

Capstone Project

Face Emotion Recognition

- Jatin

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PROBLEM STATEMENT

- In E-learning the quality of learning is compromised as teacher is not able to understanding whether students are able to grasp the content in a live class as teacher cant see the faces and assess the emotion of the class .
- Also scale of class is large in online classes.
- We have build a deep learning model which detect the real time emotions of students through webcam ,which will understand if students are able to grasp the topic according to their expressions or emotions , and then deploy the model.

Data preparation

- Manually, we have checked the pictures of some emotions, those were not clear
- Like, “FEAR” had a lot of pictures in which even human eye couldn't tell whether they were “SAD, SURPRISE OR FEAR”
- So, I decided to go with some clean dataset, I found the cleaned dataset having some less number of pictures.
- I selected dataset with 5 emotions but later on dropped the one having less data, so I have trained the model on 4 emotions

Data Summary

Data set name – Facial emotion recognition

➤ **Folders in data set** - 5

➤ **Folders description** -

Fear had 2535 number of images

Angry had 2832 number of images

Neutral had 4295 number of images

Disgust had 380 number of images

Happy had 6834 number of images

Total images were 16876

➤ I have dropped DISGUST emotion folder, due to least number of images

Sample images with emotions



Transfer Learning Model – Summary

MobileNet

It is particularly useful for mobile and embedded vision applications.

- **Smaller model size:** Fewer number of parameters
- **Smaller complexity:** Fewer Multiplications and Additions

MobileNet Model – use cases

Object Detection



Photo by Juanedo (CC BY 2.0)

Face Attributes



Google Doodle by Sarah Harrison



Finegrain Classification



Photo by HarshLight (CC BY 2.0)

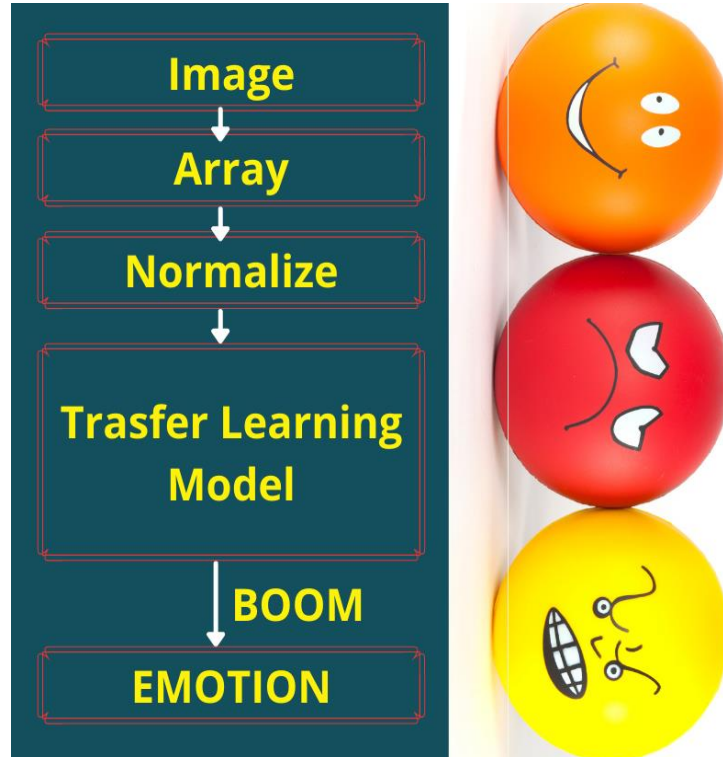
Landmark Recognition



Photo by Sharon VanderKaay (CC BY 2.0)

