

OpenCV Real-time Face Recognition Attendance System to Online-School Attendances

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Abstract:- School attendances are more difficult when it comes to the spelling of a name and the number of students who are attending class. During this pandemic, Day by day is a time-consuming matter for every teacher which a challenge to concern and prevent. Times like this can be problematic if you have manual attendance, Having an OpenCv Real-time Face recognition based on attendance system will not only allow you to take the attendances but also having Security when there's a situation where the identity and time of an entry of a specific student need to be recognized by the system. Time-saving to keep you at a safe distance from them as you can work remotely and still see who all are attending your class and lastly, It is Easy to manage the records that will be converted into excel file and to monitor the student or guest who attending since it is fully automated and much easier than the manual. This study aimed to develop a Real-time face recognition system for School attendance using OpenCV that will collect the data of the student who are present before or after class hours. The system will require registration for the student and password, automatically record the attendance of a student through face recognition which will be converted into text or excel file. The study of OpenCV Real-time Face recognition also determines the usability of the system and applicability in every institution that has a problem in this time of pandemic by changing the manual method into a system. The system is built so that it can help implement the management of attendances to become more effective and can be a solution to an existing problem. In achieving this type of the desired objective. The researcher used a descriptive developmental method of research. The development of the system was using a prototype model in which there's a new method or idea of using face recognition for that desires to meet the objectives. While, the criteria were used to test the usability, applicability, and efficiency of the system is McCall's Software Quality model.

Keywords:- School Attendance, Face recognition, Information System, OpenCV Python.

I. INTRODUCTION

Daily attendance of a student is a major factor in every educational institution, manual checking of attendance sheets is time consuming, tedious and laborious for a teacher that cannot memorize all students who are attending the class especially during pandemic which face to face classes are

prohibited. Truancy and Cutting Classes are common problems of every school which student usually attending the class to get their self- present during attendance but eventually will skipping the class. This paper aimed to develop a system software prototype that will help for the automated student attendances that can be used anywhere. There are (4) processes in which the student must do to take attendance before taking a class. First, fill in the Information given including Name, Surname and student Id, etc... Second, The image of a student will be captured like a selfie by the camera. Third, the Student needs to save the profile and the system will ask for a password. The system will recognize the face that is registered in name with the help of the dataset and will automatically list their names in the system, Face recognition evaluates student faces to recognize. Lastly, the registered name in images recorded in registration will automatically be saved in an excel file which the final step to take attendances in the record.

To develop a useful and applicable Real-time Face recognition system there are several parts need to take in hand. The system will only recognize the faces that are registered in the system. The teacher controls or holds of taking the attendance of the student.

II. OBJECTIVES OF THE STUDY

The purpose of this study is to develop a system using OpenCV that automatically takes attendance using face recognition in class and converted it into an excel file for a record. Specifically, an OpenCV Real-time face recognition system can be used to save time, effort, misspellings of names and to prevent fake attendances.

III. MATERIALS AND METHODS

Real-time Face recognition used the Descriptive research method to develop a prototype model of a system to achieve the objectives of the study. Prototype Model is used to achieve the System Development Method in which the requirements are gathered, build a quick design, build a prototype Tested by the user through user evaluation and then reworked of refining the prototype as needed until an acceptable prototype will be implemented and maintain from which the complete system can now be used.

Visual Studio Code

It is an open-source framework used to build the dynamic application.

Python

Is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built-in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components. Python's simple, easy-to-learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms and can be freely distributed.

Computer Vision

Is an interdisciplinary field that deals with how computers can be made to gain high-level understanding from digital images or videos so the idea is to automate tasks that the human visual systems can do so a computer should be able to recognize that a face of a human being is being detected.

OpenCV

Is a library that is used for computer vision it was first developed in the year 1999 at Intel by Gary Brad sky and the first release came out in 2000. It is supposed to a wide variety of programming languages such as C++ Python Java X vector and also supports different platforms including Windows Linux etc. In OpenCV, all the images are converted into NumPy arrays and makes it easier to integrate them with other libraries that use NumPy. Which, also all the images will be defined into a matrix. OpenCV will read it as a NumPy array so basically python stores the images as

NumPy array to a matrix of numbers so if it's a colored image it will be a 3d matrix and if it's a grayscale image it will be a 2d matrix.

Detection

It is done with the help of OpenCV and Haar Cascade. Face Detection using Haar cascades is a Machine Learning-based approach where a cascade function is trained with a set of input data. OpenCV already contains many pre-trained classifiers for face, eyes, smiles, etc.

Recognition

Is done by the LBPH recognizer. One of the easiest face recognition algorithms. It can represent local features in the images. It is possible to get great results mainly in a controlled environment. It is robust against monotonic grayscale transformations. It is provided by the OpenCV Library an open-source Computer vision library.

Local Binary Pattern LBP

Is a simple yet very efficient texture operator which labels an image by thresholding the neighborhood of each pixel and considers the result as a binary number.

Manage record in Excel files by GUI

CRUD operations can be performed in excel files with the help of GUI.

