Attendance Management System using Face Recognition

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Abstract—Attendance management system is one of the tremendous challenges in any organization to reduce the malpractices by the individual. This paper aims to design automatic system for attendance using the face detection using LabVIEW (Vision Assistance Module) in order to replace the manual system and makes easier for the user to calculate the number of individuals and reduces the burden in taking attendance. Face recognition is one of the biometrics used in security systems, human machine interaction and image processing techniques [5]. This system is mostly helpful in security purpose and in commercial applications. It can be done by taking the image of the individual which is been captured by camera so that this image is converted into digital form. From this digital data the pattern of individuals is extracted so that everyone will have unique patterns. These patterns are stored in the database in excel format. The identification of the person is done by comparing the image captured through camera with the database images. Initially before starting the Attendance every individual is marked absent. Once the individual comes across the camera, the Automated system will extract the information by pre-processing the image with the help of Vision Assistance and extracts the patterns from the digital data. This data is compared with the stored patterns in database if the pattern matches with the database it automatically marks present.

Keywords—Database, LabVIEW, Vision Assistance, Face Recognition, Patten.

I. INTRODUCTION

Maintaining the attendance is highly important in all the organizations for checking the performance of employees/students. Each organization has its own way in such manner, some are promoting participation physically by using the old paper or record-based processes and some have received strategies for programmed participation using some biometric systems. But sometimes people used to stay for long time in queues to enter in to the organizations. Each biometric framework undergoes some enrolment process in which highlights of an individual is kept in database after the procedures of recognizable proof check and verification.

These processes compare the biometric features of a person with previously stored template captured at the time of enrolment. Face recognition comprises of two steps, initially faces are detected and then these detected faces are compared with the database for verification [1]. Face recognition is mostly used in various areas like security, access control, forensic medicine, police controls, and in attendance management system [2]. Pattern recognition and matching consists of classification, processing the input and matching it with a known pattern. Face recognition is high complex form of pattern recognition. It consists of highly ambiguous input signals, with multiple dimensions and matching them with the know 'signals '. This requires many training samples. Several ways have been proposed to solve this problem [3]. Face recognition based on face prints can quickly and accurately detect target individuals when the conditions are favourable. If the subject's face is partially detected or not facing forward, or if the light is not enough, the system is less reliable. However, the technology is developing quickly and there are several emerging approaches to solve this problem [4].
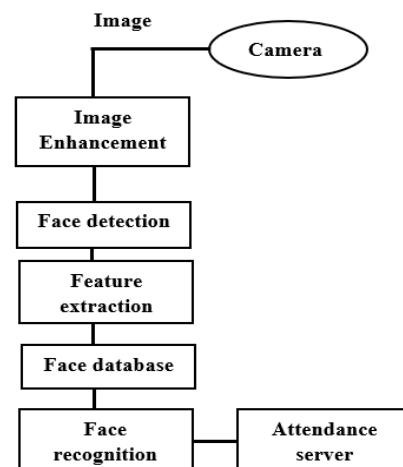

Figure.1: Block diagram for Attendance Management system

There are many methods implemented for face detection, one of the method is by using skin segmentation process.In this method, detecting face in a complex background is possible, when the image is given it will detect the skin cells by using threshold and image processing techniques [7], the time complexities will increase with the increase in size as it has to detect every pixel in the image. And face recognition can be done by using histogram matching technique under certain limitations,

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as the intensity of the natural light will have a huge impact on this technique and as the light intensity changes, the pixel values also changes, which results in error in the system [8]. To reduce these errors, an alternate method is used called as pattern matching in LabVIEW, which uses machine learning algorithm to match the template in given image and it is is more reliable than any other methods.

