# SUSTAINABLE & NO CONTACT ATTENDANCE SYSTEM USING MACHINE LEARNING (ML)

**A PROJECT REPORT**


*Submitted by*

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***(6th semester)***

***of***

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**IN**

**COMPUTER SCIENCE & INFORMATION TECHNOLOGY**



**Department of Computer Science & Engineering**

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# BHUBANESWAR-ODISHA-752054

## CERTIFICATE OF APPROVAL

This is to certify that we have examined the project entitled **"Sustainable & No Contact Attendance System"** submitted by **Priyansu Sahoo, Registration No.-1901227306, Abhishek Parasar, Registration No.-1901227257, Partho Panigrahy, Registration No.-1901227300, Alok Raj, Registration No.-1901227263**, CGU-Odisha, Bhubaneswar. We here by accord our approval of it as a major project work carried out and presented in a manner required for its acceptance towards completion of major project stage-I ($6^{th}$ Semester) of **Bachelor Degree of Computer Science & Engineering** for which it has been submitted. This approval does not necessarily endorse or accept every statement made, opinion expressed or conclusions drawn as recorded in this major project, it only signifies the acceptance of the major project for the purpose it has been submitted.

**Project Guide** **Internal Examiner**

# ACKNOWLEDGEMENT

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An assemblage of this nature could never have been attempted with our reference to and inspiration from the works of others whose details are mentioned in references section. We acknowledge our indebtedness to all of them. Further, we would like to express our feeling towards our parents and God who directly or indirectly encouraged and motivated us during Assertion.

# ABSTRACT

Attendance is one of the major factors for measuring eligibility, promptitude and commitment to the institution. To keep and manage the attendance records efficiently is veritably important for the assessment of scholars and workers.

The attendance record is a document that records the dates, times, and places that a pupil or hand is present at academy or work. It's also used to keep track of absences and belatedness. It's one of the major factors for measuring eligibility, promptitude and commitment to the institution. The attendance record is generally kept on the pupil or hand's attendance distance. The attendance record is also used to induce reports similar as the absenteeism report, the belatedness report, the tard in moment's world, paper- grounded attendance marking system is used in educational institutes where the schoolteacher calls out scholars roll figures. This is a homemade process which is prone to numerous mortal crimes and veritably time consuming for the both scholars as well as preceptors during conducting the classes. Also, the operation of staff's attendance record daily and generating yearly/ periodic report using homemade computational process has come a delicate challenge.

For the pronounced reasons, an effective Web- grounded operation is designed to track pupil's exertion in each class and also cover the check-heft and check-out time of scholars. Also have the installation to manually mark attendance by tracking the pupil conditioning.

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# CHAPTER-1
# INTRODUCTION

Traditional method of attendance marking is a tedious task in many schools and colleges which is also time consuming and prone to human errors.

This Project uses Face Recognition approach as it's among the most productive image processing applications in today's world.

Face Recognition approach is only possible with the advancement of the deep learning technology.

In this project we are going to use face detection system using computer vision and machine learning algorithms for making attendance.

# CHAPTER -2
# LITERATURE REVIEW

## 2.1. USING IRIS DETECTION:

### 2.1.1. INTRODUCTION

In the entire globe any educational association is concerned in relation to the attendance of individualities because this has an effect on their overall performances. In conventional system attendance of scholars are taken by calling pupil names or subscribing on paper which is extremely time inviting. To exclude this problem one of the results is a biometric-grounded attendance system that can automatically capture pupil's attendance by feting their iris. The ideal will be to apply an open- source iris recognition system in order to corroborate the claimed performance of the technology. The development tool used will be JAVA, and emphasis will be only on the software for performing recognition, and tackle as Active camera for landing an eye image. A rapid-fire operation development (RAD) approach will be employed in order to produce results snappily. The unborn system will be developed using Face discovery Algorithm using SSR sludge medium and Skin Pixel discovery using RGB model.

