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SmartAttendance System inCrowdedClassroom

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ABSTRACT:*Within a few span of years there has been major changes in the technique of how differenteducational institutions handle the students. Modern techniques have been introduced that are basically theonline mode of education. Many educational institutions have been using tools such as Discord, MicrosoftTeams, Google Meet, Zoom etc. for tracking student attendance. So, the face will become a crucial componentinside the human frame for uniquely figuring out all the use of face characteristics we can put into effect abiometric system. The most worrying gadget in any agency is marking the attendance in a normal basis. Intraditional method attendance was marked by signing in the attendancesheet or by calling out names inclassroom by teacher and marking present or absent. This system was prone to error and was time taking. Ourprojectismadetoconflictthisapproachandbuiltanewwayofmarkingattendance.WehaveproposedanOpen CV based face recognition project. The assignment includes a digicam that captures pics that is taken asinput, encoding and figuring out the face, marking the attendance in a separate spreadsheet and storing in agadget. We create an education database by using education the device with the faces of the authorized collegestudents. The proper snap shots are saved as a database with right labels. We extract the capabilities the use ofthe LBPH set of rules. Then the attendance is marked by comparing and marking attendance in the excel sheetforevery period.*

KEYWORDS-*ConvolutionalNetworkNetworks(CNN),HAARCASCADE,ImageProcessing, LBPH,OpenCV.*

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I. INTRODUCTION

One of the primary usages of CCTV digicam is to display the internal of a building for security. Thisform of system lets in developers to construct computer imaginative and prescient-based utility that may beincorporated withCCTV camerastoconstruct veryinteresting applications[1].
Facereputationisanextremelygoodmethodforidentityauthentication.Wecanalsoapplythissystemformarkingattendanceineducationalinstitutions[3].This systemcansignificantlyhelpinreducingthetimefortakingattendanceinschool andcolleges bytheirprofessors,significantlyincreasingtheaccuracyforattendancemarking and avoiding intermediary of infectious illnesses. The present attendance marking system that marksattendanceusingfingerprintsisnowgoingthroughmostimportantissuesbecauseofthebigintra-classvariability and massive intra-magnificence similarities which has been cited by Dyre and Sumathi. The proposedtechniquewillmaketheprocessmuchfaster,thoughtheinitialimplementationcostwillbemorethanthetraditional process.Inthepast10yearscrowdmonitoringandcrowdcountinghasbeenamajorlearningarea for researchers as theycanlearnabout humanbehavior, how theyreact todifferent situations etc.So manyConvolutional Network Networks (CNN) are designed for tracking this assignment[6]. But for working with thiswe need a high-level dataset, which is not currently available for proper working of the system. Besides abenchmark website has also been built which allows researchers to submit the results of the test set. So, thedatasetisconstructedproperafterwhichwesimilarlydescribethefactscharacteristics,evaluatefew oftheprocess of operating of kingdom-of-art (SOA) methods and analyze the problems for finding of new solutions totheproblems.

II. LITERATURESURVEY

[1] King,Davis, “Max-Margin Object Detection”, maximum item detection SMART ATTENDANCESYSTEM IN CROWDED CLASSROOM methods function through making use of a binary classifier to sub-home windows of an photograph, observed by means of anon-most separation step wherein detections onoverlapping sub-home windows are eliminated. Since the quantity of feasible sub-home windows

in even fairlysizable picture datasets is extraordinarily massive, the classifiers normally discovered from best a subset of thewindows. This avoids the computational issue of managing the whole set of sub-home windows, however, as wewillshow inthispaper, itresultsinsub-topofthe linedetector performance.

[2] Samet, Refik and Muhammed Tanriverdi, "Face Reputation based cellular computerized lectureroom attendance gadget", school room attendance check is a contributing factor to scholar participation and thevery last success within the guides. Taking attendance by means of calling out names or passing round is timetaking. As an opportunity, RFID, wireless, fingerprint and iris and face reputation-based totally strategies. Thegadget ambitions to recommend a face recognition-based cell automated classroom attendance managementdevice. Wanting no greater equipment. To this quit, a filtering device primarily based on Euclidian distancescalculatedbywayofthree phaserepitationtechniques,namelyEigenfaces,Fisherfaces andlocal binarypattern,hasbeenaworldwarforface recognition.