Requirements Gathering

The Researcher gathered the needed information on the existing problem through an online survey and interview. The researchers regulate the requirements to be used in building the system prototype.

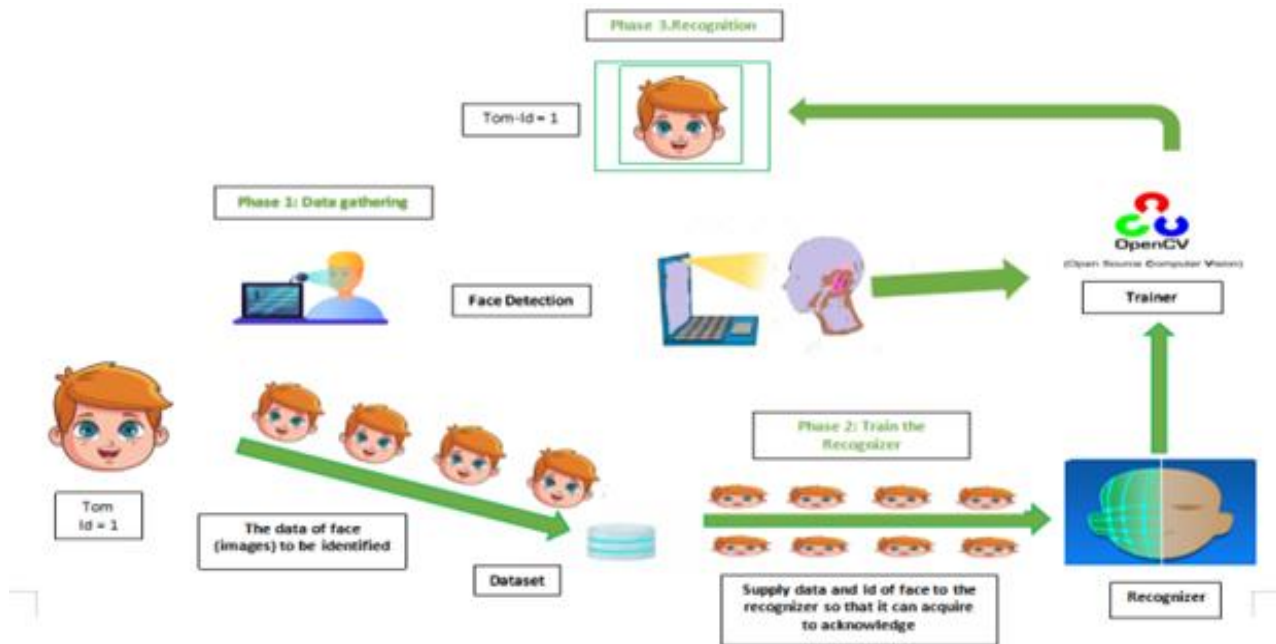


Fig 1. Block Diagram

Quick Design/Build

The built-in OpenCV library tools were used for the codes and function for face recognition of the system. Hence, The developer does not need to code the program manually. The program was designed already for a system where is usable. These are the tools that were used to run a system like

Tkinter for the whole GUI OpenCV Python for taking images and face recognition LBPH Face Recognizer CSV, Numpy, Pandas, DateTime, CSV, Pillow Smtplib, Openpyxl, and Xlrd needs to install in your computer to run the prototype and for other purposes.