Model Pipeline

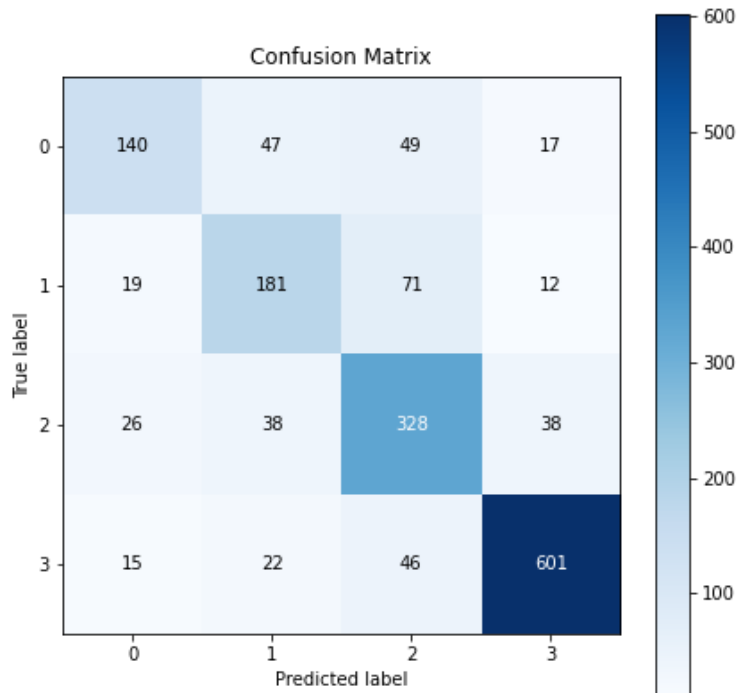
- We are having the input size of (48,48,3)
- Output is having 4 cells, and using data encoder format for the results(Softmax activation)



Accuracies

we were having 77% of accuracy in training
and 75% in testing

Confusion matrix for test
data



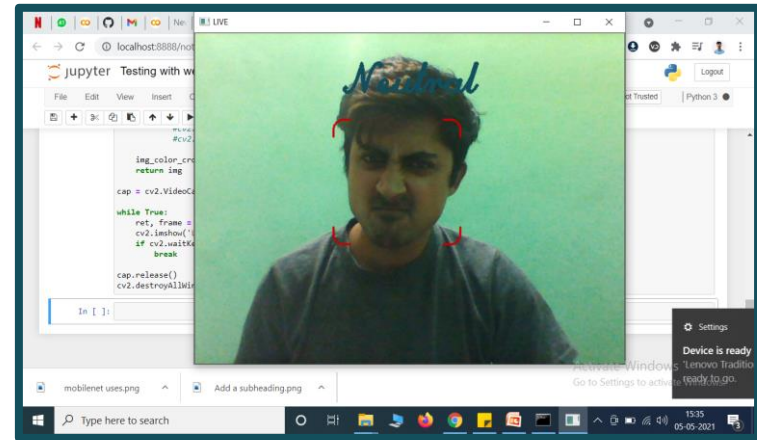
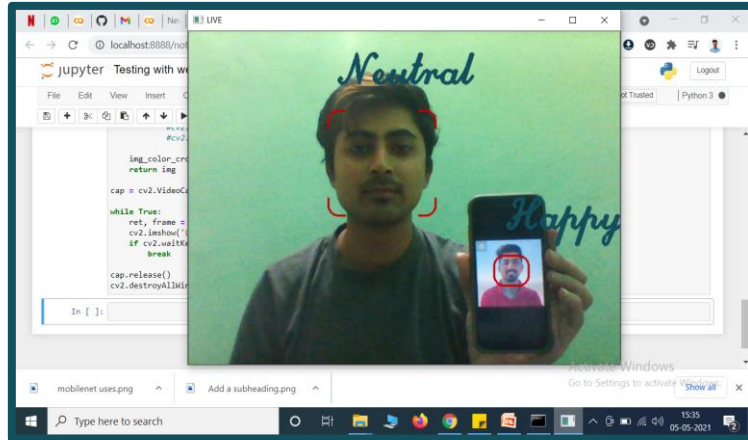
['Fear','Angry','Neutral','Happy']

Images

- Fear 2535
- Angry 2832
- Neutral 4295
- Disgust 380
- Happy 6834

Live Testing - In Local

I ran the model in my local system for checking the accuracy, we both used Computer Vision library for doing this task.



