CHAPTER -4

LITERATURE SURVEY

4.1 Work Done by others:

1. **Extended SRC:Undersampled Face Recognition via Intraclass Variant Dictionary by Weihong Deng, Jiani Hu, and Jun Guo**

   (SRC) is a face recognition breakthrough in recent years which has successfully addressed the recognition problem with sufficient training images of each gallery subject.
   Assuming that the intra class variations of one subject can be approximated by a sparse linear combination of those of other subjects, Extended Sparse Representation-Based Classifier (ESRC) applies an auxiliary intra class variant dictionary to represent the possible variation between the training and testing images. The dictionary atoms typically represent intra class sample differences computed from either the gallery faces themselves or the generic faces that are outside the gallery.

2. **Implementation Of Classroom Attendance System Based On Face Recgnition In Class by Ajinkya Patil, Mrudang Shukla**

   The face is the identity of a person. The methods toexploit this physical feature have seen a great change sincethe advent of image processing techniques. The attendance is taken in every schools, colleges and library. Traditional approach for attendance is professor calls student namerecord attendance. It takes some time to record attendance. For eachlecture this is wastage of time. To avoid these losses,we are about use automatic process which is based onimage processing. In this model they used face detection face recognition.

   It identifies difference between face and non face for better results. The otherstrategy involves face recognition for marking the studentsattendance. The Raspberry pi module is used for facedetection recognition. The camera will be connected to theRaspberry pi module.The student database is collected. Thedatabase includes name of the students, there images rollnumber. This raspberry pi module will be installed at thefront side of class in such a way that we can capture entireclass. This system is convenient to carry out attendance within less time.

3. **Dynamic Image-to-Class Warping for Occluded Face Recognition by : Xingjie Wei, Chang-Tsun Li**

Face recognition (FR) systems in real-world applications need to deal with a wide range of interferences, such as occlusions and disguises in face images. Difference with other forms of interferences such as nonuniform illumination and pose changes, face with Obstacle has not attracted enough attention yet. A novel approach, coined dynamic image-to-class warping

(DICW), is proposed in this work to deal with this challenge in FR. The face consists of the forehead, eyes, nose, mouth, and chin in a natural order and this order does not change despite occlusions. Thus, a face image is partitioned into patches, which are then concatenated in the raster scan order to form an ordered sequence. Considering this order information, DICW computes the image-to-class distance between a query face and those of an enrolled subject by finding the optimal alignment between the query sequence and all sequences of that subject along both the time dimension and within-class dimension. Unlike most existing methods, our method is able to deal with occlusions which exist in both gallery and probe images. Extensive experiments on public face databases with various types of occlusions have confirmed the effectiveness of the proposed method.

4.2 Benefits:

There are severall benefits of " Automated Attenndence System through Facial detection and recognition in machine learning"

- Accuracy of our project is 91%.
- Far better than the traditional attendance system.
- Easy to handle.
- Manual Functionality for adding attendance is implemented.
- latency is reduced

- more ordered
- improves correctness

4.3 Proposed Solution:

The attendance is recorded by using a camera that will stream video of students, detect the faces in the image and compare the detected faces with the student database and mark the attendance. The attendance gets marked in a spreadsheet which gets converted into PDF file which is mailed to the concerned e-mail Ids. The project has two main parts:

[A] Development of Face Recognition System

[B] Development of Attendance System

Face recognition is achieved using machine learning and the basic pipeline used for it is as follows:

1. Finds face in an image.

2. Analyses facial features.

3. Compares against known faces and makes a prediction.

Development of complete attendance system is achieved using UI and Android application. Here the application takes data like subject details, faculty details, date and time and provides a click to start the attendance. The images of students are clicked and sent to Linux server where python script runs to mark attendance and generate spreadsheet and PDF file which is then mailed.

1. Find face in the image:

The initial step of our pipeline includes detecting the face for which we will use Histogram of Oriented Gradients (HOG) [15]. One of the most popular and successful "person detectors" out there right now is the HOG with SVM approach.HOG stands for Histograms of Oriented Gradients. HOG is a type of "feature descriptor". The intent of a feature descriptor is to generalize the object in such a way that the same object (in this case a person) produces as close as possible to the same feature descriptor when viewed under different conditions. This makes the classification task easier. The creators of this approach

trained a Support Vector Machine (a type of machine learning algorithm for classification), or "SVM", to recognize HOG descriptors of people. It is a feature descriptor which is a representation of an image or an image patch that simplifies the image by extracting useful information and throwing away extraneous information.

2. Analyze facial features (Posing and Projecting Faces):

After differentiating the faces from the image we have to now deal with the problem of face turning into different directions which would look totally different to a computer.

Humans can easily recognize that both images are of the same person, but computer would see these pictures as two completely different people. To account for this, we will try to warp each picture so that the eyes and lips are always in the sample place in the image. This will make it a lot easier for us to compare face in the next steps. For this, we are going to use an algorithm called face landmark estimation.

Herein we would come up with 68 specific points (called landmarks) that exist on every face – the top of the chin, the outside edge of each eye, the inner edge of each eyebrow, etc. as seen from Fig. Then we will train a machine learning algorithm to be able to find these 68 specific points on any face. Now that we know where the eyes and mouth is, we'll simply rotate, scale and shear the image so that the eyes and mouth are centered as best as possible. Now no matter how the face is turned, we are able to centre the eyes and mouth so that they are roughly in the same position in the image. This will make our next step a lot more accurate.

3. Encoding Images:

Next step involves recognizing the detected face for which we need to extract a few basic measurements from each face. Then we could measure our unknown face the same way and find the known face with closest measurements. The most accurate approach is to let the computer figure out the measurements to collect itself. Deep learning does a better job than humans at figuring out which parts of a face are important to measure. The solution is to train a Deep Convolution Neural Network to generate 128 measurements for each face.

The training process works by looking at 3 face images at a time:

1. Load a training face image of a known person.

2. Load another picture of the same known person.

3. Load a picture of a totally different person.

Then the algorithm looks at the measurements it is currently generating for each of those three images. It then tweaks the neural network slightly so that it makes sure the measurements it generates for #1 and #2 are slightly closer while making sure the measurements for #2 and #3 are slightly further apart. This is a reduction of complicated raw data like a picture into a list of computer-generated numbers, a process known as Embedding.

This process of training a convolution neural network to output face embeddings requires a lot of data and computer power.

4.4 Technology used:

Front End :

- Python3.6

Back End:

- SQl
- Python3.6

Technology:

- Machine Learning
  - ❖ Support Vector Machine (SVM)
  - ❖ Fisher Face Recognizer