[3] Jayant, Nazare Kanchan and Surekha Borra, "Attendance gadget the usage of hybrid face popularitytechniques", attendance recording of a scholar and educational agency performs a vital function in judgingstudents performance. As guide exertions involved in this procedure is time ingesting, an automating attendancecontrol device based on face detection and face reputation strategies is proposed in paper. The gadget employschanged Viola-Jones algorithm for face detection, and alignment-loose partial face reputation algorithm for facerecognition.

[4] Yu-Chen1, Ying Tai, XiomingLio, Chunhua Shen, Jian Yang, "FSR Net: give upto cease learningface outstanding resolution with facial priors", face first-rate decision(SR) is a website-unique remarkabledecision hassle. The facial previous understanding can be leveraged to better grade-remedy face photographs.Wegiftanoverdepend-to-
endtrainablefaceterrificresolutioncommunity,whichusesthegeometryprevious,
i.e. face temperature tags and markers and analysis maps, so that a high level can determine low-resolution (LR)face structures without the need for alignment. Particularly, we first assemble a rough SR community to getbetter a rough excessive-decision(HR) put of that photograph. Then, the coarse HR photo is dispatched to twobranches, and estimates landmark heatmaps/parsing maps respectively. Each photograph functions and prior information are dispatched to a fine SR decoder to get better the HR picture. To generate sensible faces, weal soproposethe face super-resolution.

[5] C. Ding and D. Tao, "Trunk based ensemble convolution neural networks for video primarily basedface popularity", in CCTV footages there are frequent condition in which the photographs are blurry whichcannot be used. Accordingly in this paper, it proposes a way based on CNN to overcome challenges in video-primarilybasedface recognition(VFR).

[6] R. Fu, D. Wang and Z. Luo, "The University Attendance based on Deep Learning", Takingattendance is a vital part portal any instructional group. This paper has proven a manner in which we useexclusivedeepgettingtoknowalgorithmtoknowalgorithmi.e.theMTCNNfacedetectionandcenter-facefacereputation.Thismachinecankeeppupilstatisticsbaseduponabsence,leavingandlateness.Thisalgorithmsare havinghighaccuracy.

III. PROBLEMDEFINITION

Our model is basically based on marking attendance in various organizations. So every organizationhaveadopted differentmethods for noting attendance.Fewofthemtakes it usingtraditionalmethodi.e.manually while some of them takes it using biometric techniques. There's downside in traditional techniques asit will become a risk of errors and time ingesting for taking attendance one at a time in massive lecture room.Additionally the labor concerned in computing the attendance percentage is a prime mission. Another techniquewhich is called as the Radio Frequency Identification (RFID) technique can mark down attendance in largecrowd using radio waves. This technique has high efficiency but in many cases it has been observed that thistechniquecanbe misused.

IV. PROPOSEDWORK

During the traditional classroom environment, marking attendance manually was an important part ofverifying the characteristics of students whether he/she is present or absent, discipline etc. It was often timetaking and prone to errors. There are also new techniques that involves fingerprint sensor, iris, RFID etc. Wepropose a technique to overcome all of the one-of-a-kind drawbacks of the prevailing devices. AutomaticMarkingSystem (AMS)butmarking

theattendancewithouttheknowledgeofthestudentsmakestheprocessaviableone,takingthe attendance ina regular live classroom.
In this presented work, we have explained the proposed algorithms i.e. LBPH and HAAR Cascade algorithm.Therearefive stepsintotal:

1. Enrolmentofstudents
2. Capturingofclassroomrawphotos
3. FaceIdentificationandDescription
4. QueryDatabaseand
5. MatchingAlgorithm.

V. METHODOLOGYANDIMPLEMENTATION

We use two different image processing algorithms for the project.
HAARCASCADE
The HAAR Cascade is a machine mastering item detection set of rules that is used for figuring outobjects in an image or video. It is system getting to know model wherein the cascade feature is trained withplenty ofpositiveandnegativephotographs. Iscan thenbeusedfordetectingitemsin differentpictures[10].

