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Attendance Prediction Based on Weather Condition

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Abstract:

Since the early beginnings of education systems, attendance has always played a crucial role in student success, as well asin the overall interest of the matter. The most productive way of increasing the student attendance rate is to understand why it decreases, try to predict when it is going to happen, and act on causing factors in order to prevent it. Many benefits of predicted and increased attendance rate can be achieved, including better lecture organization (i.e., lecture time and duration, lecture class choice, etc.). This project describes the steps in the extraction of knowledge from the university's student database and making a model that predicts whether the student will attend the class or not based on weather. In this project attendance patterns are reflected using a Harr cascade algorithm.

Keywords—**Weather Forecast, Attendance Prediction, Machine Learning, Face Detection, Convolutional Neural Network,Tensor Flow.**

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I. INTRODUCTION

Weather forecasting is the application of science and technology to predict the state of the atmosphere for a given location and current location based on the data of estimated rainfall. Ancient weather forecasting methods usually relied on observed patterns of events, also termed pattern recognition. It might be observed that if the sunset was particularly red, the following day often brought fair weather. This includes temperature, rain, cloudiness, wind speed, and humidity. However, not all of these predictions prove reliable. Weather warnings are a special kind of short-range forecast carried out for the protection of human life. Weather warnings are issued by governments throughout the world for all kinds of threatening weather events including tropical storms and tropical cyclones depending upon the location distinguishing a specific group ofentitiesi.e.,Face.Ithasnumerousapplications,sucha seducation,
surveillance, and so on.This paper presents a simplified approach to serve the abovepurpose using the basic Machine Learning (ML) packagessuchasTensorFlow,Keras,OpenCVandScikit-Learn

II. RELATEDWORK

Infacedetectionmethod,afaceisdetectedfromanimagethathasseveralattributesinit.Accordingto, research into face detection requires expression recognition,facetracking,andposeestimation.Given asolitaryimage,the challenge is to identify the face from the picture. Facedetectionisadifficulterrandbecausethefacescha ngeinsize,shape,color,etc.andtheyarenotimmutable .Itbecomes a laborious job for opaque image impeded by someotherthingnotconfrontingcamera,andsoforth.

Authorsinthinkocclusivefacedetectioncomeswitht womajorchallenges:

1)unavailabilityofsizablyvoluminous datasetscontainingbothmaskedand unmasked faces

2) exclusion of facial expression in the covered area.Utilizing the locally linear embedding (LLE) algorithm andthe dictionaries trained on an immensely colossal pool ofmaskedfaces,synthesizedmundanefaces,severalm islaidexpressions can be recuperated, and the ascendancy of facialcues can be mitigated to great extent. According to the workreportedin, convolutionalneuralnetwork(CNNs)incomputer vision comes with a strict constraint regarding thesize of the input image. The prevalent practice reconfiguresthe images before fitting them into the network to surmounttheinhibition.

Herethemainchallengeofthetaskistodetect thefacefrom the image correctly and then identify if it has a mask onit or not. To perform surveillance tasks, the proposedmethodshould alsodetectafacealongwithamaskinmotion.

III. DATASET

Two datasets have been used for experimenting the currentmethod.Dataset1consists of trained images of students. Fig. 1 shows the samples of students trained pictures.

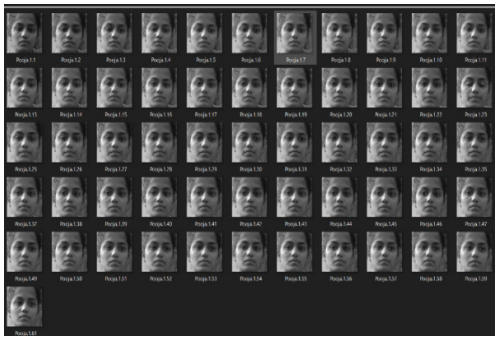

Fig. 1:Samples from Dataset 1

Dataset2consistsofimagesof students with names and id for better attendance. Fig. 2 shows trained and tested faces of students.