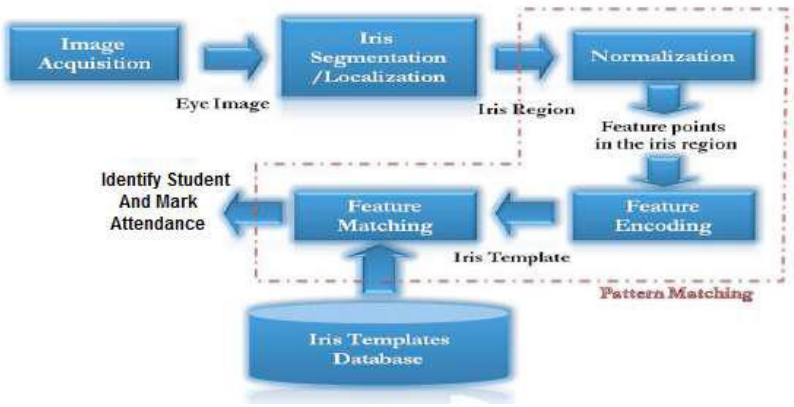


*Fig. 2.1. System Architecture*

## 2.1.2 ALGORITHM USED

### 2.1.2.1. Gray Scale Conversion:

Grayscale as the brightness dimension of the HSB scheme (or the axis of the HSB cone)—with saturation held to zero, and hue therefore meaningless. The grayscale is used by photographers, and it is also useful in many documents where variations in Gray can be used in place of costly colour printing.

• Black = 0% brightness, 100% Gray.
• White = 100% brightness, 0% Gray.
• Gray is most often specified from white = 0, thus 10% grey = 90% brightness

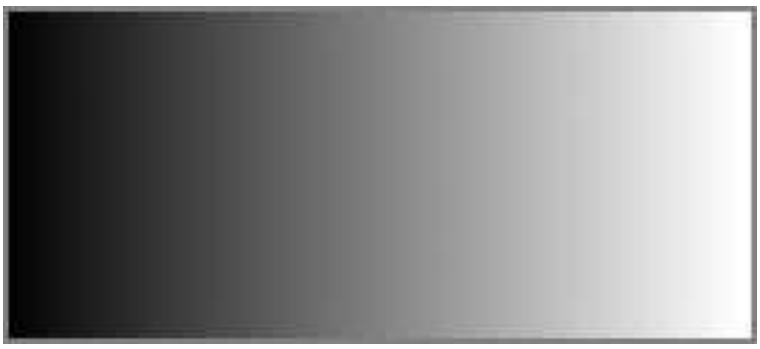

*Fig 2.2. Gray Scale Conversion*

• Hue Based
• Saturation Based
• Brightness Based

### 2.1.2.2. Six Segment Rectangular Filter:

In order to achieve high speed and dependable face discovery system, we propose the system combine both point- grounded and image- grounded approach to descry the point between the eyes (henceforth we call it Between-the- Eyes) by using Six-Segmented Blockish sludge (SSR sludge). At the morning, a cube is scrutinized throughout the input image. This cube is segmented into six parts as shown in Figure given below.

(a). We denote the total sum of pixel value of each segment (B1 ¡ B6) as 1 6 b b S S ¡. The proposed SSR filter is used to detect the between-the-Eyes based on two characteristics of face geometry.

(1) The nose area (n S) is brighter than the right and left eye area (er S and el S, respectively) as shown in Fig given below

(b), were Sn = Sb2 + Sb5

Ser = Sb1 + Sb4

Sel= Sb3 + Sb6

Then,

Sn>Ser (5)

Sn>Sel (6)

(2) The eye area (both eyes and eyebrows) (e S) is relatively darker than the cheekbone area (including nose) (c S) as shown in Fig. II.III.

(c), were

Se = Sb1 + Sb2 + Sb3

Sc= Sb4 + Sb5 + Sb6

Then,

Se<Sc (7)

When expression (5), (6), and (7) are all satisfied, the centre of the rectangle can be a candidate for Between-the-Eyes.

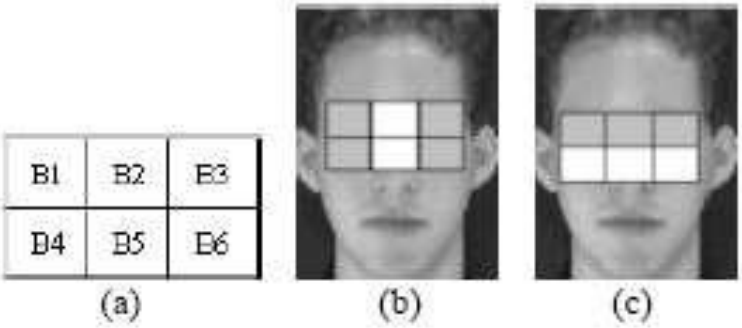


*Fig 2.3. Six Segment Rectangular Filter*

### 2.1.2.3. SKIN PIXEL DETECTION:

The skin color discovery significantly depends on the chosen color model. The RGB color space is dereliction in numerous images format. Color space metamorphosis can be applied to reduce the imbrication between skin and non-skin pixels and will thereby prop skin pixel bracket and achieve high delicacy in varying illumination conditions.