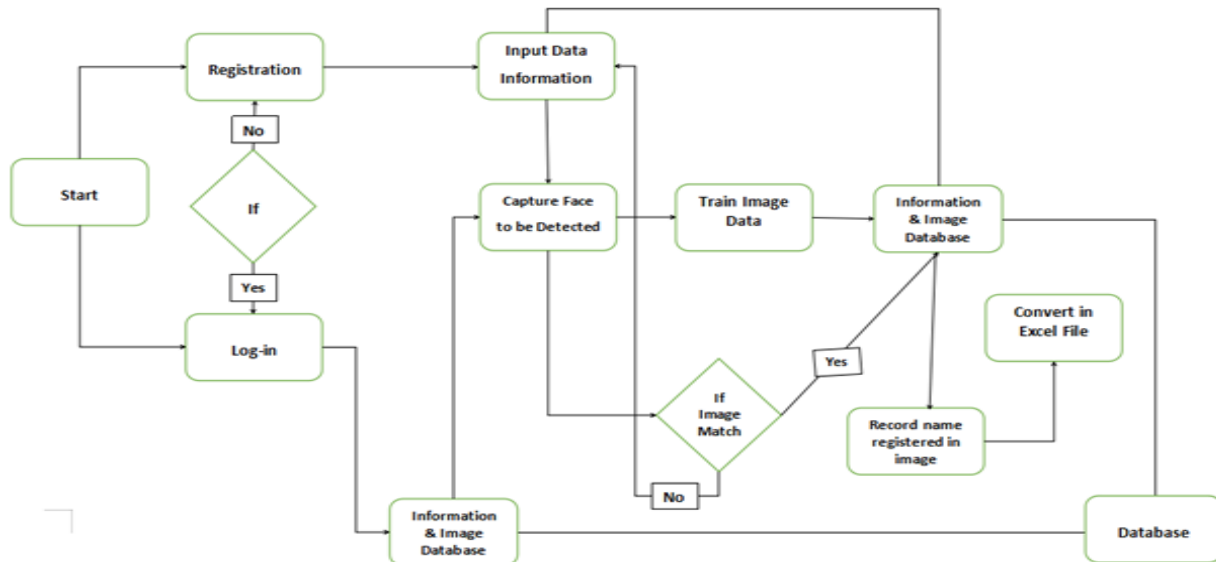


Fig 2. Flow Chart

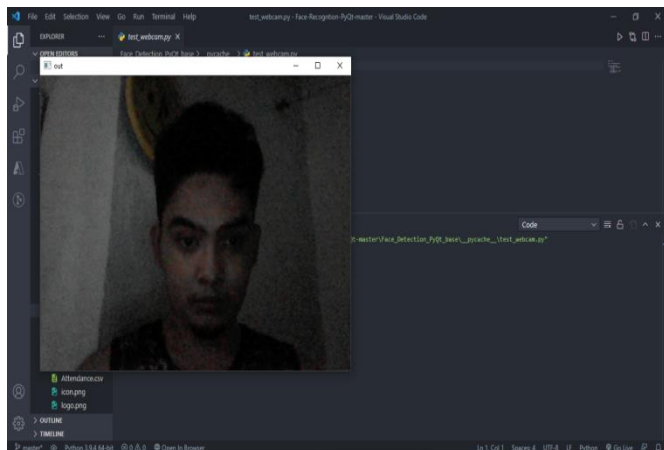


Fig 3. Sample of Online Attendance Face Detection

IV. RESPONDENT OF THE STUDY

The respondents of the study are the student of Schools and Home-based online school teachers who are residing within Bacolod City, Negros Occidental Philippines.

Table1. Summary of Respondent

Categories	Sample Size
Online-Student	130
Home-Based Teacher	50
Total	180

V. RESULTS

After the series of test conducted and the detailed evaluation of the system, the results are as follows:

Table 2. Result given by Tester

Criteria	Mean	Grand Mean
Operability	4.67	Very Good
Security	4.33	Very Good
Execution Efficiency	4.67	Very Good
Software Recognition Independence	4.33	Very Good
Accuracy	5.00	Very Good
Manageability	4.33	Very Good
Usability	4.50	Very Good
Simplicity	4.56	Very Good
Commonality	4.33	Very Good
Training	5.00	Very Good
Applicability	4.36	Very Good
Total Mean	4.55	Very Good

Table 2 showed the result of the prototype system evaluation by testers using the criteria in McCall's Evaluation for the Software Quality. The average (mean) above-mentioned criteria determined the degree to which the developed prototype and system conformed the standard in

terms of its interface, features, characteristics, and recognition. The overall performance of the system is very remarkable with an overall rating of 4.55 which means Very Good.

Table 3. Result given by Respondent

No.	Steps	Actual Result	Result
1	Feature	As expected	Pass
2	Enter User Id & Password	As expected	Pass
3	Click Submit	As expected	Pass
4	Capture Image as Attendance	As expected	Pass
5	Name recorded to excel file	As expected	Pass

Table 3 showed the result of the system's performance and running well with no malfunctions and bugs in terms of its usability. The prototype system passed the evaluation by the respondents since it can end the problem in using manual attendance. The developed prototype system will be a great help for the teachers or users for daily use.

VI. DISCUSSION

Base on initial testing of the prototype system that has been done, There are findings that the Face detection OpenCV Python library is a great assistance to Developers for they don't need to manually code the function of detecting images. The testing of the system has given expected results and the process of taking the attendance using Face detection is running well by planning. The Feature of the system can further enhance the design as a suggestion of the tester. OpenCV Real-time Face recognition attendance system is usable for the reason that it can save time for a teacher or user for taking attendances and taking of attendance by capturing the image that is recognized by OpenCv is much easier as it automatically records the names that are registered in the image and you can convert it into an excel file for documentation. Since it is an Online platform its usability is efficient for those who work remotely or in any situation or circumstances that keep us from traveling and its applicability can be a solution for a problem in a time of the pandemic.

VII. CONCLUSION

The development obtained of prototype system OpenCV Real-time face recognition attendance system's are:

- It can be a solution for taking attendances while classes are ongoing.
 - It can assist teachers to monitor the students that are attending class.
 - It easily to record the names of students and avoids misspelling.
 - It can save money for teacher or user that can work home or remotely.
 - It reduces time and effort for the teacher or user.
- It can be suggested to be used for those who are traveling long distances by going to work/school.

RECOMMENDATION

The recommendations that can be given for further research are:

The Prototype system can be developed for another purpose and in related usage of OpenCV. Such as Online registration through Face recognition & Employee's Face recognition Attendance System & Time log.

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