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# Employee Emotion Detection System Using Machine Learning

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***Abstract***: *This paper describes an employee emotion detection tool based on real-time detection using image processing with easy-to-use device interaction. Face recognition has been around for many years. It can approximate human facial expressions displayed across the face and brain sense via video, electrical signal, or image shape. Recognizing emotions from images or movies is difficult for the human eye and machines. Therefore, emotion detection with a device requires several image processing techniques to extract features. This paper proposes a system with two main methods besides face recognition and facial expression recognition (FR). This study specializes in an experimental study to determine facial emotions. This paper proposed a Real-time Employee Emotion Detection (RtEED) system to automatically detect employee feelings in real-time using machine learning. The RtEED machine helps the company monitor employee well-being and can communicate the diagnosed emotions to the appropriate employee via messages. This allowed employees to make higher decisions, increase their awareness near the paintings, engage in healthier lifestyles, and many more effective painting techniques. CMU Multi-PIE facial data is used to train the device mastery model. Each employee can be equipped with a webcam to capture the employee's facial features in real-time,*

***Keywords***: *Employee emotion detection, Artificial intelligence, machine learning, facial expression recognition.*

## I. INTRODUCTION

Human emotion recognition is used in many areas where additional security or recording of a person is in high demand. For installation, the second layer of security offers the possibility of not locating faces now better. Still, it can be useful to check whether it is a 2D illustration or a specific character situation in front of the camera. Additionally, every other benefit of using EMS is using the device to find out about company promotions. Many large groups thrive on consumer responses to their services or

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products, along with OTT platforms, cinemas, and more [1].

Large companies can determine whether a consumer likes or dislikes a product, carrier, or offer by creating an AI that can capture and perceive emotions in real-time, primarily based on images or video. Security was the primary reason for determining whether a consumer is a male or female based solely on fingerprint matching, language reputation, passwords, retina recognition, and more. By recognizing feelings, it is also necessary to filter out threats to discover the purpose of the individual. Such cases can be carried out in sensitive areas such as airports, live shows, and mega gatherings. Human emotion recognition can be grouped into anger, fear, wonder, happiness, disgust, and neutrality. Recognizing differences in human emotions based on facial muscle torsion can lead to easy discrimination of unique expressions [2].

Artificial intelligence (AI) and machine learning (ML) are actively used in many domains, including healthcare, e-commerce, logistics and supply chain, and agriculture. Today, AI is standard in every element of business existence. The company leader, therefore, wants to make as much capital as possible from this era.

Machine learning techniques are used to locate pattern reputation and class problems. In particular, these techniques have been used for several decades to detect facial expressions or emotions and for electroencephalography (EEG). Facial expression evaluation also gained attention using the IoT era to build smart hospitals, homes, cities, and businesses.

Emotion recognition is identifying human expression through facial and verbal expressions. These emotions are fear, contempt, disgust, anger, wonder, sadness, contentment and impartiality, and so on. These emotions are very subtle. Therefore, locating feelings is a mile's difficult task and also imperative.

Facial expression is one of the most potent, natural, and instantaneous ways people have to express their feelings and intentions. Company employees cannot show their feelings in some situations, such as B. Hospital patients. Therefore, a device for popularizing human emotions is essential and leads to effective conversations and the proper outcomes. It has been proven that recognizing emotions hidden in snapshots or films is complex and trivial for the human eye [3].

At first, the worker's feelings were the least joyed in an enterprise. But recently, much research has examined how feelings

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affect organizational production, agency, and performance. Positive emotions of all employees are crucial for the company's performance since emotions simultaneously affect numerous parameters in everyday situations, including customer service, employee retention, organization capital investment, etc. Therefore, employee emotion recognition plays a crucial role in the success and well-being of every employee and employer.

In the past, giving the employees emotions in the organization the least choice. However, much research is being done today examining how emotions affect production, business, and corporate performance. Positive feelings of all employees consistently lead to organizational fulfilment, considering that feelings directly affect many parameters within the current conditions, including customer service, employee retention, capital investment of the organization, etc. Therefore, the emotional recognition of employees in a gift situation plays a vital role in the performance and well-being of employees and employers.

## II. LITERATURE SURVEY

At this section, the researchers' contribution to emotion recognition is mentioned in Element. Emotion recognition involves mapping facial expressions and recalling facial features.