#### 2.1.2.3.1. Advantages & Disadvantages:

**Disadvantages of iris scanning include:**

• Cannot use a regular camera; requires IR light source and detector. Visible light must be minimized for loftiest delicacy needed for hunt.

• Generally, bear close propinquity to camera, which can beget discomfort for some.

• Lower value for felonious disquisition (no latent).

it is veritably time- consuming process means one have to stay until the former bone is done with the process.

Advantages

• Contactless Identification Process.

• Accurate Matching Performance.

• Delicate to Forge.

• Stable.

• Protean.

## 2.2. USING FACE RECOGNITION:

### 2.2.1. INTRODUCTION:

This is a design done by scholars as a final time design at Kingston University London in 2018.

The system will be presented an image either via camera or from memory and it must descry the number of faces on it automatically. After relating faces, the system should crop the faces from the image and store them in memory for image recognition which will be done in the alternate step. The system should be suitable to automatically count the number of faces detected on the image.

The alternate step will be the recognition part where the system will be suitable to match faces from the stored dataset and compare it to the input data from the first step. A software will be used for this system which automatically sorts out the faces. The software will beinter-active so to grease commerce between multiple tasks as needed. Because the system has two way, the alternate phase of the system will involve the training of images on a dataset that are to be used for recognition.

The system behaviour has been explained in the following flowchart:

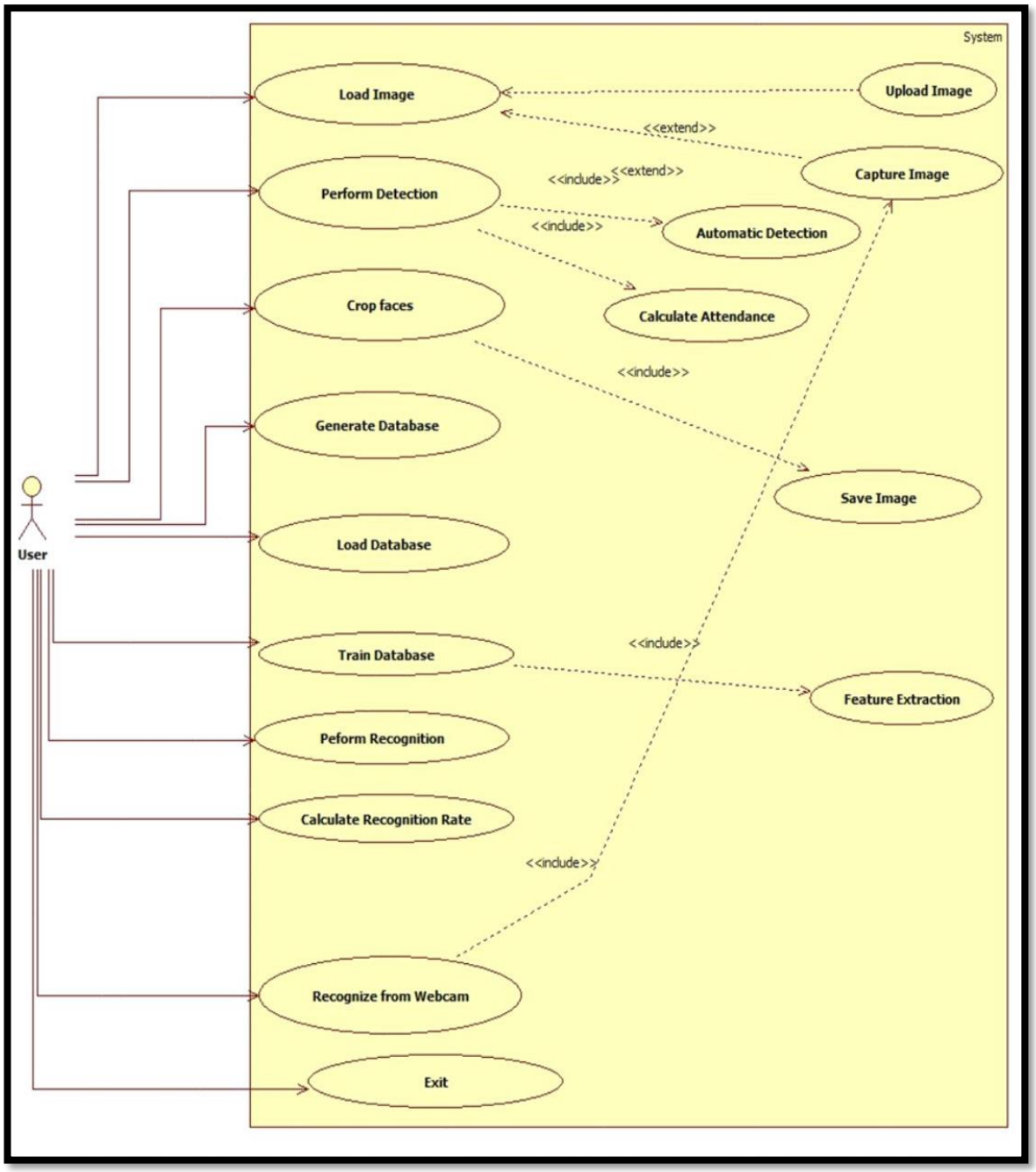


*Fig 2.4. Face Detection system behaviour flowchart*

### 2.2.2. Technology Used:

The crucial algorithms are Viola-Jones for face discovery and Hidden Markov Model with SVD.

- The perpetration of The Viola-Jones algorithm is available on software's like MATLAB, OpenCV and Web Cybersurfers (using adobe flash).
- The being perpetration of the Hidden Markov Model with SVD for face recognition are available on MATLAB, C and OpenCV libraries.

### 2.2.3. Advantages of face detection:

As a crucial element in facial imaging operations, similar as facial recognition and face analysis, face discovery creates colorful advantages for druggies, including

- Advanced security. Face discovery improves surveillance sweats and helps track down culprits and terrorists. Particular security is also enhanced since there's nothing for hackers to steal or change, similar as watchwords.
- Easy to integrate. Face discovery and facial recognition technology is easy to integrate, and utmost results are compatible with the maturity of security software.
- Automated identification. In the history, identification was manually performed by a person; this was hamstrung and constantly inaccurate. Face discovery allows the identification process to be automated, therefore saving time and adding delicacy.

### 2.2.4. **Disadvantages of face detection:**

While face discovery provides several large benefits to druggies, it also holds colorful disadvantages, including

- Massive data storehouse burden. The ML technology used in face discovery requires important data storehouse that may not be available to all druggies.
- Discovery is vulnerable. While face discovery provides more accurate results than homemade identification processes, it can also be more fluently thrown off by changes in appearance or camera angles.
- A implicit breach of sequestration. Face discovery's capability to help the government track down culprits creates huge benefits; still, the same surveillance can allow the government to observe private citizens. Strict regulations must be set to insure the technology is used fairly and in compliance with mortal sequestration rights.

# CHAPTER-3
# PROBLEM STATEMENT

**Aim of the Project:**

Sustainable and No Contact Attendance system using Image processing & Machine learning Algorithm.

## 3.1. Scope of the project:

The compass of the design is the system on which the software is installed, i.e., the design is developed as a desktop operation, and it'll work for a particular institute. But latterly on, the design can be modified to operate online.

The main intention of this design is to break the issues encountered in the old attendance system while reproducing a brand new innovative smart system that can give convenience to the institution. In this design, a smart device will be developed which is able of recognising the identity of each individual and ultimately record down the data into a database system.

This will help in maintaining the attendance records of the scholars and faculty members and at the same time give convenience to the druggies by furnishing them the installation of online submission of their attendance. This system will be developed as a desktop operation which will be installed on the institute's computers and will work for the particular institute. But latterly on, the design can be modified to operate online. The operations developed in this design will be handed with the online installation so as to help the institute in perfecting the productivity of the workers.

The system will be developed as a desktop operation and will work for a particular institute. But latterly on, the system can be modified to operate online. The operation will be developed using Machine literacy Algorithms The operation will give an interface to the druggies where they can enter the data and can also edit the same, view the report and also publish the same.

