IN AND OUT DETECTION USING FACE RECOGNITION

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Abstract

In present days entry log book keeping for places like public libraries, laboratories etc. is being so tough as people should enter the details like time, name manually. We can reduce this burden using machine learning models. Our project mainly focuses on getting the entry and exit time and name of a particular person using face recognition, for implementing this we used OpenCV and NumPy in python. Firstly, we trained our machine learning model with the images of people using LBPH algorithm in OpenCV. The algorithm generates a "yml" file which contains all the training data of people images and respective id's generated uniquely for each person in training data. The "yml" file is used in recognizing person's face and output the entry or exit time. The output data given by the model is collected and is used to produce a graphical representation of the person's frequency in visiting the place, using Matplotlib and Pandas.

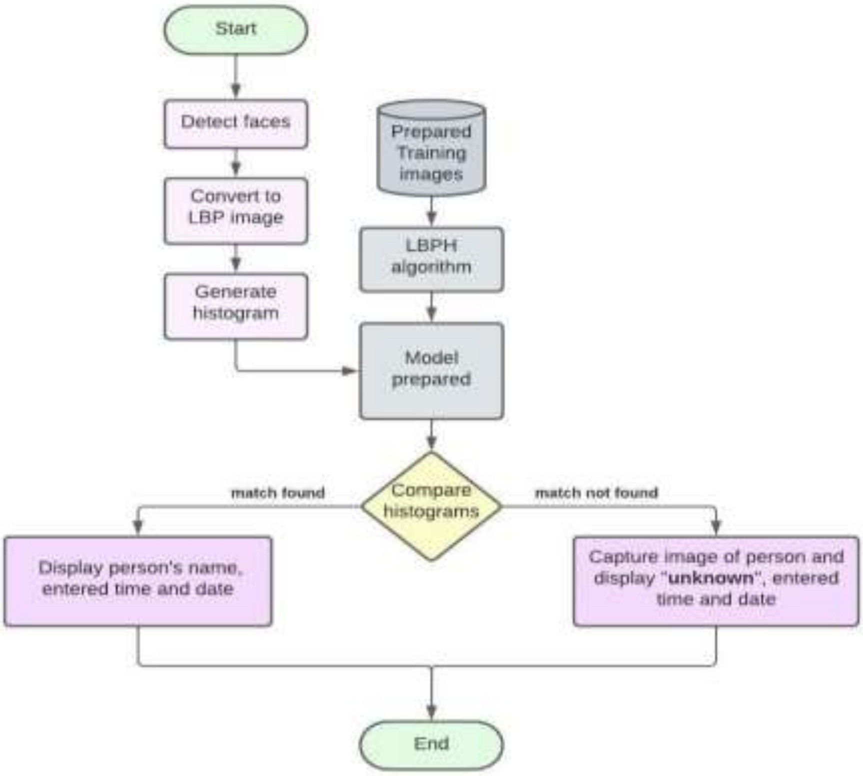
Keywords: online shopping, convenience, web site quality, awareness

Introduction

Face recognition is a technology designed to match a person's face to a digital image or frame from a video with the help of a website. Face recognition has many applications such as video surveillance, identical face collections, robots, mobile biometric. In this project we aim to solve the log-book of ongoing problems. Every day in different places there is a logbook kept by people to record the time of people's entry and exit time. Therefore, we want to automate this process using face recognition and motion detection to automatically record entry and exit times. Since facial recognition involves photographing, measuring and identifying human physiological features, the system is considered biometrics. Unlike fingerprints and iris stamps facial recognition is a non-invasive procedure. Automatic facial recognition dates back to the 1960s.

Project Design

The main purpose of this project is to reduce the time that takes for entering the details of the people before entering or after leaving the room in the log book. The project uses face recognition for identifying the people and a own motion detection algorithm to detect where the particular person entered or left the room. We used LBPH algorithm for training the images and generate the model. Below diagram show the flow of the project.



Implementation

We implemented our project using python, OpenCV, LBPH algorithm, matplotlib. Be- low steps are the description of the implementation.

Dataset Creation

We collected the images of the person that need to be trained with our model. We make folders with the names of each person and store the images in respective folders. Now the collected images in the folders are iterated using the OS module and id's are developed for each folder. The id's and the corresponding folders are stored in the dictionary. The created data set is used for training. We create a haar cascade face classifier for detecting faces in the training images. The face from whole training image is detected using detectMultiscale function of the classifier using the scale factor, neighbors. The obtained face is converted to gray scale and resized to a specific dimension for better results. We create two lists one for storing the modified image and other for storing the corresponding id of the image.

Training

Being data generated we have to train our algorithm to create a machine learning model. We create a recognizer using LBPHFaceRecognizer_create for training our algorithm. The algorithm used is Local Binary Pattern Histogram. The algorithm works in such a way that the training face is divided into pixels each pixel is di- vided into a grid of 3X3 size. The center value of the grid is taken for comparing with all other values in the grid, if the value of the grid is greater than the center value of grid then it is replaced with '1' else with '0', all the modified values other than the center value are concatenated to generate a binary value. This binary value is converted to decimal and placed in the center value. The process is repeated for all the pixels of the image to generate a local binary pattern image. Now this image is divided into blocks and each block will be converted to histograms and all the histograms of block are concatenated. This process is repeated for all the images and a model is created as "yml" file. This file is used in predicting the person in working of the project.