Weihong Deng, Jiani Hu, et.al [4] The author of this paper examines the basic features of a learning dataset, feature representations, and machine learning algorithms for a system that works reliably in more practical situations. A new database, Real International Affective Face Database (RAF-DB), which contains nearly 30,000 highly diverse facial images, is being published on social media. The consequences of crowdsourcing argue that the problem of proper recognition of an international expression is typical in an unbalanced multi-marker type. The single-label balanced data sets currently used in the literature are likely to lead studies to misleading algorithmic solutions. A deep learning architecture, DeepEmo, has been proposed to address the current global task of emotion popularity by mastering distinct, high-level representations that can be incredibly effective for differentiating practical facial expressions. Extensive empirical results show that the deep knowledge approach is superior to handcrafted features, and with the limitations of semi-forward posture, human-level reputation accuracy is possible.

Almudena Gil, et.al,[5] It provides a set of rules for recognizing simple and quick

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expressions with ambitions while running at a secondary level to provide emotional interest to primary packages, including, for example, real-time Exergames. The algorithm is mainly based on extracting 19 facial features used to counter a series of Action Units (AUs) described in FACS and one newly created. Also, the new idea of CAUs is well presented and described. These are grouped AU units that can be recognized as a unit. On the other hand, the consequences for the emotional reputation of men and women are weak due to two problems: on the one hand, the problem of the diligent study of motor organs with few facial features. The difference lies in the sparse array used to mark the selection tree.

On the other hand, excellent results are obtained from a quick assessment of a person's mood. This knowledge can be used as valuable information about an initial benefit. The category of applicable sentiment is mainly based on logical guidelines, and there is no fear of recognizing them. The applications were implemented on a cellular platform. Achim Health et al., the author, performed an HSV (Hue-Saturation-Value) color model to detect the face in the image. PCA is an essential component analysis that was used to reduce the extra dimensions of an eigenspace and then display the image on an eigenspace and calculate the Euclidean distance between them

The expressions are ranked in the test image and the mean of the objectives of the instructional data set. A known data set is used for motivational training. Grayscale images of the face are used by the tool that allows you to categorize 5 primary emotions, including surprise, sadness, anxiety, anger, and happiness. The training dataset contains images of different people. It gives good results when tested, but there is a certain similarity between sadness and fear, and it can be improved with more intense training.

Pravin Nagar et al. [6] proposed a device that mechanically recognizes the emotions depicted on the face. A solution based on a Bezier curve is used with image processing to classify emotions. Color facial images are entered into the system. Then, a raster extraction technique based on image processing is implemented to extract a fixed number of specified function points. Finally, the extracted features such as eyes and mouth captured after processing are provided as input to the curves algorithm to capture the incoming emotions. Canny Edge Location computation was implemented via the OpenCV API, which changed the hair string report for eyes and mouth to predefined values . The test shows widespread effects under exclusive

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facial expressions such as smile, unhappiness, exclamation, and usual. This approach offers a reputable emotion success rate of 60%.

**Facial expression recognition**

Various methods and techniques used to classify facial expressions include neural networks, support vector machines, etc. To form distinct vectors, LDA is used to transform training images in the work of Lyons et al. analysis. At lower resolutions, constantly understanding facial expressions is the biggest challenge for face recognition engines as high-resolution video becomes unavailable in real-time applications. This problem has been solved with the help of LBP technology, and studies show that LBP plays powerfully and consistently at the low resolution of facial images. Another limitation is that popularity can end with static shots that do not include the behaviour of facial expressions over time. Basile noted that by using dynamic snapshots, facial expressions could be identified with greater accuracy. Another drawback of popular facial expression strategies that have been turned into recognition engines is understanding facial expressions by thinking about sharp front faces aggregated in a heavily managed environment. But it is unreal in real time because they collect low-resolution images. Due to the use of these low-resolution images, real-time expression recognition has proven to be a complex endeavour. The eye and nose areas are revealed using the Viola-Jones rule set with hair feature identification and the AdaBoost shaping rule. But this algorithm also has drawbacks. It only works properly for foreground images.

