



## Student Behavior Analysis Using ML

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### Abstract:

Student engagement has been a key topic inside the educational training. The three specific styles of engagement of the students in a class are: behavioral, emotional, and cognitive. The time period behavioral engagement is commonly used to describe the scholar's willingness to participate within the getting to know system. Emotional engagement describes a scholar's emotional attitude toward learning. Cognitive engagement is a chief part of overall learning engagement. From the facial expressions the involvement of the students in the magnificence can be decided. Commonly in a lecture room it's far difficult to recognize whether the students are able to understand the lecture or no longer or even whether there is any kind of stress. So that you can know that comments form will be collected manually from the students. However those feedbacks given by using the students will now not be correct. Hence they will no longer get proper comments. This hassle can be solved by means of the use of a facial emotion evaluation. From the facial expression the emotion of the students may be analyzed. Quantitative observations are achieved in the lecture room wherein the emotion of students might be recorded and statistically analyzed. With the aid of the use of facial emotion we will directly get correct information approximately college students understand potential, and determining if the lecture become exciting, boring, or mild for the students. And the apprehend capability of the scholar is recognized by the facial emotions. Also using Face data We can Update the attendance to make the attendance process automatic.

### Introduction:

The major component of human communication is facial expressions. Facial expressions are used not only to express our emotions, but also to provide important communicative cues during social interaction, such as our level of interest, continuous feedback signaling understanding of the information conveyed. Real time system to recognition the basic emotions from video. The system automatically detects frontal faces in the video stream and codes each frame with respect to 7 dimensions: Neutral, anger, disgust, fear, joy, sadness, surprise. The facial features from the video source is extracted and mapped with the basic emotions. This can be used in any kind of environment. We use this system classroom environment to identify the involvement of students during lecture.

Facial expression is one or more motions or positions of the muscles beneath the skin of the face. Facial expressions are form of nonverbal communication. The important fact that felt emotions is only one source of facial expressions besides others like verbal and non-verbal communication or physiological activities. We use facial expressions to display our emotional states and to manage our interactions. The term "facial expression recognition" often refers to the classification of facial features in one of the six so called basic emotions: happiness, sadness, fear, disgust, surprise, anger and neutral. By these expressions, we can examine the behaviour of the student during lecture. The involvement of students can be identified by their facial emotions. Face speaks

more than words, it's better to convey messages. Non verbal communication in classroom is more important, as students express their situation or feelings by facial emotion or expressions.

Traditionally, attendances are taken manually in the class room using attendance registers given to the faculty members. But it is a time consuming event. Also, it is very difficult to verify students one by one in a large classroom environment, whether they are present or not.

### Literature Survey:

## Towards Emotionally Aware AI Smart Classroom: Current Issues and Directions for Engineering and Education

**Authors:** YELIN KIM<sup>1</sup> , (Member, IEEE), TOLGA SOYATA<sup>1</sup> , (Senior Member, IEEE), AND REZA FEYZI BEHNAGH<sup>2</sup>

### Methodology:

The proposed system is capable of making real-time suggestions to an in-class presenter to improve the quality and memorability of their presentation by allowing the presenter to make real-time adjustments/corrections to their non-verbal behavior, such as hand gestures, facial expressions, and body language. We base our suggested system components on existing research in affect sensing, deep learning-based emotion recognition, and real-time mobile-cloud computing. We provide a comprehensive study of these technologies and determine the computational requirements of a system that incorporates these technologies. Based on these requirements, we provide a feasibility study of the system. Although the state-of-the-art research in most of the components we propose in our system are advanced enough to realize the system, the main challenge lies in: 1) the integration of these technologies into a holistic system design; 2) their algorithmic adaptation to allow real-time execution; and 3) quantification of valid educational variables for use in algorithms. In this paper, we discuss current issues and provide future directions in engineering and education disciplines to deploy the proposed system.

**Advantages** : Deals with E Learning Systems  
Simple and easy implementations

**Disadvantages** : only deals with different type of learning

## 2. Resolution Invariant Face Recognition Using a Distillation Approach

**Authors:** Syed Safwan Khalid , Zhen Hua Feng

### Methodology:

This Paper propose to train a network using both HR and LR images under the guidance of a fixed network, pretrained on HR face images. The guidance is provided by minimising the KL-divergence between the output Softmax probabilities of the pretrained (i.e., Teacher) and trainable (i.e., Student) network as well as by sharing the Softmax weights between the two networks. The resulting solution is tested on down-sampled images from FaceScrub and MegaFace datasets and shows a consistent performance improvement across various resolutions. We also tested our proposed solution on standard LR benchmarks such as TinyFace and SCFace. Our algorithm consistently outperforms the state-of-the-art methods on these datasets, confirming the effectiveness and merits of the proposed method.