### 3.2. Ideation:

- The idea is to track the scholars during an online class and keeps track of active period in a class. And to validate the time a pupil enters the class and the time they take off.
- And cover all the exertion during an online class. And reduce malpractice.
- Because of the information sharing, numerous preceptors can fluently know the online pupil's exertion during the class. And also, can know when the online pupil isn't paying attention during the class. And also, can know when the online pupil isn't doing their work and farther ameliorate the effectiveness of the class. And also, can know when the online pupil is taking too important time during the class.
- The system will give the following information to the preceptors- Tracks the scholars during an online class and keeps track of active period in a class. And to validate the time a pupil enters the class and the time they take off. -And cover all the exertion during an online class. And reduce malpractice.
- So that the preceptors will have a clear idea about the participation of the scholars in an online class and also the time they spend in the class. And at the end of the class, the scholars will be needed to fill up a form which will be participated with the schoolteacher. And the schoolteacher will be suitable to cover the malpractice of the scholars.
- So that the preceptors will be suitable to plan their tutoring better and also identify the weak pupil and also give individual attention to them.

- Numerous attendance operation systems that live currently are lack of effectiveness and information sharing. Thus, in this design, those limitations will be overcome and also further bettered.

# CHAPTER-4
# Problem Formulation & Representation

## 4.1. Steps involved in face detection:

**Step 1**: **Finding all the Faces or Detecting the faces:**

The first step in our channel is face discovery. Obviously, we need to detect the faces in a snap before we can try to tell them piecemeal!

Still, you ’ve presumably seen face discovery in action, If you ’ve used any camera in the last decade.

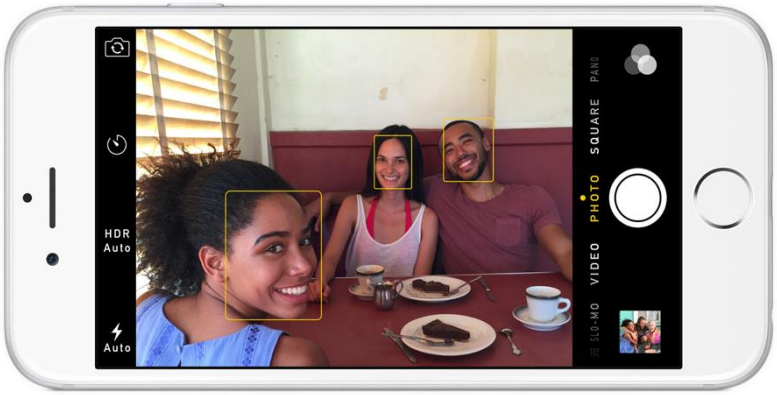


*Fig 4.1. Face-detection in action*

Cameras with facial recognition erected in can frequently descry where a face is in an image, and also track the face as the subject moves. Cell phones can frequently negotiate a analogous result by detecting the eyes and mouths of a face and using that information to induce a rough figure of the face. A computer program also uses the figure to find the eyes and mouth again, and uses the position information to induce a more accurate image of what the face looks like.

**Step 2: <u>Posing and Projecting Faces</u>:**

Now that we've insulated the faces in our image. But now we've to deal with the problem that faces turned different directions look completely different to a computer.

To do this, we're going to use an algorithm called face corner estimation.

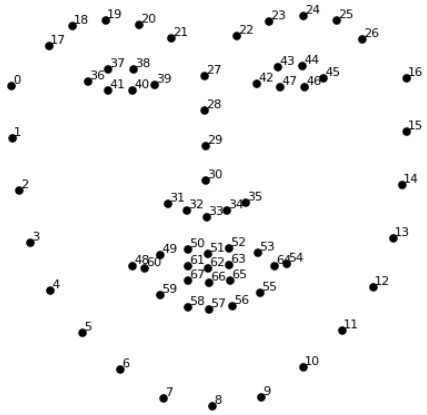

*Fig 4.2. Face Landmark estimation*

The introductory idea is we will come up with 68 specific points ( called milestones) that live on every face — the top of the chin, the outside edge of each eye, the inner edge of each eyebrow, etc. Also we will train a machine learning algorithm to be suitable to find these 68 specific points on any face.

We're only going to use introductory image metamorphoses like gyration and scale that save resemblant lines called affine metamorphosis.

Now that we've insulated the faces in our image. But now we've to deal with the problem that faces turned different directions look completely different to a computer. We'll also use a slightly advanced- position algorithm

called face corner estimation to find the 68 specific points on every face so our artificial intelligence system will be suitable to fete people indeed when their faces are rotated or gauged. We'll use the affair of this algorithm to train a machine learning model so our AI system will be suitable to directly identify the person in the print grounded on their face alone. The end result will be a system that can identify people in prints by looking at their faces alone, without demanding to see the rest of the image.

We're only going to use introductory image metamorphoses like gyration and scale that save resemblant lines called affine metamorphosis.

