACCORDING TO DISTANCE

Euclidean distance (d)	True	False	Accuracy Rate (%)
d≤1500	26	4	86.66
1500<d≤1800	20	9	68.96
1800<d≤2100	15	11	57.69
2100<d≤2500	23	18	56.09
2500<d≤3000	29	18	61.70
3000<d	28	63	30.76

TABLE II.
ACCURACY RATE OF FISHERFACES ACCORDING TO DISTANCE

Euclidean distance (d)	True	False	Accuracy Rate (%)
d≤250	39	0	100
250<d≤400	77	19	80.21
400<d≤550	37	19	66.07
550<d≤700	17	15	53.13
700<d	15	26	36.59
d≤250	39	0	100

TABLE III.
ACCURACY RATE OF LBP ACCORDING TO DISTANCE

Euclidean distance (d)	True	False	Accuracy Rate (%)
d≤ 40	15	0	100
40<d≤50	55	10	84.62
50<d≤60	82	49	62.60
60<d≤70	27	22	55.10
70<d	0	4	0

TABLE IV.
MEAN PERCENTAGE ACCURACY RATE

Steps	True	False	Accuracy Rate (%)
Step-I	38	17	69.09
Step-II	94	36	72.31
Step-III	67	12	84.81

The most significant restriction of tried participation observing procedure is diminished accomplishment with expanding separation between the camera and understudies. The outcomes in regards to understudies sitting in front seats are increasingly precise in contrast with results in regards to understudies sitting in the back. Also, the precision rates may have diminished because of the obscuring brought about by vibration while the photograph was taken. Thirdly, now and again one piece of the understudy's face might be secured by another understudy sitting before him/her, which may hamper an effective face acknowledgment process. Since the study hall photographs are taken in uncontrolled conditions, the light and posture could, to a huge degree, influence the exactness rate. The created separating framework limits these impacts. To build precision, present open minded face acknowledgment approach may likewise be utilized [16, 17].

V. CONCLUSION

The current paper proposes an adaptable and continuous face acknowledgment based versatile participation the board framework. A sifting framework dependent on Euclidean separations determined by Eigenfaces, Fisherfaces, and LBP has been created. The proposed framework dispenses with the expense for additional hardware, limits participation requiring some investment, and permits clients to get to the information whenever and anyplace. Savvy gadgets are very easy to use to perform study hall participation checking. Educators, understudies, and guardians can utilize the application with no limitations and progressively. Since the web association speed has been consistently expanding, high caliber, bigger pictures can be sent to the server. Likewise, processor limit of the servers is additionally expanding on regular routine. With these mechanical turns of events, the

exactness pace of the proposed framework will likewise be expanded. Face acknowledgment could be additionally tried by other face acknowledgment strategies, for example, Support Vector Machine, Hidden Markov Model, Neural Networks, and so on. Moreover, identification and acknowledgment procedures could be performed on brilliant gadgets once their processor limit is adequately expanded.

Along with this we have added a feature which will calculate the percentage of attendance for each student and will help the student to monitor his leaves. As in many institutions there is a criteria of maintaining at least 75% of attendance otherwise the student is debarred. This feature will help student to regularly check weather his attendance is up to mark or falling below 75%.

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