
FACIAL EMOTION RECOGNITION SYSTEM

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ABSTRACT

Face detection has been around for ages. Taking a step forward, human emotion displayed by face and felt by brain, captured in either video or image form can be approximated. Human emotion detection is the need of the hour so that modern artificial intelligent systems can emulate and gauge reactions from face. This can be helpful to make informed decisions be it regarding identification of intent, promotion of offers or security related threats. Recognizing emotions from images or video is a trivial task for human eye, but proves to be very challenging for machines and requires many image processing techniques for feature extraction. Several machine learning algorithms are suitable for this job although our group will dry run and select one of those algorithms. The model will give an approximate recognition of the expression and also the percentage of accuracy with it. Any detection or recognition by machine learning requires training algorithm and then testing them on a suitable dataset. So, we will first design the model, then train it using datasets from Kaggle or/and UCL. The language we will be using is python modules used would be OpenCV, tensorflow, Keras and some more basic modules. [1]

Keywords: Machine Learning, Artificial Intelligence, Web Application, Etc.

I. INTRODUCTION

1. The project to be developed will be a machine learning model. It will detect the real time emotions on an actual human face. The main aim would be to try to get it as accurate as possible and as real-time result as possible. This application will turn on user's webcam and then it will let the user see his camera's input, draw a rectangle around the user's face just for the sake of letting the user name about what face the application is detecting emotions for and along with that, the application will display the detected emotion on the user's face. It will also provide the accuracy by the side of it.

2. It will be real-time, the displayed and detected emotions will keep on changing according to the user's facial behavior.

1.1 Aim

1. The model will detect the user's face with the help of a web camera and then draw a rectangle and display a string on the screen reflecting the emotion it has detected according to the user's facial features and current state.

2. A secondary aim of the model will also be to play music and recommend shows that go with user's current emotion.

1.2 Objectives

1. Objectives of the application mainly include to detect emotions of the user to help in situations where the emotions of a person are crucial. Which is places like an interview, an investigation of a crime.

2. With the help of the datasets created by this model, Modern artificial intelligent systems can emulate and gauge reactions. The collected datasets can be used to train other machines for replicating those emotions in the future.

3. It can be useful in psychological studies and researches to see the user's facial emotions during various situations.

4. Facial expressions can display personal emotions and indicate an individual's intentions within a social situation.

1.2 Resources used

Hardware:

- Computer System with minimum 4 GB RAM, i3 processor and 1 GB of disk space
- Webcam that functions properly

Software:

- Python
- Jupyter Notebook
- Notepad

II. LITERATURE SURVEY

The human face plays an important role in communication. The face can express their feelings through emotions. Face Expression approach can be divided into three major steps so that the face in an image is known for further processing, facial feature extraction which is the method used to represent the facial expressions and finally classification which is the step that classifies the features extracted in the appropriate expressions. The facial expression are for identifying the basic human emotion like anger, fear, happiness, sadness, and surprise [1]

Most common exposition of an idea of emotion could be found as "a natural instinctive state of mind deriving from one's circumstances, mood, or relationships with others". Which misses depicting the driving force behind all motivation which may positive, negative or neutral. This is very important information to understand emotion as an intelligent agent. It is very complicated to detect the emotions and distinguish among them. Before a decade or two emotion started to become a concern as an important addition towards the modern technology world. Rises the hope of new dawn for intelligence apparatus. Imagine a world where machines do feel what humans need or want. With the special kind of calculation then that machine could predict the further consequences and by which mankind could avoid serious circumstances and lot more. Humans are far more strong and intelligent due to the addition of the emotion but less effective than machines. But what if machines get this special features of human? [2]

III. MODELING AND ANALYSIS

3.1 Problem definition

1. Emotions are psychological states brought on by neurophysiological changes, variously associated with thoughts, feelings, behavioral responses, and a degree of pleasure or displeasure. Emotions are often intertwined with mood, temperament, personality, disposition, or creativity.
2. At some occasions it is very crucial to know one's emotion that's when our model uses the person's face and facial features to recognize the emotion without any human involvement.

3.2 Solution

1. Research on the algorithms used in Machine Learning
2. Search for datasets that will be used and are actually opportune
3. Scrap the suitable datasets
4. Clean the datasets
5. Preprocess the datasets
6. Make a train-test split
7. Create a Classifier algorithm object
8. Train and Test the data
9. Prepare the coordinates for the output
10. Exhibit the output