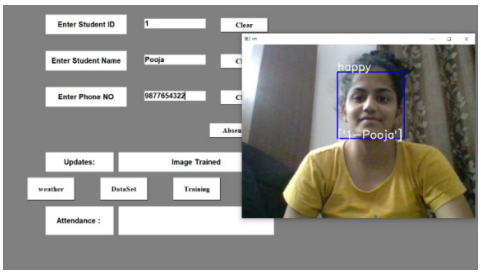

Fig. 2:Samples for Dataset2 of student's face recognition

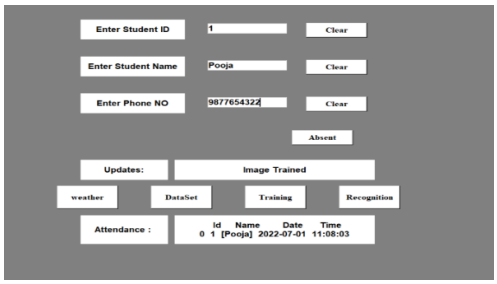

Fig 3: Sample for student Recording Attendance

IV. INCORPORATEDPACKAGES

A. TensorFlow

TensorFlow, an interface for expressing machine learningalgorithms, is utilized for implementing ML systems into fab-rication over a bunch of areas of computer science, includingsentiment analysis, voice recognition, geographic informationextraction, computer vision, text summarization, informationretrieval, computationaldrug discoveryand flawdetectionto pursue research. In the proposed model, the wholeSequential CNN architecture (consists of several layers) usesTensorFlow at backend. It is also used to reshape the data(image)inthedataprocessing.

B. Keras

Keras gives fundamental reflections and building units forcreation and transportation of ML arrangements with highiterationvelocity.Ittakesfulladvantageofthesc

alabilityand cross-platform capabilities of TensorFlow. The core datastructures of Keras are layers and models. All the layersused in the CNN model are implemented using Keras. Alongwith the conversion of the class vector to the binary classmatrixindataprocessing,ithelpstocompilethe overallmodel.

C. OpenCV

OpenCV(Open-Source ComputerVisionLibrary),anopen-sourcecomputervisionandMLsoftwarelibrary,isutilizedto differentiate and recognize faces, recognize objects, groupmovements in recordings, trace progressive modules, followeyegesture,trackcameraactions,expelredeyesfrompicturestaken utilizing flash, find comparative pictures from an imagedatabase, perceive landscape, and set up markers to overlay itwith increased reality and so forth. The proposed methodmakes use of these features of OpenCV in resizing and colorconversionofdataimages.

V. THEPROPOSEDMETHOD

The proposed method consists of a cascade classifier and apre-trained CNN which contains two 2D convolution layersconnected to layers of dense neurons. The algorithm for facemaskdetectionisasfollows:

A. DataProcessing

Datapreprocessinginvolvesconversionofdatafromagivenformattomuchmoreuserfriendly,desired,and meaningful format. It can be in any form like tables, images,videos,graphs,etc.This organized informationfitinwithaninformationmodelorcompositionandcapturesrelationshipbetweendifferententities. Theproposedmethod deals with image and video data using NumPy andOpenCV.

B. DataVisualization

Datavisualizationistheprocess of transforming abstract data to meaningful representations using knowledge communication and insight discoverythroughencodings.Itishelpfultostudyaparticularpatterninthestudent imagedataset.Data visualization provides a good, organized pictorial representation of the data which makes it easier to understand, observe, analyse.

C. Conversion of RGB image to gray image

Moderndescriptor-basedimagerecognitionsystemsregularlyworkon grayscale images, without elaborating the method used toconvert from color-to-grayscale. This is because the color-to-grayscalemethodisoflittleconsequencewhenusingrobustdescriptors.Introducingnonessentialinformationcouldincrease the size of training data required to achieve goodperformance.Asgrayscalerationalizesthealgorithmanddiminishesthecomputationalrequisites,itisutilizedforextractingdescriptorsinsteadofworkingoncolorimagesinstantaneously.

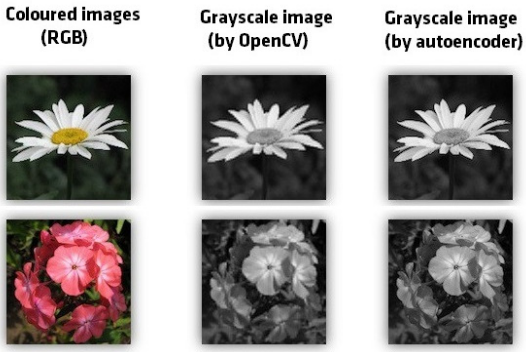

Fig.3.ConversionofaRGBimagetoaGrayScaleimages

We use the function *cv2.cvtColor(input image, flag)* forchanging the color space. Here flag determines the type ofconversion. In this case, the flag *cv2.COLOR BGR2GRAY*isusedforgrayconversion.

D. ImageReshaping

The input during relegation of animageisathree-dimensionaltensor,whereeachchannelhasaprominent unique pixel. All the images must have identicallytantamount size corresponding to 3D feature tensor. How-ever, neither images are

customarily coextensive nor theircorrespondingfeaturetensors.
MostCNNscanonlyaccept fine-tuned images. This engenders several problemsthroughoutdatacollectionandimplementation ofmodel.However, reconfiguring the input images before augmentingthem into the network can help to surmount this constraint.