## III. PROPOSED METHODOLOGY

Emotion recognition is a natural human ability. However, if we ever want to create a humanoid robot that can interact with its human partners and show emotions, the problem of emotional connection must be solved. The laptop's ability to recognize human emotions has many precious current international packages. Consider the field of therapeutic robotics designed to provide the care and well-being of the disabled and disabled.

**Real-time employee emotion detection**

Figure 1 shows a real-time employee emotion recognition tool. The employee's photo is captured using the webcam. The face in the photo is revealed and then cropped. The image has been pre-processed so it can be resized as needed. In feature extraction, the pathological shape function is detected within the image. Some critical positions of the main suit are outlined in the image to sense the worker's

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feelings. Finally, the detected feelings of the worker are displayed on observer.

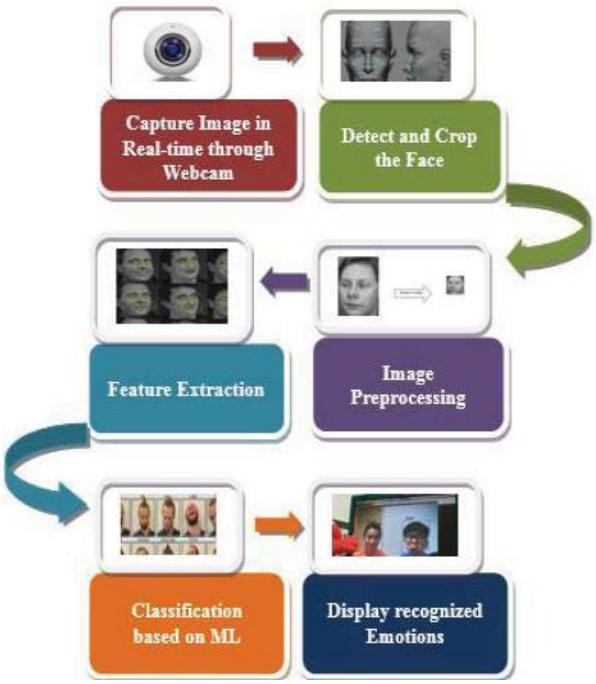


**Fig.1** System architecture

**The proposed algorithm**

The above tool architecture shows how emotion detection works. A secure object of the tool captures a real-time image while the job detection is performed using the device scan algorithm.

Here the version can improve its accuracy in extracting useful facial features. After facial extraction, the system uses a non-linear classification algorithm at its final level to detect whether the consumer is happy, sad, or neutral.

Facial recognition algorithms are used on a detected image or object to detect facial emotions. The buoyancy of the emotion recognition engine is as follows.

Algorithm: Real-time Employee Emotion Detection

//Recognizes the emotions of the employee in the image captured and displays it

Input: Employee image captured using webcam

Output: Display of recognized emotions of the employee

Step1: Capture the image of the employee using webcam.

Step2: Detect the face in the image and crop it.

Step2.1: Select Haar-like features

Step2.2: Create an integral image

Step2.3: Select subset of features which helps more to identify face in image

Step2.4: Create classifier cascades

Step3: Pre-process the image for required size.

Step4: Find the best match position in the image.

Step5: Identify the emotions of the employee by choosing few important best match positions in the image.

Step6: Display the recognized emotions and also intimate the same to the concerned authority via message.

Step7: End

The algorithms used for implementation of RtEED process at each step are discussed below.

**1. Capture employees with the webcam:** Every 1/2 hour, the facial features of an employee are captured with the webcam.

**2. Detect and Crop Face in Captured Image**: This module aims to identify the presence of faces in the captured image. In-depth knowledge of the rule set, known as the Viola-Jones rule set, is used to trip

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over faces in the captured image. This algorithm includes the 4 main steps to detect and crop the face in the captured image.

**a. Selecting hair-like features**: This step allows the image to be divided into lighter and darker areas based on the photo's pixel values.

**b. Creating an integral image**: The neighbouring pixel values are supplied together to contribute to an identical function.

**c. Running AdaBoost training**: There are certainly 160,000 skills that can consider for facial recognition. But not all features are equally important. Therefore, the AdaBoost algorithm is used to select a subset of features designed to aid in recognizing faces in captured images

## IV. RESULTS

In a web application, there are pages in the Race panel: Staff Management and Report Management. Emotion details of various employees were previously shown in Personnel Management. The management report shows the standardized percentage of different emotions displayed by specific people over a specific period. This fact allows the company to take steps regarding the emotional position of its employees. Figure 3 shows the RtEEd dashboard. Figure 4 shows the employee sentiments detected by the RTEED device and the date. Figure 5 shows the output of the RtEED system, i. H- The feelings that have been identified are displayed to the worker next to the captured image. Figure 6 shows the text message sent to the worker regarding his/her emotional fame.