II. METHODOLOGY

A.   Image Acquisition

LabVIEW, vision development module contains NI-IMAQdx and Vision Express modules which are used to set up image acquisition systems and acquire images. These modules contain Virtual Instruments (VIs) which allow us to acquire images, open and close interface. In this project, Vision Express VIs are used to develop common image acquisition and processing the application. It contains step by step procedure to interface device. Once USB camera is connected, shown in select Acquisition source tab, select the device and click on next to navigate the Acquisition type. Here we are selecting continuous Acquisition mode, which will acquire images from camera continuously and most recent image is acquired and sent for further processing. By clicking on next it navigates to configure Acquisition settings where video mode is chosen as 640x480 YUV, so that the time for operating on the images is reduced as it requires small size. Then by clicking finish the device is configured and ready to grab these images from the camera as shown in figure 2.
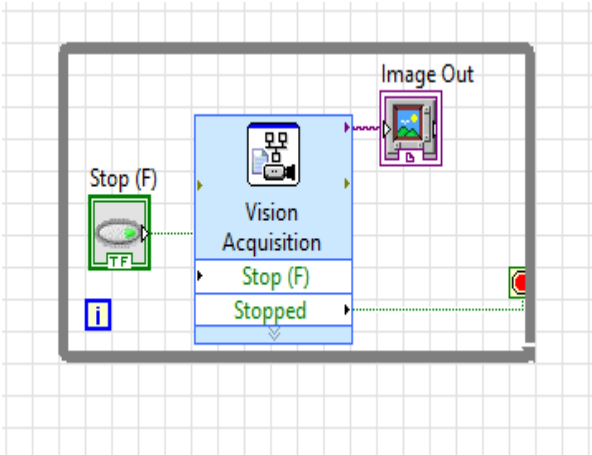
Figure 2: Block diagram of vision Acquisition

B.   Image Pre-Processing

The image which is captured by the vision Acquisition is passed to next VI called as vision Assistant, which creates, edits, and runs vision algorithms using NI vision Assistant. When we place this VI on block diagram, NI vision Assistant Launches. It contains image processing functions like edge detection, morphology, filters, which are used to create an algorithm using these functions. This algorithm is used to select the required controls and indicators which is required to programmatically set in LabVIEW. In this Project the VI reduces the noise and fix the brightness in the input image and then convert it from RGB to grayscale as shown in figure 3.1 and 3.2. This image is passed to next step face Detection.
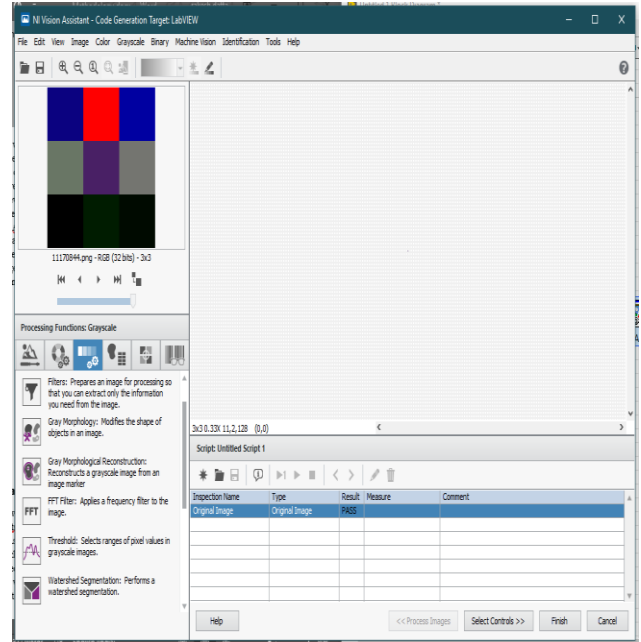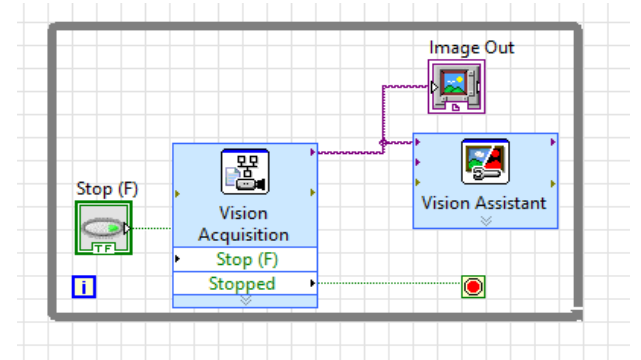
Figure 3.1: View of vision Assistant.vi