The images are normalized to converge the pixel rangebetween0and1.Thentheyareconvertedto4dimensionalarraysusingdata=np. reshape (data, (data. shape [0],img size, img size,1)) where 1 indicates the Grayscale image.As, the final layer of the neural network has 2 outputs – withmask and without mask i.e., it has categorical representation,thedataisconvertedtocategoricallabels.

E. TrainingofModel

Building the model using CNN architecture:Deep learning is a very significant subset of machine learning because of its high performance across various domains. Convolutional Neural Network (CNN), is a powerful image processing deep learning type often using in computer vision that comprises an image and video recognition along with a recommender system and natural language processing (NLP).

The CNNs have several different filters/kernels consisting of trainable parameters which can convolve on a given image spatially to detect features like edges and shapes. These high number of filters essentially learn to capture spatial features from the image based on the learned weights through back propagation and stacked layers of filters can be used to detectcomplex spatial shapes from the spatial features at every subsequent level.

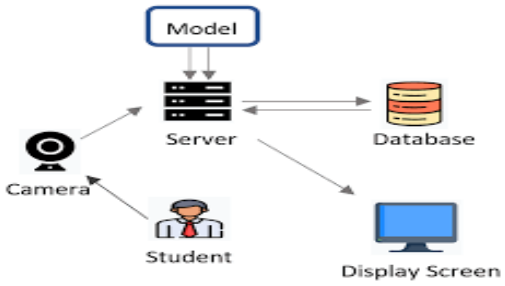

Fig.4.Face Recognition usingCNN

CNN architecture for face recognition system is proposed including the process of collecting face data of students.Experimentally it is shown that the proposed CNN architecture provides 99% accuracy. Further, the proposed CNN framework is used to develop a “Smart Attendance Management System (SAMS)“, which is a web-based application, to provide attendance of students using face recognition, in realtime. The proposed application is easy to deploy and maintain.

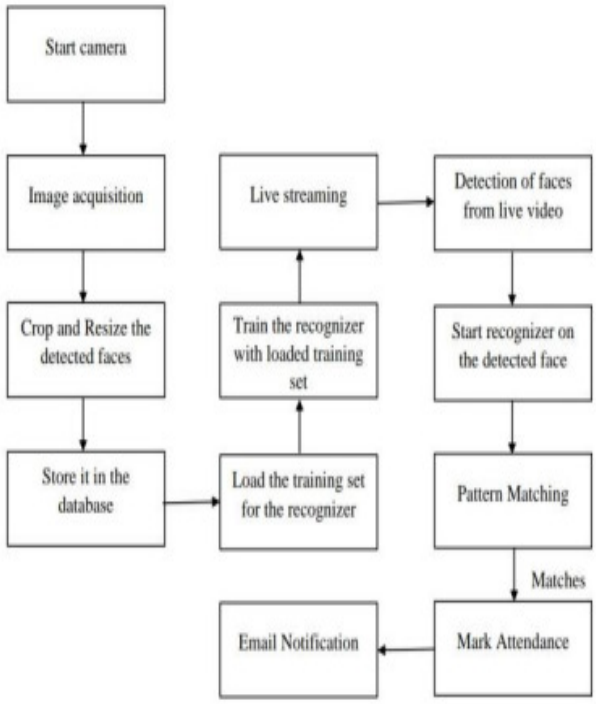

Fig.5.OverviewoftheModel

VI. RESULTANDANALYSIS

The users can interact with the system using a GUI. Here users will be mainly provided with three different options such as, student registration, faculty registration, and mark attendance. The students are supposed to enter all the required details in the student registration form. After clicking on register button, the web

cam starts automatically and pops up and starts detecting the faces in the frame. Then it automatically starts clicking photos until 60 samples are collected or CRTL+Q is pressed. These images then will be pre-processed and stored in training images folder.

Attendance prediction based on the weather forecast is the one in which the organization can analyze or predict whether the student will attend the class based on present weather condition.

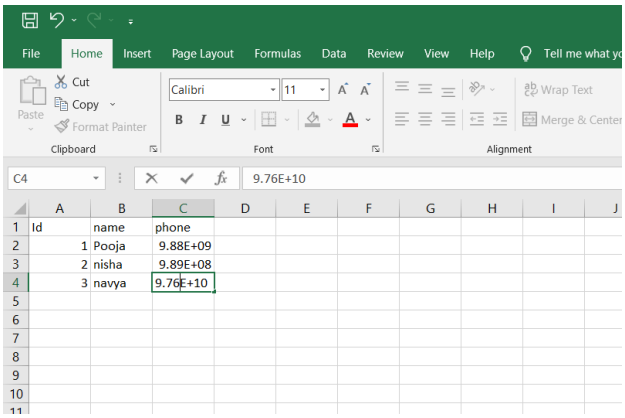

Fig 6:Attendance sheet

VII. CONCLUSIONS

In this paper, system aims to build an effective class attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face Id. It will detect faces via webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record.

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