3.3 Proposed architecture

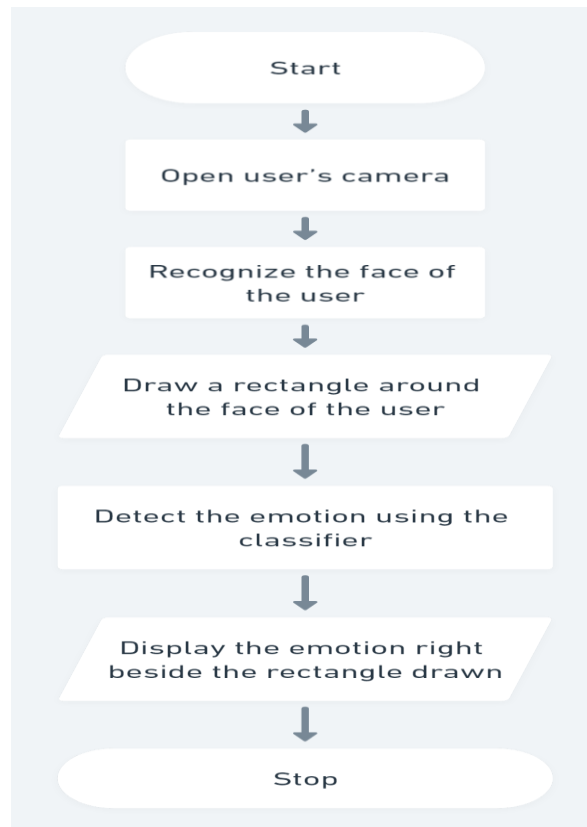


Figure 1: The proposed flow of the project

As we know that machine learning is not a straight-forward process, so first we had to select a language for the model. Machine learning can be carried out in a few languages only because of its complexity. After a lot of discussions within our group and with the guides, we decided to go with python since python provides us modules which can help us in the statistical part while building the model by reducing the redundancy of code through out the program. First of all, we would need a lot of data to train the model since we need it to be as accurate as possible.

So, first we would scrap some datasets from various sources. But we would have to be careful when we scrap the data from any source in the future of our project since in today's age, data scrapping can put trojans and viruses in our machines, there's threats all around the internet. So, after some research and guidance by the assigned guides, we found a couple of trusted sources for datasets are kaagle and ucl. So we would need to research and scrap the data from there in the future for our project.

After that, we would have to preprocess the data, since any model to be trained needs preprocessed and clean data. So, for the sake of preprocessing, we will have to see the processes we need to perform for finding outliers and the processes we need to perform for finding inlier, processes for finding out the null values in the datasets and then deciding whether to clear them or fill them which will be decided according to the correlation of the column/label with the feature which is the output. And in order to do that, we would need to visualize our datasets using various python modules like pandas, numpy, matplotlib, seaborn, etc. After that we would have to decide accordingly whether to clear those null values or fill them or just straight away remove the label which would be the case if it doesn't correlate that much to the feature. After that, we would have to drop few columns and for that, we would have to draw a heatmap using visualization libraries. After the preprocessing and visualization processes, we would have to decide which classifying or regression algorithm to use, after we decide the algorithm, we would need to split the datasets for training and testing so that the model doesn't result in overfitting or underfitting detections. Once we are done with that, we would have to use the classifier or regressor to train the model and then use the test part of the data to test the results. At the end, we would

then use opencv to detect user face via camera and display those results in real time and in a terminal along with the user's face

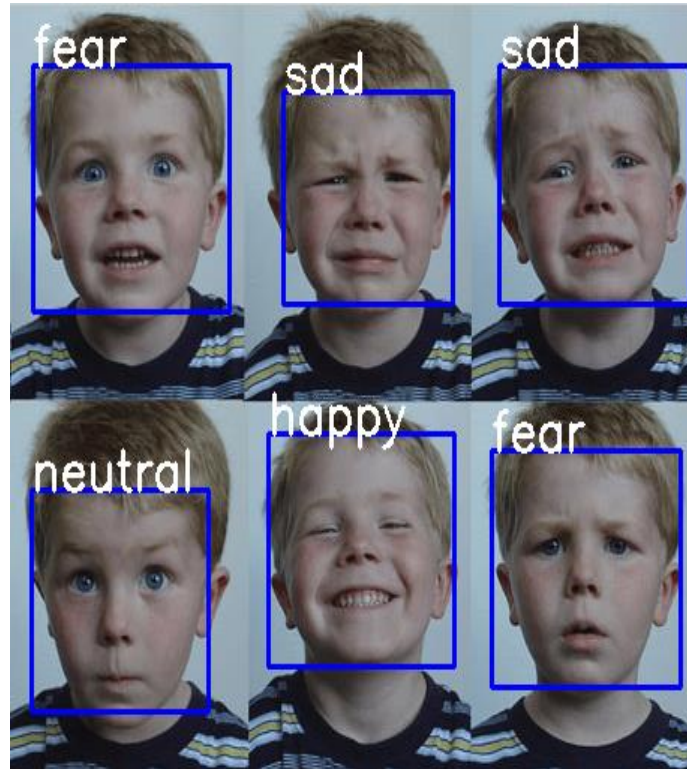


Figure 2: A hypothetical view of the model

IV. CONCLUSION

In this paper, we previewed the model's development. We discussed and came to a conclusion that our model will scrap the datasets from Kaggle, UCL. It will be developed using a classifying algorithm and the data preprocessing will be done using matplotlib, seaborn. The visualization and cleaning will be done prior to the train test split. Then we will use some deep learning models to make the model more accurate and then test the model according to its fitting. We will conclude the model by using OpenCV to exhibit output on the user's screen. The model will have various applications in places where emotions are crucial and it can have some secondary applications like suggesting music, infotainment or entertainment to the user according to their current mood or emotion based on the output.

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V. REFERENCES

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