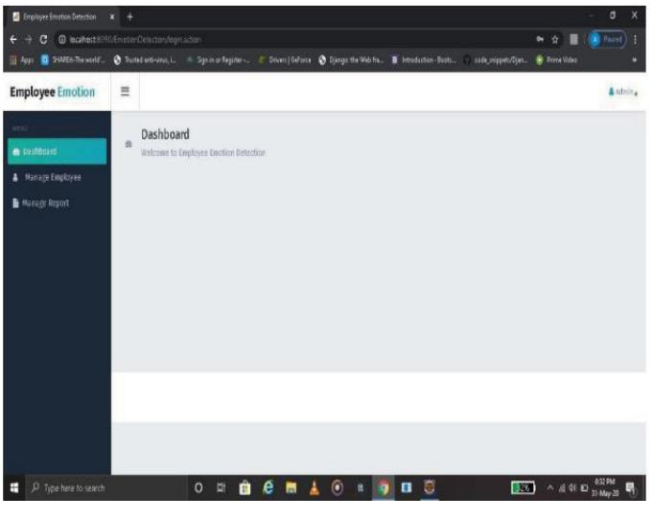


Fig.2 RtEED system dashboard

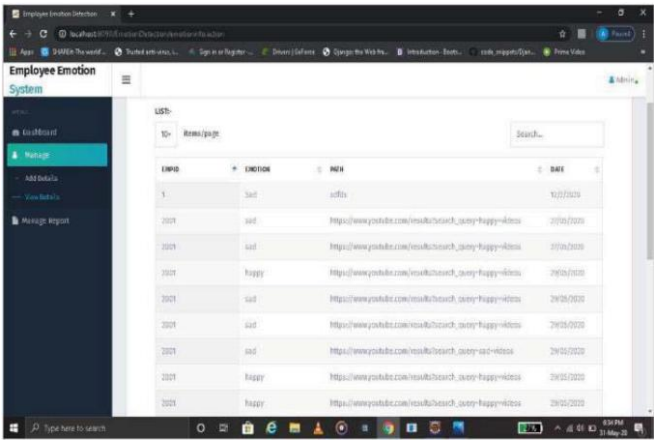

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Fig.3 List of detected emotions of employees with date

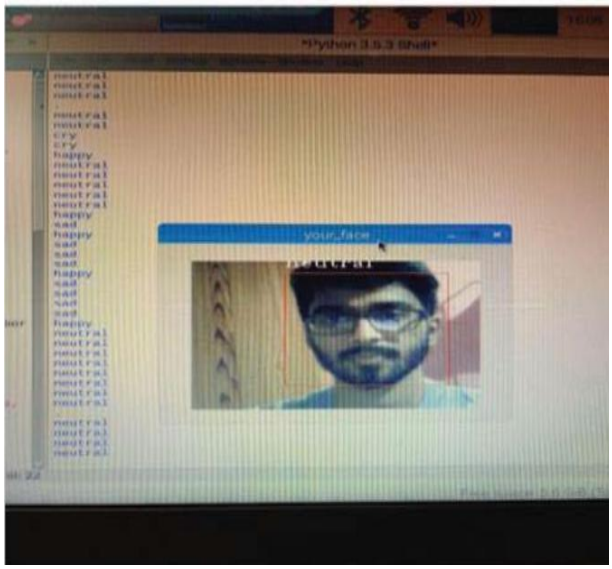

Fig.4 Sample output of emotion detection system

## V. CONCLUSION

Now a days detecting the emotions of an employee performs a major factor in numerous businesses for the achievement of their commercial enterprise and prosperity. In this paper, the RtEED device is proposed to discover the feelings of a worker in real time using device mastering algorithms. The RtEED device proves its efficiency in capturing the picture in real time the usage of webcam for a predefined length, cropping the photograph and detecting the emotion of a worker as it should be. So that the organization can make the better selections about the well-being in their employees.

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