Figure 3.2: Block diagram of vision Assistant

C.   Face Detection

For face detection Vision Assistant VI is used. As this VI contains pattern matching, this uses the machine learning and template matching algorithm to detect the face in the input image. For this purpose, template is created by taking a real human face and train the VI and to learn the curves that results from eyes, nose and mouth in the given image as shown in the figure 4.1. Whenever it receives the image from the preprocessing step (B) it uses the template matching algorithm to detect the face and draw a bounding box around the detected face as shown in figure 4.2. The marked green lines are the curves that are trained to detect the face from given image as shown in the figure 4.1. The detected faces are stored in the folder/DB for recognition process. For this purpose we have to make sure that the detected face contains face or not as template matching gives some error file finding so, created a vi which will look for the eyes the in the image and calculate the distance between them if the eyes has a distance of 60 to 193 pixel it will conform that the image passed contains a face and then it is stored in the folder/DB as shown in figure 4.2.
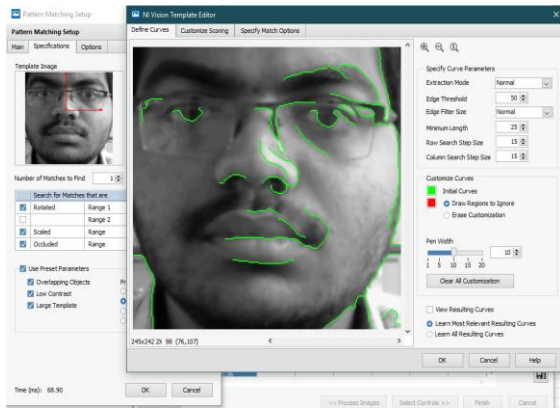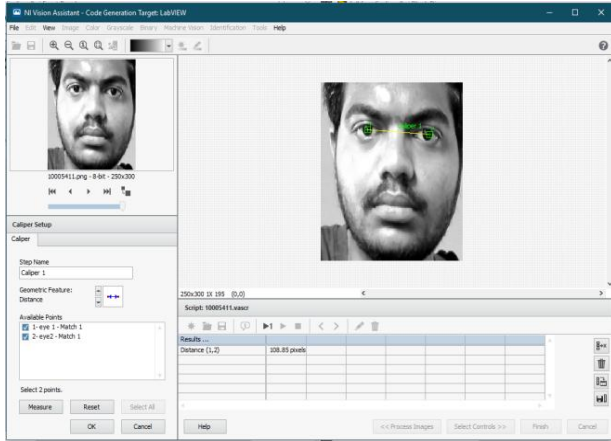
Figure 4.1: Face detection training

Figure 4.2: Distance calculating using caliper.

D. Face Recognition

Face Recognition can be done by using the pattern matching VI where the same steps are done as above to detect the face. The output is passed to IMAQ Match Pattern where it matches the input image with the DB and generates the score for each and every image and the highest score represents best match and passes the ID number to the output Data Base (DB) as shown in the figure 5.1 and figure 5.2 describes the block diagram of face recognition.
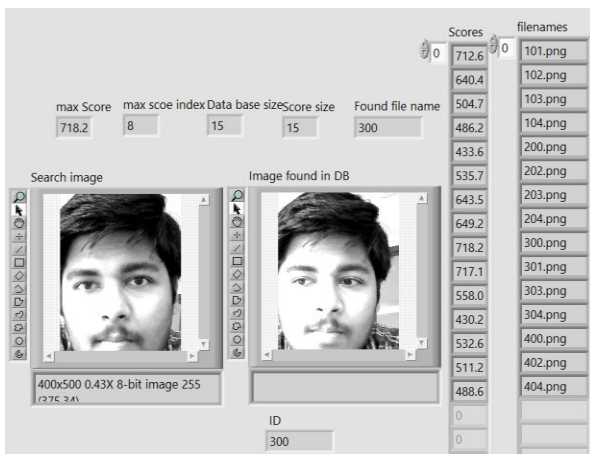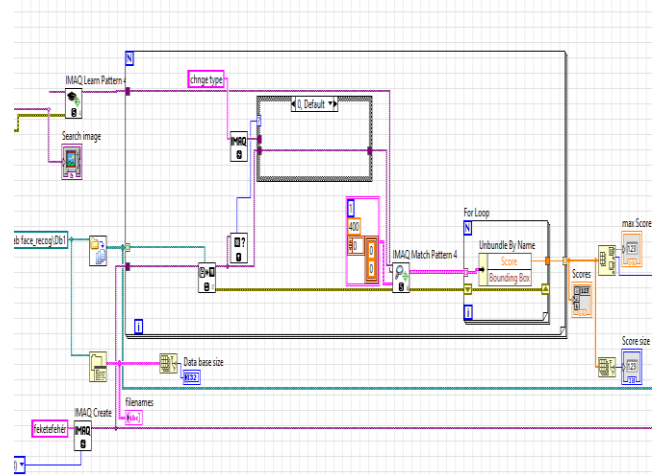