**Advantages** : Invariant age face will be detected  
Works for different age faces

**Disadvantages** : only deals with face recognition technique with different age groups

### 3. Cyberbullying: A Systematic Literature Review to Identify the Factors Impelling University Students Towards Cyberbullying

**Authors:** Farhan Bashir Shaik , Aamir Amin

#### Methodology:

In this project, this study observed 32 studies out of a total of 7,939 reviews searched for the purpose. This study reviews a multitude of factors such as the role of an individual's personal, socio-cognitive, psychological and environmental factors towards cyberbullying and provides a 360-degree view of the factors contributing to cyberbullying behaviour instead of the traditional approach of focusing on one or two factors. This study will not only enrich the understanding of potential cyberbullying factors that drive university students towards notorious cyberbullying behaviour but also provides valuable insights to researchers, policy-makers, educators, universities, governments and parents.

**Advantages:** Deals with cyber bullying or toxic message detection with respect to college student data

**Disadvantage:** Just Deals with Text Classification

Low accurate of performance evaluation

### 4. Clustering-Based Emotion Recognition Micro-Service Cloud Framework for Mobile Computing

**Authors :** Liu Wenyuan , Wang Siyang

#### Methodology :

In this paper, an online method on modeling the position-behavior feature of multiperson scene is presented. First, a position-based model of individual behavioral feature transformation is proposed. The behavior features in other positions are generated by the behavior of the individual in a particular position. Second, a multiperson behavior feature generation method based on noise reduction is proposed to generate the same behavior feature in an online pattern. Finally, taking advantage of the models, a multiperson fitness coaching system is designed and implemented, named multiuser fitness coach. The system can identify the irregular behavior of individuals in the multiperson environment. The performance of the system is evaluated in different scenarios, and the results show that the precision of feature generation can be effectively applied to the decision of irregular behavior in multiperson scenarios.

**Advantages** : Easy Implementation Methods

**Disadvantages** : Low Accurate Methods as method just focus on Wifi based Methods

### General Sequence Teacher–Student Learning

**Authors :** Jeremy heng Meng wong , Mark John Francis

#### Methodology :

This paper addresses both of these issues by examining teacher-student learning within a sequence-level framework, and assessing the flexibility that these approaches offer. Various sequence-level teacher-student criteria are examined in this work, to propagate sequence posterior information. A training criterion based on the Kullback-Leibler (KL)-divergence between context-dependent state sequence posteriors is proposed that allows for a diversity of state cluster sets to be present in the ensemble. This criterion is shown to be an upper bound to a more general KL-divergence between word sequence posteriors, which places even fewer restrictions on the ensemble diversity, but whose gradient can be expensive to compute. These methods are evaluated on the augmented multi-party interaction (AMI) meeting transcription and MGB-3 television broadcast audio tasks.

**Advantages** : Just discusses about different methods of learning

**Disadvantages:** Huge Datasets Required

## Student Smart Attendance Through Face Recognition using Machine Learning Algorithm

**Author:** Nandhini R, Kumar P

### Methodology:

In today's competitive world, with very less classroom time and increasing working hours, lecturers may need tools that can help them to manage precious class hours efficiently. Instead of focusing on teaching, lecturers are stuck with completing some formal duties, like taking attendance, maintaining the attendance record of each student, etc. Manual attendance marking unnecessarily consumes classroom time, whereas smart attendance through face recognition techniques helps in saving the classroom time of the lecturer. Attendance marking through face recognition can be implied in the classroom by capturing the image of the students in the classroom via the camera installed. Later through the HAAR Cascade algorithm.

## Computer Vision for Attendance and Emotion Analysis in School Settings

**Author:** Sarah Deniz1 , Dakyung Lee1

**Methodology:** This paper presents facial detection and emotion analysis software developed by and for secondary students and teachers. The goal is to provide a tool that reduces the time teachers spend taking attendance while also collecting data that improves teaching practices. Disturbing current trends regarding school shootings motivated the inclusion of emotion recognition so that teachers are able to better monitor students' emotional states over time. This will be accomplished by providing teachers with early warning notifications when a student significantly deviates in a negative way from their characteristic emotional profile. This project was designed to save teachers time, help teachers better address student mental health needs, and motivate students and teachers to learn more computer science, computer vision, and machine learning as they use and modify the code in their own classrooms.

