

Face Recognition in Parallel and Sequential Processing Approach and its Analysis

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Abstract—All over the world the important task of the educational institutions is to maintenance of records of students along with monitoring of students attendance. There are many methods and techniques like Manual, RFID, Face Recognition, Finger and Iris scanning has been adapted by the institutions. One of the important and widely adapted methods was Face Recognition based attendance management system. In the face recognition based automated attendance management System require efficient algorithm and high performance computing resource for processing large numbers of faces at a time for detection and recognition. Although if we using efficient algorithm, the sequential computing will degrade the performance of the system. So that we require another method is called Parallel algorithm. This Paper proposed a design, development and analysis of Optimized face recognition algorithm in sequential and parallel approach for “Automatic attendance Management System”. The proposed system provides the detection and recognition of the faces in sequential and parallel approach and so that it could be used to automate the attendance management system for further analysis. Through this proposed method we tested with smaller number of face to the large number of faces and noted the performance of the face recognition in sequential and parallel approach.

Keywords— Face Recognition, Parallel, Sequential, Attendance Management

I. INTRODUCTION

Face recognition is the one of the important tasks and it have been used in many of the applications like campus security authentication, Smart homes, Personal gadgets authentication, National Individual Identification system(Aadhar) etc.. Face recognition is the analysis of characteristics of the person's face, face structure, distance between eyes, nose, mouth, and jaw edges and store this information in to the database for the purpose of identification of the person [1]. Despite the fact that other methods of identification (such as fingerprints, iris scans) can be more accurate, face recognition has always remains a major focus of research because of its noninvasive nature and because it is a people's primary method of person identification[2]. Traditional method of student attendance is taken by manually by circulating attendance sheet to the lecture for each hour and took the attendance, then at the end of the semester each student attendance are calculated cumulatively [1]. This method is very time consuming process. In the list of Face recognition applications, Automatic Attendance Management System is the one of them

In Automatic Attendance Management System have three steps. One is to detect the face from the frame which is received from the video camera, second is to compare these face with the face one which was stored or trained in the database, third is to store the in-time and out-time into the database; once if both the faces are matched. To perform these process require high end computing system, fast capturing camera and efficient algorithms. Today systems

are very high end and multi core system, even though the availability of high end system, all the algorithms and instructions are running in the sequential processing only. This will again degrade the performance of the best algorithms. So that we require another approach is called parallel processing approach.

This paper proposed Optimization of Face Recognition Algorithm in Parallel Processing Approach and Analysis of this algorithm in sequential processing for the Automatic Attendance Management System. The proposed method uses two important tasks, on is the well known algorithm called Viola Jones algorithm for faces detection from the video frame or image [3]. Issues like scaling, Illumination, rotation are the major challenges could be tackle in the Viola Jones method [3][4]. Viola Jones algorithms includes the Haar features, Integral image, Adaboost and Cascading method [3][4]. The another one is Local Binary Pattern (LBP) for the Face recognition operation [3][4].

In this paper we have arranged the following section. Sections II explain about the related work. Section III explains proposed system architecture. Section IV explains about the Implementation, Execution and Results. Section V explains about the analysis of algorithms with various inputs and outputs. Section VI explains about the future enhancement and conclusion.

II RELATED WORK

There are several existing work proposed by the many of the author to prove efficient object detection and recognition, among them here we will discuss few of them are taken for our proposed work. In [1], they proposed an Automatic Attendance Management System using face recognition approach for digitization of attendance recording. It reduced the time consumption taken by the manual attendance system uses Eigen faces method and implemented in the MATLAB software.

In [2], this paper describes a method for Student's Attendance System which will integrate with the face recognition technology using Personal Component Analysis (PCA) algorithm. It was implemented in OpenCV for detection and recognition with Haar classifier.

In [4], in this paper they proposed Face Recognition for the Automated Attendance management system integrates such as image contrasts, Integral images, Adaboost, Haar like features, cascade classifiers and used LBP for face recognition. They stated to get better result it can be changed for over a period of time.

In [5] Ren Meng et al, they proposed CUDA based real-time face recognition which is effectively completed the face detection and recognition tasks. This system used Viola Jones cascade classifier, parallel methodologies for image integral, and they compared the traditional CPU with NVIDIA GTX 580 running time. They got the running time for object detection is at 22.42 times speedup and for recognition is 1668.56 times speedup. This method uses

2000 training images for CUDA and 40 images for CPU. It was tested in i7 processor and it achieves a good real-time performance.