*Fig 4.3. Affine Transformation*

**Step 3: Encoding Faces**

In Step 2 with all the filmland we've of people that have formerly been tagged. When we find a preliminarily tagged face that looks veritably analogous to our unknown face, it must be the same person. There’s actually a huge problem with that approach. That would take way too long. They need to be suitable to fete faces in milliseconds, not hours.

To break this problem, we're going to train it to induce 128 measures for each face and store it in a database. After which it's easy for the machine to execute and compare faces with this data

So, in this step in erecting this system is to train it to induce 128 unique measures for each face. This is done by feeding the system a large collection of filmland of people that have formerly been tagged. The system also measures the distance between each of the 128 measures and compares it to the measures of all the people that have beentagged. However, it's a good chance that the person in the picture is unknown, If there's a large distance between two of the person’s measures. So, if it's shown a picture of a person, it can tell within milliseconds if it has seen that person before or not. It can also tell us if it has seen a preliminarily tagged face or not. This means that we can get a result in seconds rather of hours.

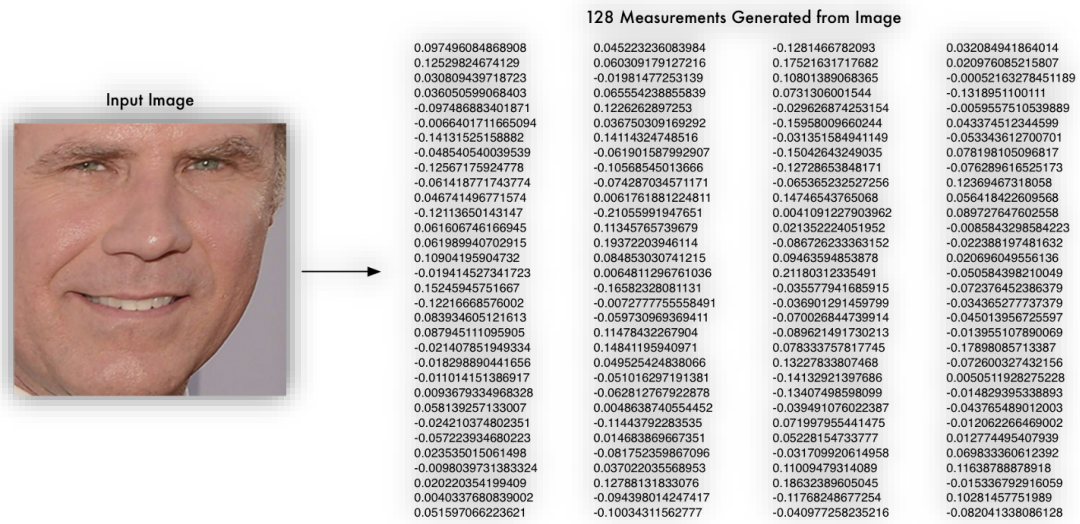


*Fig 4.4. Encoding faces*

**Step 4: <u>Finding the person's name from the encoding</u>:**

All we have to do is find the person in our database of known people who has the closest measurements to our test image.

We can do that by using any basic machine learning classification algorithm, like a support vector machine or a neural network. The key is that we provide the software with a "training set" of images that are similar to the image we're trying to identify. The software "learns" how to recognize these images, and uses that knowledge to classify new images that aren't in the training set. This is how computers are able to "see" things, understand things, and learn things!

**Step 5: <u>Monitoring Activity</u>:**

We can determine this by comparing the current timestamp against the expected timestamp of the class time. This is done by using difference between current timestamp and expected timestamp. If the difference is greater than the threshold, it means that the student is not present in the video for more than or equal to 70% of the class time, which will result in the attendance award being denied.
This process is called as frame detection.

We can also detect the absence of the student in the video frame for more than or equal to 70% of the class time. We can even do this without the

video feed. For example, if we have the video of the classroom, then we can use that to detect the presence or absence of the student.

We can monitor the video and detect whether the student is currently available in the video frame or not.

If the condition is normal i.e., if the student is present in the video frame for more than or equal to 70% of the class time, then he/she will get the attendance. And vice-versa for abnormal.

# CHAPTER-5
# CONCLUSION

This system aims to make an effective class attendance system using face recognition ways. The proposed system will be suitable to mark the attendance via face Id. It will descry faces via webcam and also fete the faces. After recognition, it'll mark the attendance of the honored pupil and modernize the attendance record.

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