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# Real Time Emotion Detection

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**ABSTRACT:** Human Face expression Recognition is one of the most powerful and challenging tasks in social communication. Generally, face expressions are natural and direct means for human beings to communicate their emotions and intentions. Face expressions are the key characteristics of non-verbal communication. It describes Face Expression Recognition (FER) techniques which include the three major stages such as pre-processing, feature extraction and classification. This system is to determine the student behaviour which can be identified by scanning the facial expressions of the students. The staff can later collect and view the feedback for any of their lecture.

**KEYWORDS:** Emotion detection, Extraction, Features, Expression.

## I. INTRODUCTION

Students' interest and involvement during class lectures is imperative for grasping concepts and significantly improves academic performance of the students. Direct supervision of lectures by instructors is the main reason behind student attentiveness in class. Still, there is sufficient percentage of students who even under direct supervision tend to lose concentration. Considering the e-learning environment, this problem is aggravated due to absence of any human supervision. This calls for an approach to assess and identify lapses of attention by a student in an e-learning session. This study is carried out to improve student's involvement in e-learning platforms by using their facial feature to extract mood patterns. Analysing the moods based on emotional states of a student during an online lecture can provide interesting results which can be readily used to improve the efficacy of content delivery in an e-learning platform.

## II. RELATED WORK

E-learning presents a lot of learning opportunities for people unable to attend regular schools, colleges or universities. Given the importance of E-learning in this information age, a lot of research has been carried out to improve the performance and adaptability of e-learning. This section will present past, present and prospective studies undertaken for the purpose of improving the e-learning ecosystem. Online teaching and e-learning methodologies have transcended to new levels after the boom of information technology age. As a result, the quality of education and number of online learners has increased substantially. Still, the modernized way of e-learning creates problem that affects a student's learning curve due to unavailability of any direct supervision.

An instructor can provide some insight into student's satisfaction during lectures, therefore student's involvement in class has direct correlation with the professional aptitude of the instructor. Direct supervision not only facilitates learning but also keeps the student synchronized with the course objectives due to instant communication with the instructor at any time during the lecture. Lack of communication has shown that affected students may experience high levels of frustration. As supervised teaching is very critical to the learning curves of the students, online courses present a different set of challenges to instructors and students. Online students may never visit a physical campus location and may have difficulty establishing relationships with faculty and fellow students. Researchers who study distance learners must understand and account for these differences when investigating student satisfaction, mentioned three important

types of interaction in online learning courses: (a) learner-content, (b) learner instructor, and (c) learner-learner. He emphasized that instructors should facilitate all types of interactions prompting attentiveness in their online courses as much as possible. E-learning requires use of video, audio, text to simulate the traditional class and learning environment as closely as possible. E-learning environments may be used for a numerous educational purpose.

Modern trends indicate that e-learning based education will come at par with traditional education methods in the near future. In an e-learning environment, teacher and student are not in direct interaction and content is provided by the instructor thorough online platforms using multimedia and software interfaces. As there is no means of instant communication, machine can only understand what it records using standard man machine interfaces. As there is no verbal communication between the student and the e-learning platform, facial expressions are the only means that can provide concrete information about a student's mood and involvement during the class for example, when students show confused expressions, one of the common mood patterns may be one or a combination of the following facial features i.e., eyebrows lowered or drawn together, vertical or horizontal wrinkles on the forehead, and inconsistent eye contact etc. In order to understand whether the student is grasping what is being delivered, a lecturer must sense the subtle nonverbal indicators exhibited by the expressions of the students' Facial features and their relevance to emotions has been rigorously investigated by Ekman et. al in various publications and their work is regarded as one of the most significant contribution to facial attributes-based emotion analysis.

Facial acting coding system can provide information about instantaneous facial emotional reactions, but still the need to ascertain a complete mood based on various action units as they vary from person to person and situation to situation. Facial features (Forehead, eyes, nose, mouth, etc.) are the fundamental attributes that are extensively used in face recognition systems as their movements help determine the construction of expression on a human face.

### III. PROPOSED ALGORITHM

#### A. Design Considerations:

- Design and develop a standalone application that will help to identify feedback of teacher's lecture depending on the student emotion.
- The main objective of this project is to design an efficient and accurate algorithm that would generate a feedback on current emotional state and behavior of the user.
- The algorithm designed requires less memory overheads, less computational and processing time, reducing the cost of any additional hardware cost for sensors.