### Limitations:

1. Some papers deals with only emotions doesn't deal with only with respect to Students
2. Attendance Based Papers doesn't deals with student stress
3. Natural Language processing based papers deals with text classification which is low in accuracy
4. Sensor based systems used for stress detection which is not cost effective and moreover difficult to implement
5. Intimation systems are not developed

### OBJECTIVES:

If the face image present in frame1 matches the pre-trained image then the attendance is ensured for the particular student for the concerned lecture hour. If the student named as frame1 is not available in the trained dataset then the student's face saved as image1 doesn't belong to the particular class which means that the particular student may belong to the different class. The attendance can be maintained in any kind of SQL database for further easier retrieval of attendance data of a student.

Attendance window is used in checking the attendance of a particular class of students by inputting certain factors like date, branch ad year. On providing these inputs, the attendance for the corresponding date will be provided as a report.

### Problem Statement:

The problem of face recognition can be stated as follows: Face Recognition human facial features like the mouth, nose and eyes in a full frontal face image. We will be adapting a multi-step process in order to achieve the goal. To detect the face region we will be using a skin-color segmentation method. Morphological techniques will be adapted to fill the holes that would be created after the segmentation process. From the skeletonization process, a

skeleton of the face will be obtained from which face contour points could be extracted. Facial features can be located in the interior of the face contour. We will use several different facial-images to test our method.

### **Proposed System:**

virtual classroom is analogous to the communication in real classroom.

Facial Expressions that signal emotions include muscle movements such as raising eyebrows, wrinkling the forehead, rolling the eyes or curling the lip. Therefore the action units of face such as eyes, mouth, eyebrow and forehead are the emotion indicators. Here we analyzed whether the emotion of the students with respect to comprehension are indicated through expressions of facial action units. In this study, the main hypothesis of the first step proposed that facial expression is the widely used nonverbal communication mode by the students in the classroom which in turn helps the lecturers to identify the comprehension of the students. The second step proposed that the facial expressions through the action units (Eyes, Mouth, Eyebrows and Forehead) help the lecturers to identify the involvement and comprehension of the students in the classroom during the lecture. The third step proposed that the student's expressions are significantly correlated to their emotions that in turn identify their level of comprehension. The significance of the study was statistically interpreted. Facial Expression plays a vital role in identification of Emotions and Comprehension of the students who are geographically distributed in the virtual classrooms as the classroom Communication in

### **Methodology:**

In the proposed algorithm, face image and facial landmark detection is performed first for stress recognition. We used a Convolution Neural Network (CNN) algorithm In the proposed network, the face images and expression detected earlier are inputted to output stress recognition results.

The results of face recognition are composed of students present in the class.

#### Step 1: Convolution

A convolution is a joined integration of two methods that demonstrates to you how one method changes the other.

#### Step 2: Apply the RLU (Rectified Linear Unit)

In this step, the corrective function is used to increase nonlinearity on CNN. The data set is made up of different objects which are not linear to one another. Under this function, the grouping of information can be seen as a linear problem, although it is a non-straight problem.

#### Step 3: Pooling

Spatial invariance is a term that does not influence the neural network's ability to detect its particular feats when finding an item in the data collection. Pooling helps CNN to detect swimming pools, such as max and min pools, for example.

Based on the weather prediction detect the faces and students attendance will taken.

### **Face Recognition based Attendance:**

The total system is divided into 3 modules- Database creation, Training the dataset, Testing, sending alert messages as an extension.

#### 1. Database creation

- a) Initialize the camera and set an alert message to grab the attention of the students.
- b) Get user id as input
- c) convert the image into gray scale, detect the face and
- d) Store it in database by using given input as label up to 20 frames.

#### 2. Training

- a) Initialize LBPH face recognizer.
- b) Get faces and Id's from database folder to train the LBPH face recognizer.
- c) Save the trained data as xml or yml file.

