EMOJIFY – EMOJI FACE RECOGNITION

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Abstract. When evaluating non-verbal reactions to things, services, or products, artificial intelligence-based technologies are used to recognize and classify human emotions that are shown. Emojis are small images that are frequently used in text messages on social media. A new form of communication is created by combining text and visual elements in one message. Avatars or emojis can be used to represent nonverbal cues. These indicators are now a crucial component of online conversations, product reviews, brand sentiment, and many other activities. The amount of data science research on emoji-driven storytelling has also increased as a result. Now that computer vision and deep learning have advanced, it is possible to identify human emotions in photographs. We will categorize human facial expressions in this project to filter and map corresponding avatars or emojis.

1 Introduction

Emojis have developed into a new language that can more clearly convey a thought or feeling. This visual language has become the norm for online communication, and it is accessible on Facebook, Instagram, and other large online platforms in addition to Twitter. People in today's generation frequently use emoticons to communicate with one another. We, therefore, considered creating our own unique emoticons. In this project, we are building a convolution neural network to recognize facial emotions.

2 Problem Statement

The goal is to recognize non-verbal cues such as facial expressions and convert them into emojis or avatars using Convolutional neural networks (CNN).

1. We must train our model on the dataset.
2. After training the model, must map the recognized emotions with corresponding emojis or avatars using OpenCV's Haar cascade XML we must get the bounding box of faces in the webcam. Next, we must feed these boxes to the trained model for classification.
3. The main aim is to classify human facial expressions to filter and map corresponding emojis or avatars.

3 Related Work

Different companies already widely use emotion recognition to gauge consumer mood towards their products, brands, marketing efforts, staff, or in-location experiences. Understanding customer emotions are vital to ensure business growth and enhance experiences, however, the opportunities brought by this technology go further than market research and digital advertising.

Detection of Emotion Using Multi-Block Deep Learning in a Self-Management Interview App by Dong Hoon Shin, Kyungyong Chung, and Roy C. Park[1]

In this paper, the author proposes the detection of user emotions using multi-block deep learning in a self-management interview application. Unlike the basic structure for learning about whole-face images, the multi-block deep learning method helps the user learn after sampling the core facial areas (eyes, nose, mouth, etc.), which are important factors for emotion analysis from face detection.

Emotion Recognition for Healthcare Surveillance Systems Using Neural Networks [2]

In this survey, the author presents recent research in the field of using neural networks to recognize emotions. The author focuses on studying emotion recognition from speech, facial expressions, and audio-visual input and shows the different techniques of deploying these algorithms in the real world. These three emotion recognition techniques can be used as a surveillance system in healthcare centers to monitor patients. We conclude the survey with a presentation of the challenges and the related future work to provide insight into the applications of using emotion recognition.

Video Game Review using Facial Emotion Recognition [3]

In this paper, AbstractVideo games are designed keeping in mind a specific target audience. Each video game aims to evoke a particular behavior and set of emotions from the users. In video gaming, during the testing phase, users are asked to play the game for a given period and their feedback is incorporated to make the final product. Use of facial emotion detection can aid in understanding which emotions a user is going through in real- time as he is playing without analyzing the complete video manually. Such product feedback can be taken by analyzing a live feed of the user and detecting his facial emotions.

4. Data

We found a FER-2013 dataset from Kaggle which has images of the facial expressions:

- angry
- disgust
- fear
- happy
- neutral
- sad
- surprise

Data size
Combining both train and test data set has almost 36000 images

The description of each original attribute
The task is to categorize each face based on the emotion shown in the facial expression into one of seven categories (0=Angry, 1=Disgust, 2=Fear, 3=Happy, 4=Sad, 5=Surprise, 6=Neutral). The training set consists of 28,709 examples and the public test set consists of 3,589 examples.

Main characteristics of the data
The data consists of 48x48 pixel grayscale images of faces. The faces have been automatically registered so that the face is centered and occupies about the same amount of space in each image.

5. Data exploration

Data exploration helps us understand the data better. The dataset cannot be used directly to train a model. The dataset exploration conducted in this part includes finding out null values present in the dataset for dependent as well as independent variables.

The model depends hugely on pixel values. After exploring the whole dataset for NAN values, we didn't find any as the image we get is already gray scaled, we don't need any preprocessing step.
We did not find any NAN values.

6. Data preprocess

Data pre-processing requires is the second part of exploration. The discovered missing or null values must be handled fairly such that they do not lead to inaccurate model generation. Following are steps for the same.
We went through all the images in the dataset and in case we found any NAN values, we would have replaced the pixel value with the mean.
We divided the data into test set, training set, and validation like 70,20,10.

7. Methodology (/Proposed Methods/ Approach/ Procedure)

Facial expression is the common signal for all humans to convey human emotions. There are many attempts to make an automated facial expression analysis tool as it has applications in many areas such as robotics, medicine, driver assistance systems, and polygraph. The appearance of the face always poses a large problem with the detection of the face. Consequently, the recognition of facial expressions develops rapidly as a sub-field of image processing. Refer the Figure (1) for the steps involved in this project.
First, we have used video camera to capture real time human face and detect the exact location of face by a bounding box of coordinates. This was done by using Haar cascade and Open CV library.
In this phase face is detected and face features are extracted and stored in the database for face recognition.
In the next step we used CNN model. CNN is used to classify human emotions.
Finally, the recognized human face is classified based on the expression in real time as angry, fear, sad, happy, disgust, surprise, and neutral.