In [6], in this paper they proposed student attendance management system by using both RFID and Face recognition method and they analyzed various attendance system like iris scanning, finger prints, mobile based, and Bluetooth based. In the proposed they concluded that RFID will take auto attendance for all the students entered in to the class which will reduce the professor time. On the other hand Face Recognition will verify the student which will avoid the proxy attendance.

In [7], they proposed Histogram normalization, noise removal, skin classification, face detection (Haar classifier) and recognition for the Attendance Management System using Face Recognition method.

III PROPOSED SYSTEM

A. System Architecture

The proposed system consist of the following subsystem

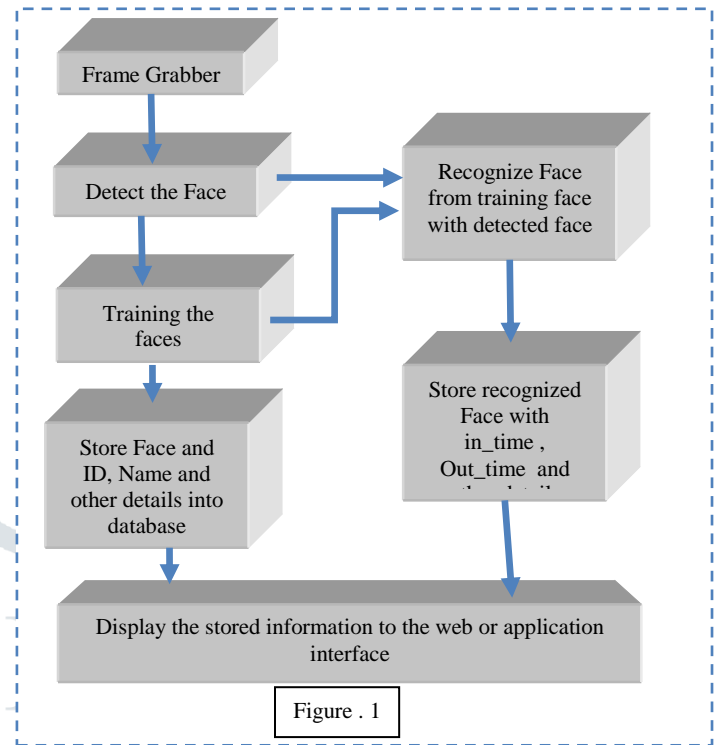
1. Video grabber
2. Faces Training
3. Face Detection
4. Face recognition
5. Store recognized face in to database and report generator

1. *Video grabber:* This section perform the capturing the video from the web camera or IP camera using openCV with .NET c#. It will read the video streaming from the camera and feed into the face detection and training section for the further process.
2. *Faces training:* this section all the faces will be trained before to perform face recognition. In the face training section it will read the video frame and feed into the face detection section to add faces for training
3. *Face Detection:* In the face detection module will read the video frame from the camera and detect the face using Viola Jones algorithm. This algorithm can be run in sequential and parallel processing approach depending upon the processing in which you are selected. Once the face are detected in the current frame then this face will be feed into the recognition phases
4. *Face Recognize:* this section will perform the whether the detected face is presented with training face or not. If it's present then the detected face should be added in to the face found list. Then it should be feed into the database to storing in-out time for the person and display the in-out time of the person.
5. *Store recognized face in to database and generate the report:* This section read the recognized face and store in to the database along with user ID, User

The detected frames are passed into the Parallel.For function which is used to check for each face to be detected then these detected should pass in to the recognition section. The recognizer will recognize face with the face which is available from the trained images using Eigen value and Eigen vector. The same process could be used by the sequential process except Parallel.For function. Then, noted the sequential and parallel running time of the face detected and recognized.

The face training section detected face could stored into the disk or database(s) for training purpose, then these

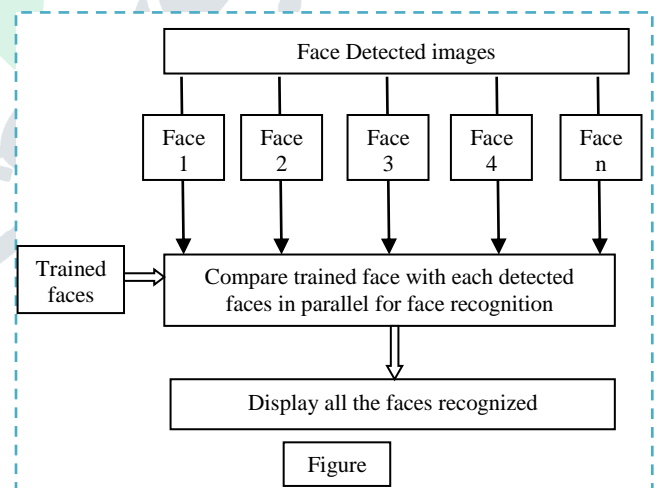
Name etc.. to the database and display it into the users. Then these detail could be passed in to the analysis and reporting purpose. The complete architecture are shown in figure.1



