

## **Abstract:**

Emotions play a very significant role in conveying what we think. Research has shown that almost 90% of our communication can be non-verbal. The overall body language coupled with emotions could help to effectively recognize the thought process. Hence recognizing emotions becomes a vital task. There are seven types of emotions namely, happy, sad, anger, smile, neutral, disgust and fear. To effectively identify these would help to decipher the thinking. Hence the importance and need of recognising emotions is growing rapidly.

Machine Learning and Artificial intelligence has enabled us to recognize emotions. Understanding contextual emotion has widespread consequences for society and business. In the public sphere, governmental organizations could make good use of the ability to detect emotions.

## **Introduction:**

A face emotion recognition system comprises of two step process i.e. face detection (bounded face) in image followed by emotion detection on the detected bounded face. The following two techniques are used for respective mentioned tasks in face recognition system. Haar feature-based cascade classifiers : It detects frontal face in an image well. It is real time and faster in comparison to other face detector. This blog-post uses an implementation from Open-CV.

## **Objectives:**

- To be able to recognize human emotions effectively.
- To be able to distinguish between the different emotions.
- In particular cases to be able to predict the future action of the individual.
- To focus on optimizing the resources.

## **Literature Review:**

Image and voice are the most direct and most natural channels that people acquire information. If achievements in these two fields are applied on robots that can greatly improve the intelligence of the machine. In practice, in image recognition and speech recognition we will encounter the feature selection problem. Common image features are composed of color feature, texture feature, shape feature, spatial relations characteristics. Sometimes in order to acquire a better final result, these characteristics also be integrated appropriately.

CNN is a specially designed multi-layer perceptron to identify two-dimension shapes. Therefore dimensional information retained in waveform points is effectively utilized by CNN. CNN model due to its characteristics of adaptive feature extraction, it is applied for image recognition and emotion recognition in voice signals. In the emotional speech recognition, based on the test of two classic characteristics of the speech signal, we propose that directly use waveform points to characterize the emotional speech signals. It neither loses information, but also takes advantage of the natural correlation information between the waveform to identify emotion. In image recognition, SVM and CNN models are used for image recognition. And we compare the recognition result before and after PCA.

## **Problem Definition:**

Facial and emotion recognition has essentially been a research topic but advancements in image processing and pattern recognition has positively impacted the progress. Image processing uses technology like Convolutional Neural Networks. Whereas real time image capturing is done by OpenCV.

## **Scope:**

In this project, we introduce an approach to classify emotion, gender and age from images of human faces. The thoughts of humans are effectively conveyed through emotions which are often uncertain and situation dependent. Automatic detection can help to recognise human behaviour in real time and avert unwanted events. This project is a continuation of previous year's project which was specifically regarding emotion recognition. The project is based on real time analysis and we hope to complete it by the end of the year.

## **Technology Stack:**

Google Colab: To implement the machine learning algorithm based on CNN(Convolutional Neural Network) using Keras from Tensorflow as the backend and OpenCV for taking real time input and providing the processed output.

## **Benefits for Environment:**

Efficient algorithm to reduce computational cost and complexity for analysing emotion, age, gender.

## **Benefits For Society:**

Would help to provide advanced security surveillance systems. Real time detection of mischievous behaviour could help to avert an unwanted event. By detecting if the driver is drowsy, could help to avoid accidents. It could also prove helpful to determine the characteristics of a missing person through a photograph. It could also prove beneficial to provide an overall behavior index to not only to the government but also to other statistical agencies.

## **Applications:**

- Health Care: It would help to decide when patients necessitate medicine or to help out physicians determine who to see first.
- Automobile Industry: In their pursuit to build more smart car features, it makes sense for car manufacturers to use ML to help them understand the human emotions. Using facial emotion detection smart cars can alert the driver when he is feeling drowsy.
- Video Game Testing: Video games are designed with a specific target audience in mind and aim to evoke a particular behavior and set of emotions from the users.
- Security: It could be used for detecting malicious behaviour which show distinct facial characteristics.
- Interrogation: Could help to analyse and identify if the person who is being interrogated is speaking truth or not.