### 3. Testing

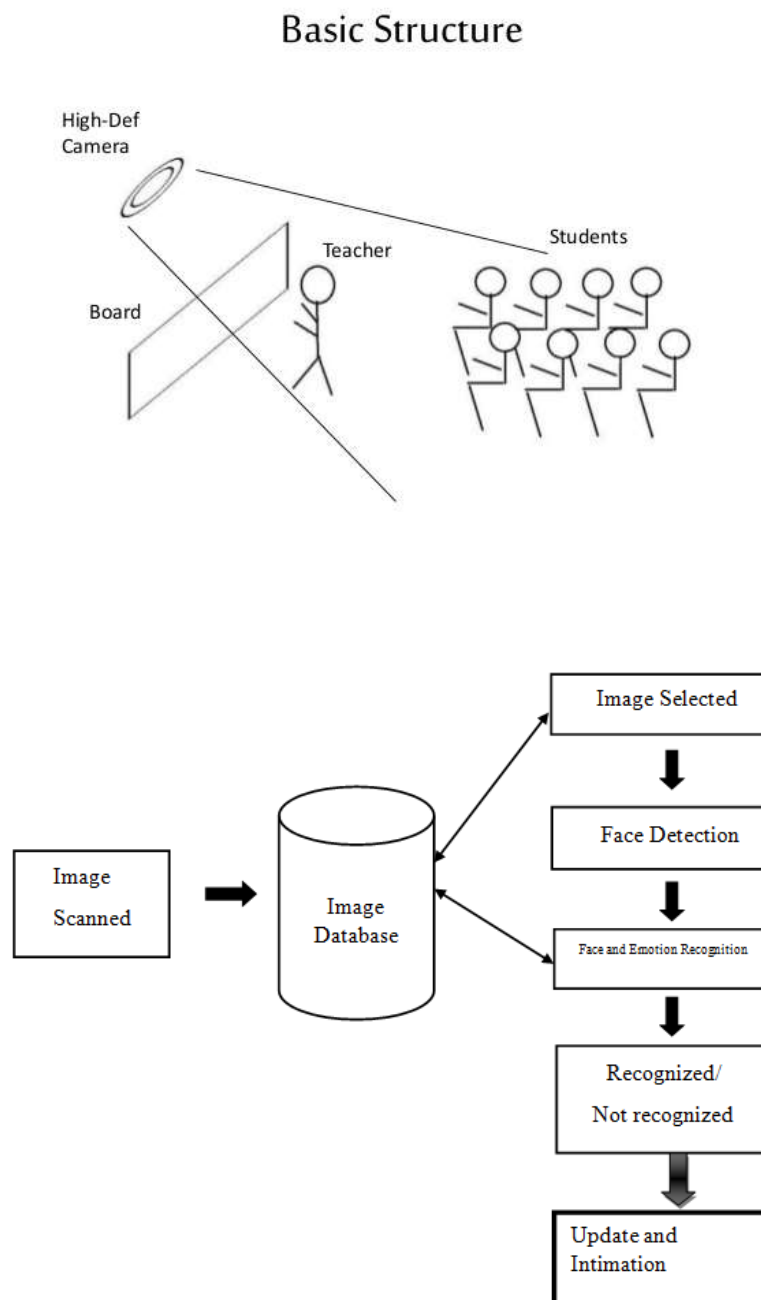
Load Haar classifier, LBPH face recognizer and trained data from xml or yml file.

- a) Capture the image from camera,
- b) Convert it into gray scale,
- c) Detect the face in it and
- d) Predict the face using the above recognizer.

This proposed system uses Haar cascade algorithm for face detection which uses modified Haar Cascades for detection. Raspberry Pi is the main component in the project. We will be using USB webcam to capture photos. We can access System console either by using SSH in laptop. Firstly, the algorithm needs a lot of positive images and negative images to train the Haar cascades classifier. Positive images are images with clear faces where negative images are those without any faces.

### System Architecture:

The system architecture for proposed emotion recognition framework is represented by Fig



The execution of the entire project comprises three main steps:

Static approach using extracted features and emotion recognition using machine learning is used in this work. The focus is on extracting features using python and image processing libraries and using machine learning algorithms for prediction. Our implementation is divided into three parts. The first part is image pre-processing and face detection. For face detection, inbuilt methods available in dlib library are used. Once the face is detected, the region of interest and important facial features are extracted from it. There are various features which can be used for emotion detection attendance updation and behavior detection. In this work, the focus is on facial points around the eyes, mouth, eyebrows etc.

### Applications:

- Computer human interaction.
- Face ID smart cards.
- Safety and secure applications.
- Audio-visual observation.
- Others applications

### Advantages:

- Easy to implement
- Avoids Human Effort
- Saves Times

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