Figure 5.1: Score generation

Figure 5.2: Block diagram for face Recognition

E. Attendance Management

A simple user interface is created for this process. The details of the individual can be verified by clicking on the check button in the interface as shown in the figure 6. And the attendance process can be started by clicking the process button. The common process is to detect the face and send the image for recognition process. After reorganization it gives a unique number which is allotted to that member called as UID. This number is searched in the data base and stored in EXCEL sheet. And then it returns the details of the individual. But whenever the process button is pressed the ID should match with the ID stored in the faculty/Authorized database. If not, it shows a pop-up message as "UNAUTHORIZED" access. If the details were not found it displays a message as please contact admin or no records found.
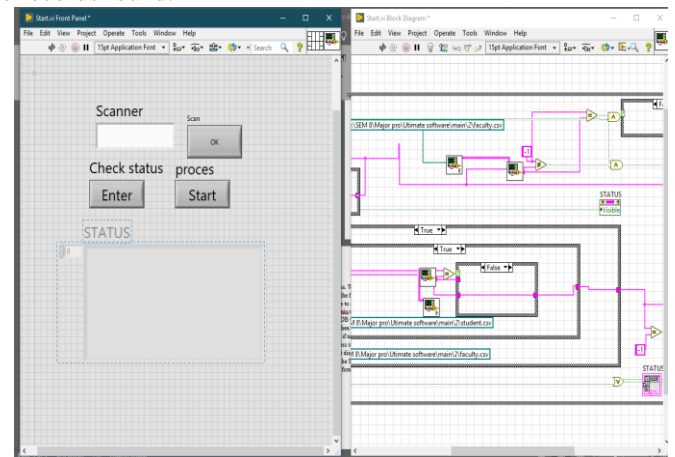

Figure 6: Interface VI.

III RESULT AND ANALYSIS

Attendance process:

When the process button is clicked, a new VI opens that detects the face and match the face with the images stored in the folder/Data base and then it returns the ID of that person when the ID is matched with the details in the faculty/Authorized excel file.

If the details were present then it starts the attendance process and the ID is noted as shown in figure 7, if not it displays an unauthorized message on the screen.
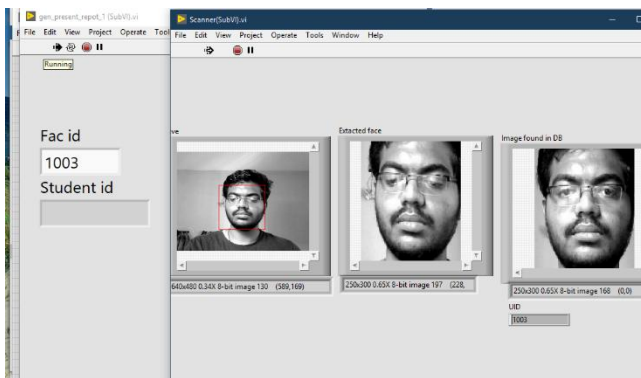