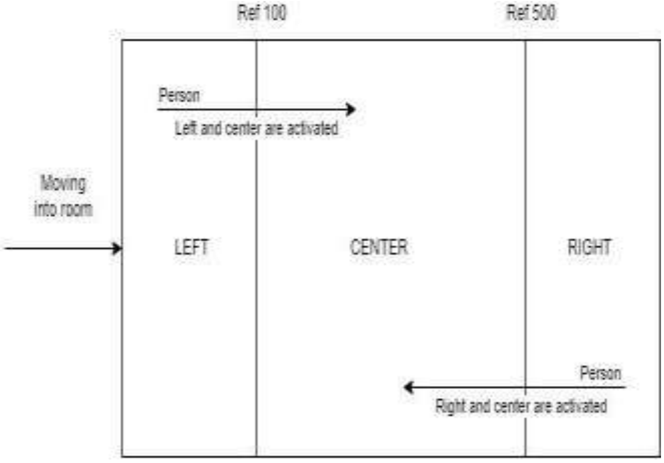
Prediction

The image of person is taken as the input to the model using capture method which opens a console for video recording. Now the image is read from the video capture console. Face of the person is detected from the input image by using face classifier created by haar cascade and detectMultiscale.

Now the obtained input face is con- verted to gray color image and is predicted using the predict method from the recognizer created to identify people. The predict method returns the confidence value based on which the accuracy is measured.

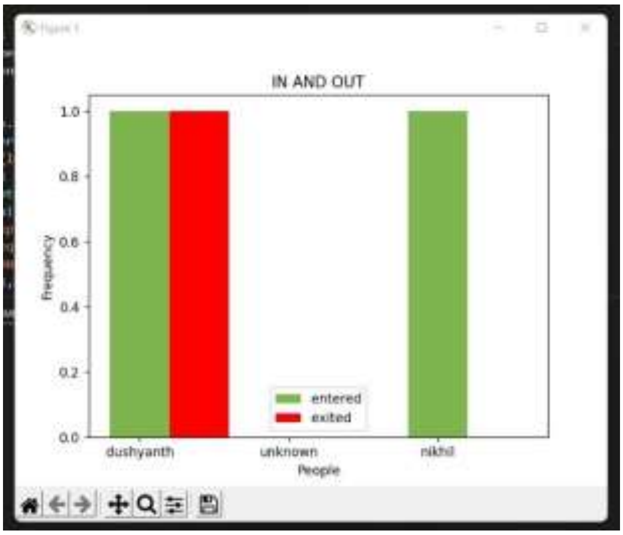
Motion Detection

After the identification of person is done, the second part of the project comes into picture. In this we record whether the person entered or exited into the room by using the below method. We initially take three variables left, right, center. Each variable is set to false at first. We create a reference point as shown below. When a person move into the room the left reference variable is activated, if the person cross the range specified then center is activated and finally if the person cross the extreme right limit then entry into the room is identified and all the variables are set to false. When a person moves out of the room the right reference point is activated and if the person move specified range then center is activated, finally if the person cross left limit then exit is identified.

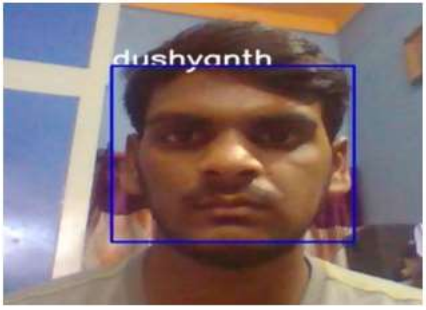


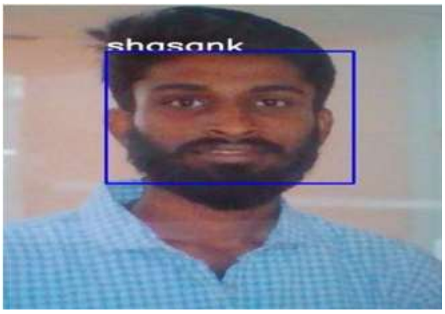
Graph Generation

After identification and motion detection is done we create pictorial representation of frequency of the persons entered and exited the room using matplot library in python. We use bar graphs for representation.

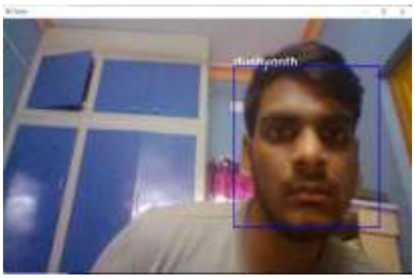


Results for Recognition

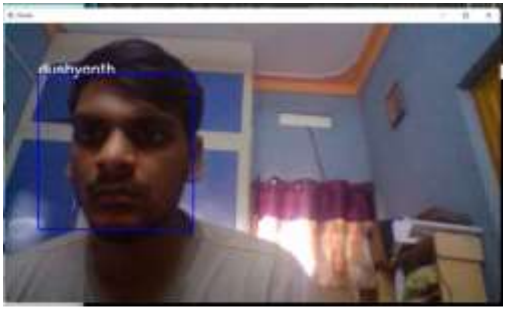




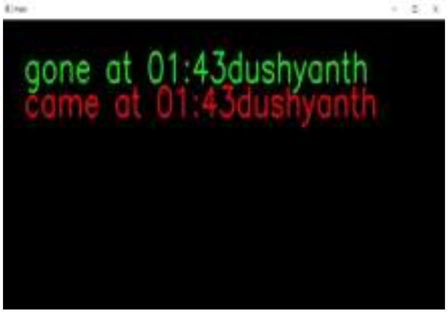
Output Console



Person face is recognized and is moving INTO (i.e right side) the room



Person face is recognized and is moving OUT (i.e left side) of the room



```
gone at 01:43dushyanth
came at 01:43dushyanth
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Person name and the entered, exited time are printed in the console.

Conclusions

Face recognition and movement detection to avoid handling manual logs work well but are not completely flawless. There is still a range to improve the face recognition feature should be more accurate and achievable using better algorithms. We tried to pro- duce accurate results for the recognition using the algorithm.

References

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