IV IMPLEMENTATION AND EXECUTION

1. Face trainer and recognizer

This proposed system was designed and implemented completely in c#.NET with openCV. The grabbed frames are passed into the face detection section in both sequential and parallel. The parallelism can be achieved by using **Parallel.For** utility which is available in c#.NET (see in the figure 2).



images could be taken for recognize purpose. We have to store more number of faces to get accuracy of face to be detected. Suppose if we store less than five faces, then it will recognize wrongly. If you store more than ten faces, we will recognize face with more accuracy.

2. Store face recognized into database and display

The recognized face are store into the database along with the UserID, Name, Department, in_out_time, date and other details. Then this information can be analyzed for the analysis purpose. The stored information could be displayed on the asp.net table with all the information.

Fig.3 Automatic Attendance Management Design Model

3. Execution and Result obtained

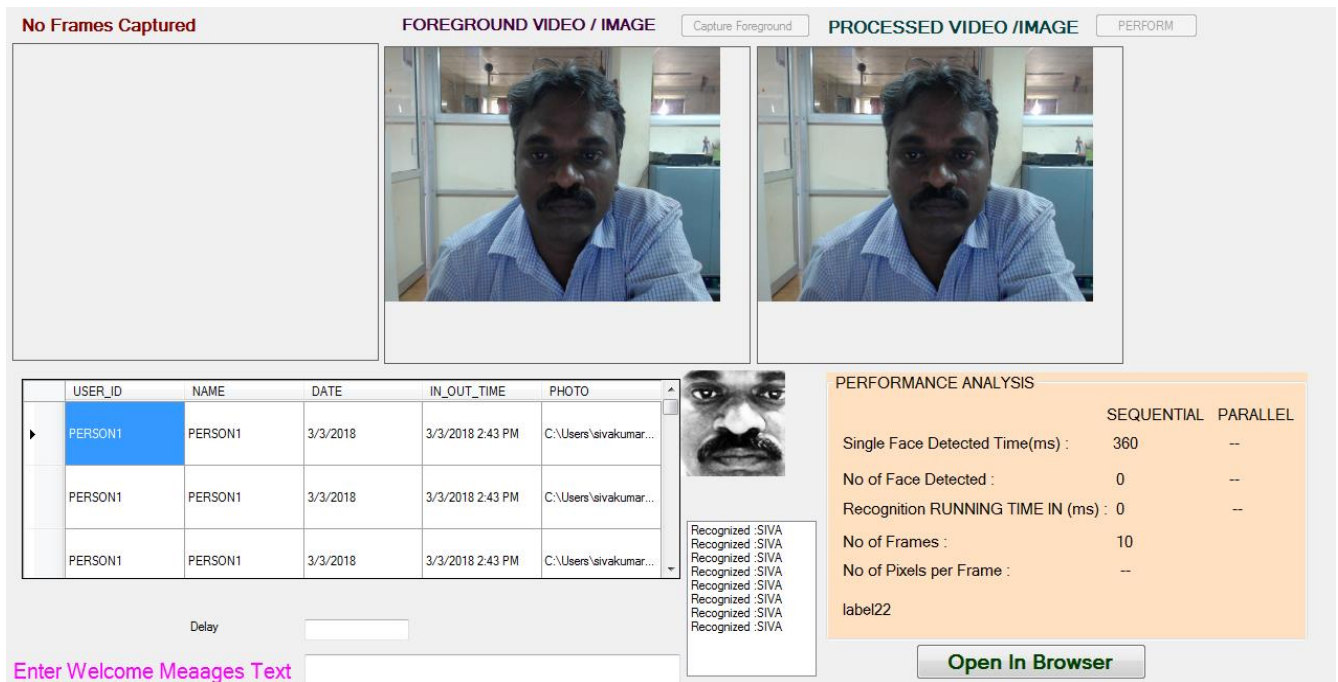


Fig.3 Automatic Attendance Management Design Model

The above shows the complete design of the automatic attendance management system. It consists of background video, foreground video for face detect and processed video for face recognized. The table show about the user attendance entry once the face was recognized. The analysis The table.1 shows the face detection and recognition with its trails and time taken in sequential and parallel processing in terms of ParallelFor concepts which is available in C#.NET. We tabulated the face detection and recognition analysis including No of Person(s) Trained, No of Training Face(s) for each Person, No of Correct Face(s) Detected, Face In this analysis we have taken only four parameters Analysis and reports.