Thealgorithm worksinfourstages:

1. HAARFeatureExtraction
2. CreatingIntegralImages
3. AdaboostTraining
4. CascadingClassifier

ThefirststepinvolvescollectingtheHAARfunctionswhichareavailableasadjoiningsquareregionsat precise locations in a detection window, sums up the pixel intensities in every vicinity and calculates thedifferenceamongthe sums.

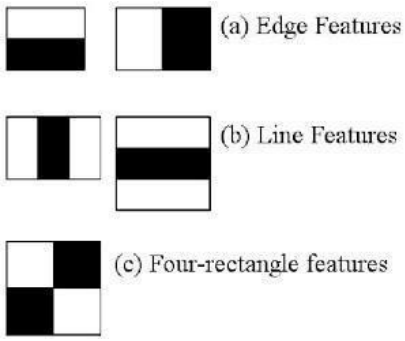

Fig-1ExtractingFeaturesfromPixels

Thesecondstepinvolvescreatingintegralimageswhereeachofthepixelrepresentsthecumulativesum ofeachofthecorrespondinginputpixels[10].

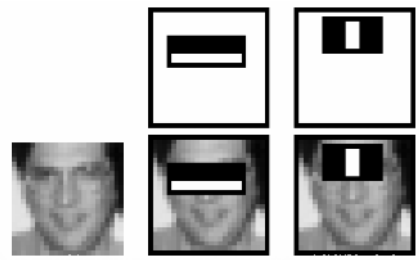

Fig-2DividingFramesintoPixels

The third step involves Adaboost training which selects the great functions from the input and trainstheclassifiers basedonthat[11].

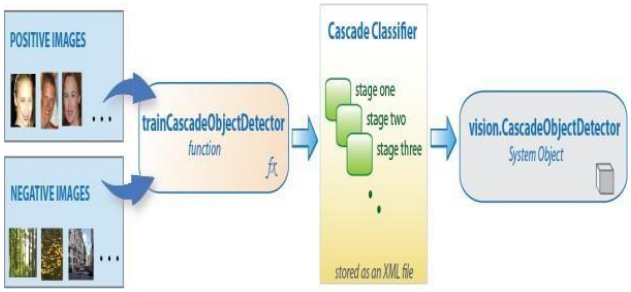

Fig-3AdaboostTrainingmethod

The final step is the Cascade Classifier which consists of a number of tiers for classifying. Thevulnerable beginners are easy classifiers referred to as decisions, stumps[2]. Each of the degrees are trained byusing a technique known as boosting. It is miles a process of training excessive accurate classifier by usingconsideringthe weighted average of thechoicesmadethroughweakrookies.

LBPHFACEREORGANIZATION
Thisalgorithmisbasedonthebinaryoperator,itishavingextensiveusagesduetoitscomputational simplicityanddiscriminativeenergy[5].

Therearemultiplestepsinvolvedinthisprocess:

1. Creatingofadataset
2. Faceorganization
3. Featureextraction
4. Classification

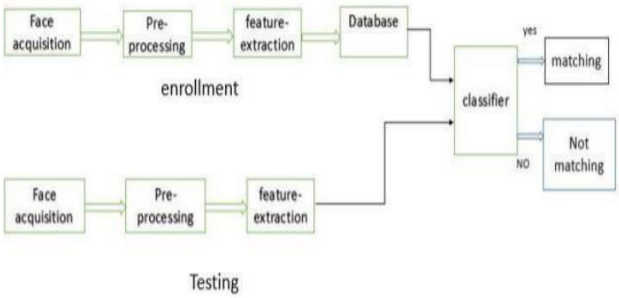

Fig-4 LBPH Flow DiagramThe LBPHgenerates monotonicgrayscale transformations[14].