Figure 7: Facial Recognition

And now it will start to record the attendance process and scans the faces of the student as shown in figure 8 and checks for the details in excel file and marks the attendance. It creates a new report file by taking all the student details and mark absent for everyone. So, by the end of the process the student who are present will be marked present. And whenever it detects the same faculty it stops the attendance process.
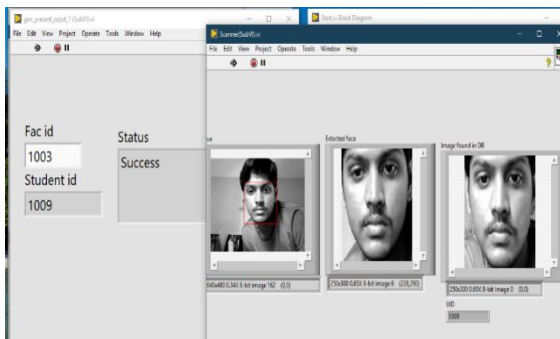

Figure 8: Student Recognition

The figure 9 displays the Student and faculty/Authorized details present in the excel Files

uid	cid	name	branch	subject	cotact
1000	201	Rakesh	E.C.E	SIGNAL AN	941
1003	202	Datta	E.C.E	LabVIEW	956
103	203	ade	E.E.E	CONTROL	985
104	204	efg	E.C.E	AECD	965
105	205	xyz	MECH	ENGINEER	841
106	206	ghy	CIVIL	DESIGN TH	851
107	207	hjy	E.C.E	DIGITAL SY	861
108	208	lki	C.S.E	SOFTWAR	871
109	209	kli	E.E.E	ANALOG E	881
110	210	ghr	CIVIL	COCRETE 1	891
111	211	juh	C.S.E	OPERATIN	901
112	212	ghy	C.S.E	MACHINE	911
113	213	rakesh	ECE	System De	9532

Figure 9.1: Details of faculty

uid	cid	name	branch	contact
1003	1.5E+08	Praveen	ECE	942
1004	1.5E+08	Sanjay	CSE	718
1009	1.5E+08	Anirudh R	ECE	962
304	404	ACB	ECE	972
305	405	ABC	ECE	982
306	406	ACB	ECE	992
307	407	rak	ECE	943
308	408	tra	ECE	805
309	409	ADY	ECE	825
310	410	XYZ	ECE	845
311	411	KIIL	ECE	865
312	412	Bill	CSE	895

Figure 9.2: Details of Student

The figure 10.1 and figure 10.2 are displaying the report file generated before and after the attendance process

uid	cid	name	contact	P/A
1003	1.5E+08	Praveen	942	A
1004	1.5E+08	Sanjay	718	A
1009	1.5E+08	Anirudh R	962	A
304	404	ACB	972	A
305	405	ABC	982	A
306	406	ACB	992	A
307	407	rak	943	A
308	408	tra	805	A
309	409	ADY	825	A
310	410	XYZ	845	A
311	411	KIIL	865	A
312	412	Bill	895	A

Figure 10.1: Rreport generation before the process

uid	cid	name	contact	P/A
1003	1.5E+08	Praveen	942	A
1004	1.5E+08	Sanjay	718	P
1009	1.5E+08	Anirudh R	962	P
304	404	ACB	972	A
305	405	ABC	982	A
306	406	ACB	992	A
307	407	rak	943	A
308	408	tra	805	A
309	409	ADY	825	A
310	410	XYZ	845	A
311	411	KIIL	865	A
312	412	Bill	895	A

Figure 10: Report generation after the process

IV. CONCLUSION

By implementing the Face recognition technique, it helps the users to reduce the errors in manual based system. This is done without human interface which reduces the time of intervention. There will be no chance for the individuals for manipulating like Proxy attendance. This face recognition technique is implemented with the help of LabVIEW using Vision Assistance Module in order make the system more precise one.

The proposed system can be used in Security based places, Organizations, also in schools and colleges. This face recognition is made by using Pattern Matching algorithm because the histogram values varies from place to place, so we may face difficulties in detecting the face. By using Pattern Matching this problem can be reduced and gives better result compared to histogram-based technique.

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