V RESULT ANALYSIS

In this proposed system we have analyzed the performance of detection and face recognition. From the output result we have understand than if we increase the no of training faces

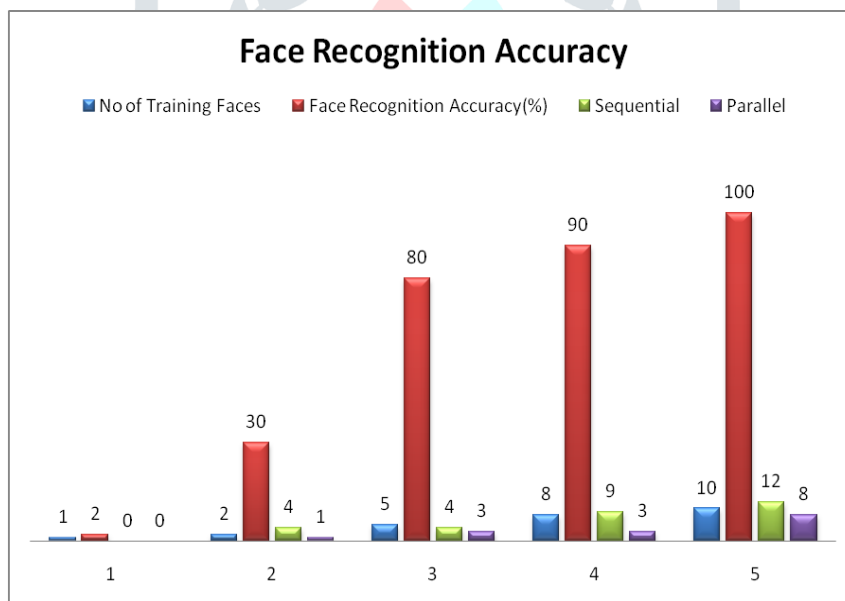
section, display the time taken to complete both sequential and parallel processing. The users in, out time details could also viewed in browser.

Detection Accuracy, No of Correct Face(s) Recognized, No of Incorrect Face(s) Recognized, Trails and Face Recognition Accuracy % and Sequential and Parallel Processing running time in milli seconds. Fig. 4 shows the face recognition accuracy and its graphs, which showing the above said parameters and its analysis. we will get more accuracy for face recognition and detection but the challenges here is that it required more memory space to store the training faces, high speed computing processor and best algorithm it might be parallel. Simple parallel algorithm only is not enough to do but we required other best algorithms which is suitable to adapt multi core processor.

Table 1. Face detection and Recognition Result Analysis

S.No	No of Person(s) Trained	No of Training Face(s) for each Person	No of Frames	No of Correct Face(s) Detected	No of Incorrect Face(s) Detected	Face Detection Accuracy %	No of Correct Face(s) Recognized	No of Incorrect Face(s) Recognized	Trails and Face Recognition Accuracy %	Recognition Running Time (in Milli Seconds)	
										Sequential Processing	Parallel Processing
1	1	1	10	1	0	100	0	0	0	--	--
		2	10	1	0	100	2,3,5	0	20 30 50	4	1
		5	10	1	0	100	9	1	90	4	3
		8	10	1	0	100	2,4,8,9	2 1 1 0	20 40 80 90	9	3
		10	10	1	0	100	10	0	100	12	8

Fig.4. Face recognition Analysis



VI CONCLUSION AND FUTURE SCOPE

The proposed system developed for face recognition algorithm for automatic attendance management system using sequential and parallel processing approach from this we have analyzed the performance of both sequential and parallel processing approach with few to large numbers of training faces, running time taken for both face detection and recognition, how much memory space consumed and what are the challenges by increasing no of

training faces and what is solution for this were analyzed. This system gave considerable result compared other system which was already developed. But there were many challenges like implementing multi core processor, developing efficient parallel face recognition if we have large numbers of training faces (1000 faces to lakh) it is difficult to develop an algorithms efficiently. This is gap will help left to the future enhancement in terms of space consumption and algorithms.

VII References

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