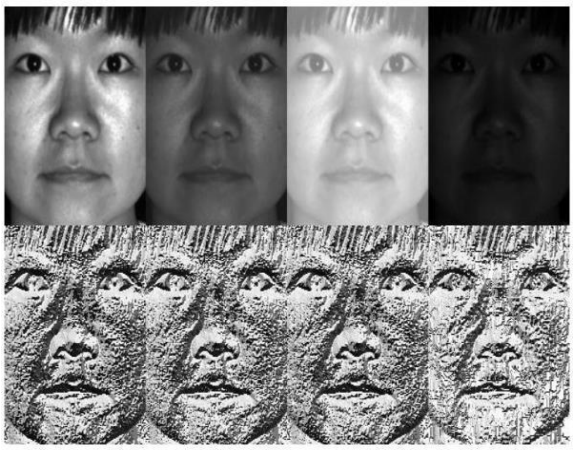

Fig-5GrayScaleImages

For implementation ofthismodel,ithasbeenfurtherdividedintodifferent modulesforoperation:

1. ExperimentalSetup
2. ImageCapturing
3. TrainingPhase
4. FaceRecognition

Experimental Setup: The hardware setup consists of a 64-bit operating system, 2.5GHz processor, 8GBRAM and 32megapixel high resolution camera. Considering thatthe hardware requirements are fulfilled, areal time working can be performed with strength of 30 students who are sitting in different poses. The systemistestedusingthe benchmark dataset(FDDB).The HAARCascadeprovidesanaccuracyof 94.71%.

Image Capturing: The model consists of a high resolution camera which is to be placed in a properposition in a classroom. Live images will be captured which will then be converted into frames using the facedetectiontechniqueinOpenCV.

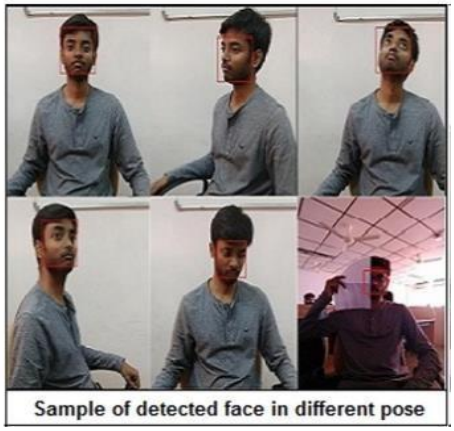

Fig-6FaceRecognition

TrainingPhase: Inthis phase,studentssitinclassroominreal-time.Thenumberofstudentsthatmaybedetecteddependsupontheseatingpreparations ofthescholarsinsidethelectureroom.

The proposed system can detect all type of angled faces with 96.69% accuracy. The studentfaces are detected using the face identification algorithms. The precision of scholars face detection canbeimprovedbyincreasingthetimeinfacerecognitionprocess.

FaceRecognition: ThefacerecognitioninvolvesHAARCASCADEandLBPHalgorithm.Usingthistechnique,wecan detectallvariedfacesthatare positionedin different angleswith99.69% accuracy.

Fig-7Recognizingfacesofstudentssittingwithfrontalface

Fig-8Recognizingfacesofstudentssittingwithtilted faces

VI. RESULTSANDDISCUSSION

The manual attendance gadget common execution time for 20 college students is approximately 8 secas towards 3.80 seconds for the proposed for the clever attendance machine. The usage of face detection.Reportsgenerationfortheattendancegadgettakesabout3seconds.Thebelowdescisa20pupilsampleoutof 80 checks performed. It is able to be proven in theunderneath graph and, it may be seen that proposedclever attendance device using face detection is better and faster than the guide way of taking attendance theuseof papers.

Students	Manual Attendance (secs)	Smart Attendance (secs)
1	4.2	1.2
2	3.9	1.3
3	4.8	1.2
4	5.3	1.2
5	4.8	1.2
6	4.2	1.0
7	4.1	1.0
8	3.6	1.3
9	4.7	1.2
10	4.8	1.3
11	3.5	1.2
12	5.3	1.3
13	4.9	1.3
14	4.3	1.2
15	4.5	1.2
16	3.9	1.3
17	3.9	1.2
18	3.9	1.3
19	5.1	1.3
20	5.5	1.3

Table1: Comparisonofexecutiontime ofManual Attendanceand SmartAttendance System.

VII. CONCLUSION

The final output is a smart attendance system which can be implemented in schools, colleges formarking attendance in a faster way. The images are taken in varied sessions. There are variety of algorithm forface detection but in our proposed model we have considered thebest. We have used a model called asFaceNetwhichgaveanaccuracy of95%.

We have tried to build the best model for marking attendance which is accurate and time efficient. Forany future enhancements we will try to apply more sophisticated algorithms for reducing the dimensionalitycheckingofthestudents.

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