Later on, we have implemented the same code with Streamlit as well as Flask for the front end for our application

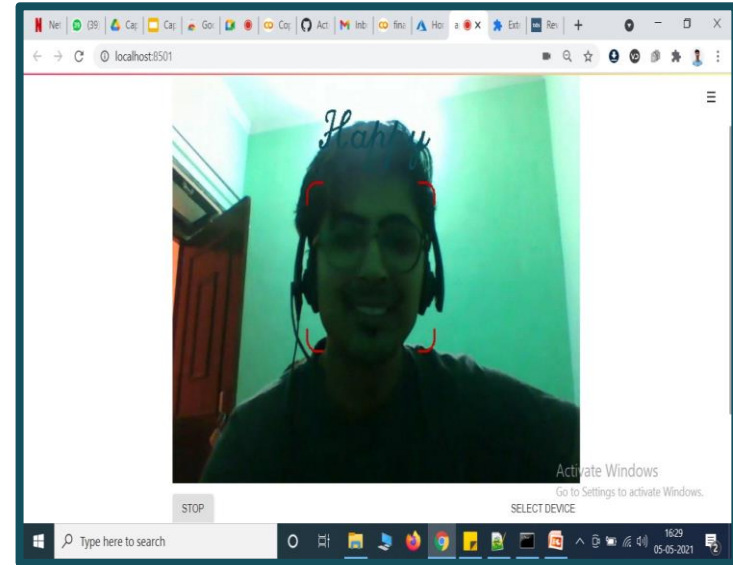
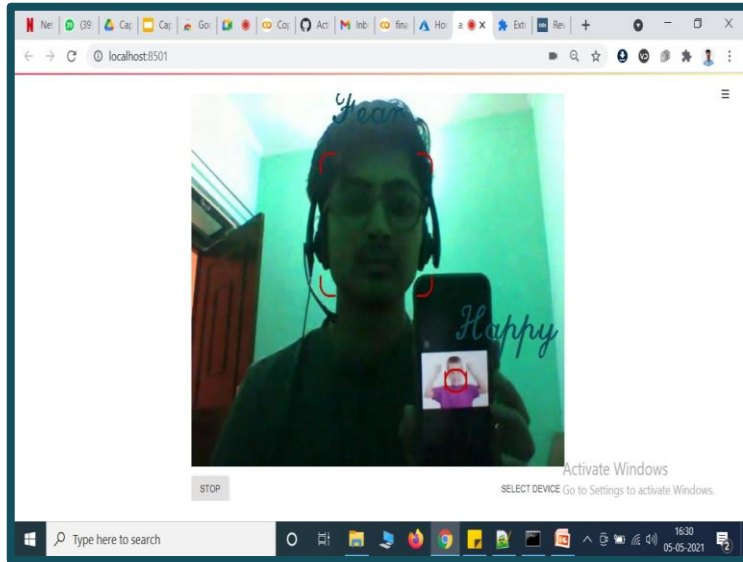
Making an Application

- Streamlit

- In streamlit , we used `streamlit-webrtc` helps to deal with real-time video streams.
- Streamlit doesn't provide the live capture feature itself, instead used a third party API, that's why the video is taking a bit time for loading
- Image captured from webcam is sent to `VideoTransformer` function to detect the emotion.
- Then this model was deployed on Heroku with the help of `heroku buildpack-apt`.

Streamlit- Emotion Detection Local Server

We ran the model in the local system for checking the accuracy, we used Computer Vision library for doing this task.



Conclusions

- The emotion detection model will be helpful for teachers to teach in online mode.
- The model was giving an accuracy of 75.
- Frontend of model was made using flask and Streamlit and ran successfully locally.

THANKYOU