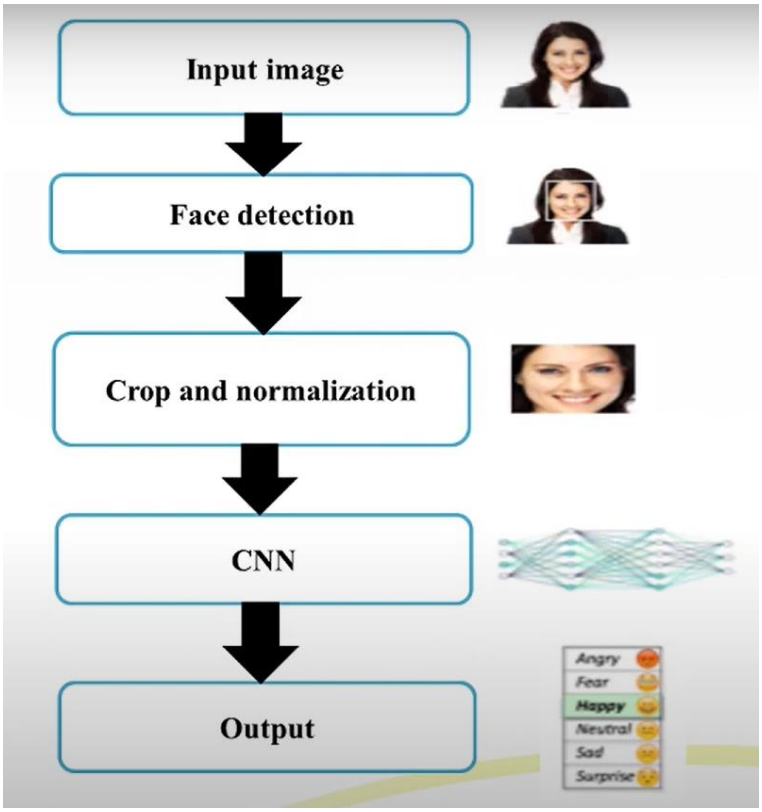
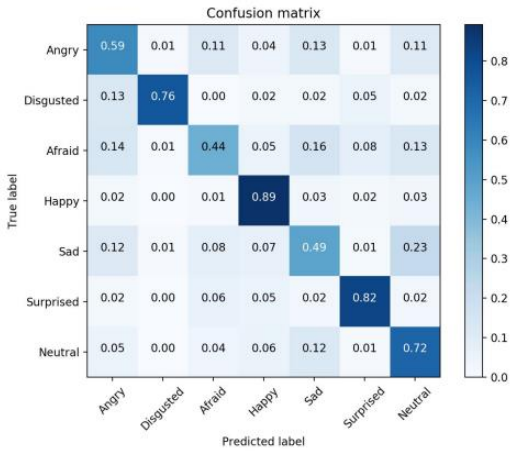


Figure (1). Methodology of the process

8. Experiment Results

We have used Keras Sequential, Linear stack of the data and one input tensor and output tensor.

Confusion Matrix:



From the figure we can see that diagonals are the maximum values in row. From this values we can conclude that the model is good.

Figure (2) Happy facial expression to surprise emoji

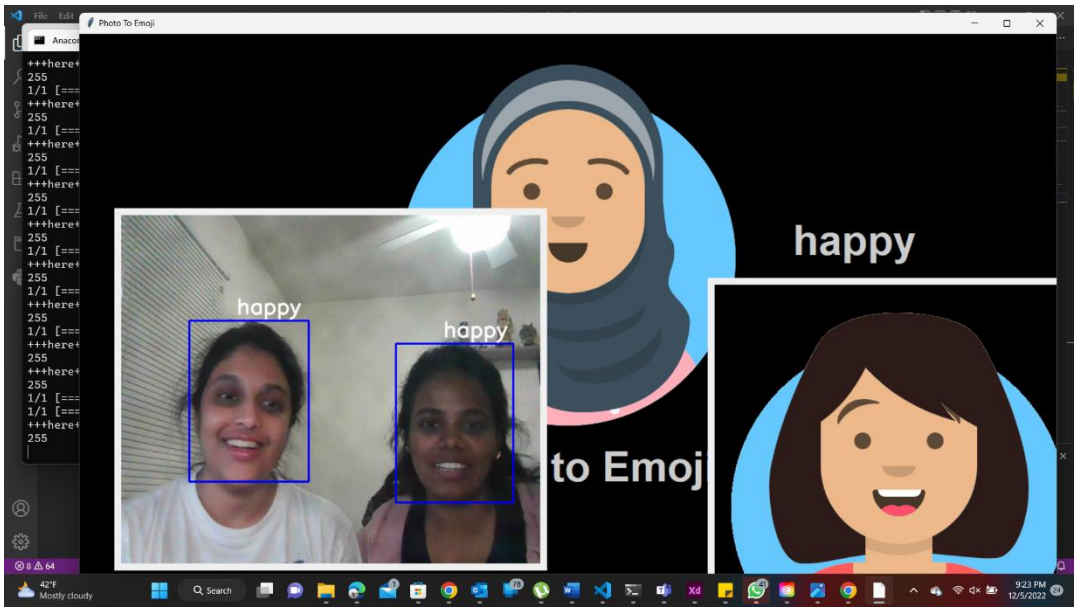


Figure (3) Happy facial expression to happy emoji

9. Conclusion

As Today's generation of people is loving the trend of communicating with non-verbal cues like emoticons so we thought why not bring out our own emojis?
With advancements in computer vision and deep learning, we will now be able to detect human emotions from images. In this project, we will classify human facial expressions to filter and map corresponding emojis or avatars. The result we are expected is the use of emojify in the chatting world. We want people to communicate with their own customizable emoticons
The project will recognize one's current emotion and convert that emotion's emoji so that the customer gets emoji of their face and use it in chat.

References

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