#### B. Description of the Proposed Algorithm:

There are various face detection algorithms to extract the details of the face region.

Voila and Jones:

This is the first face or object detection algorithm framed by Viola jones for solving the issue of face detection. It is projected in three significant ways namely through

- An integral image (a new image) for the computation speed.
- An efficient classifier called Ada Boost for choosing a small number of visual features from a very large set of potential features.
- A process of cascade classifier for locating the required facial regions.

### IV. PROPOSED SYSTEM

The Viola-Jones algorithm is a widely used mechanism for object detection. The main property of this algorithm is that training is slow, but detection is fast. This algorithm uses Haar basis feature filters, so it does not use multiplications.

1. The efficiency of the Viola-Jones algorithm can be significantly increased by first generating the integral image by using equation.  $I(y, x) = \sum_{p=0}^y \sum_{q=0}^x Y(p, q)$
2. Detection happens inside a detection window. A minimum and maximum window size is chosen, and for each size a sliding step size is chosen.
3. Then the detection window is moved across the image.
4. Set the minimum window size, and sliding step corresponding to that size.
5. For the chosen window size, slide the window vertically and horizontally with the same step.
6. At each step, a set of  $N$  face recognition filters is applied. If one filter gives a positive answer, the face is detected in the current widow.

7. If the size of the window is the maximum size stop the procedure. Otherwise increase the size of the window and corresponding sliding step to the next chosen size and go to the step 2.

Random forest classifier creates a set of decision trees from randomly selected subset of training set. It then aggregates the votes from different decision trees to decide the final class of the test object.

The following are the basic steps involved in performing the random forest algorithm:

1. Pick N random records from the dataset. Build a decision tree based on these N records.
2. Choose the number of trees you want in your algorithm and repeat steps 1 and 2.
3. In case of a classification problem, each tree in the forest predicts the category to which the new record belongs.
4. Finally, the new record is assigned to the category that wins the majority vote.

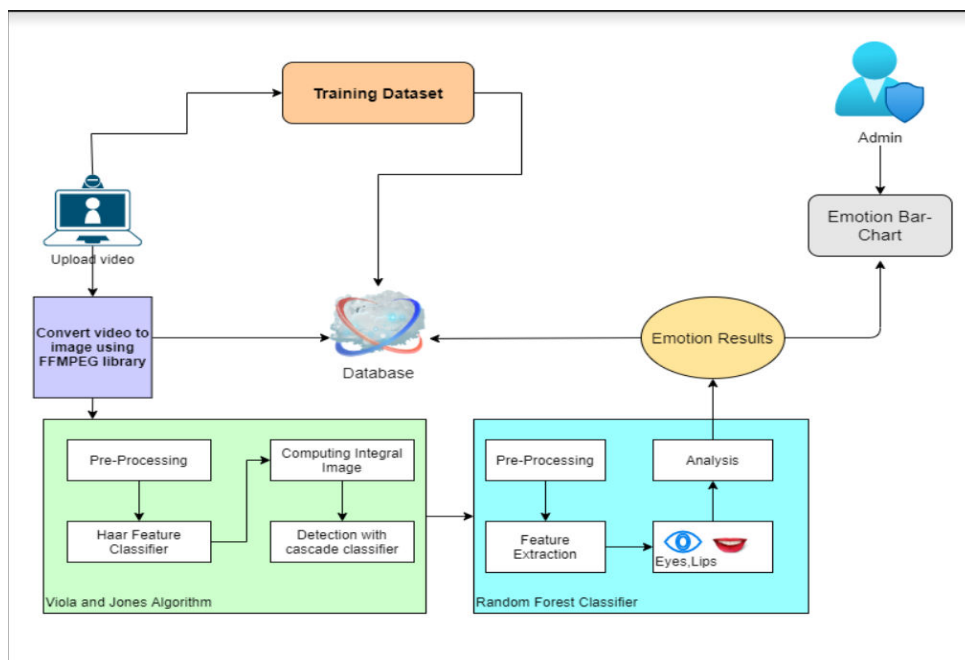


Fig.1. Proposed System

## V. CONCLUSION AND FUTURE WORK

The system thus aims at providing the teachers with a cheaper, additional hardware free and accurate emotion-based feedback system. This project will be of great advantage to teachers to redefine the teaching plan or can repeat any lecture if emotion is dull. This will help students to achieve good marks. We build an ERP based system but an android app can be designed for ease of access.

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