Customer Satisfaction based on facial recognition

By Sriram Koyalkar

ABSTRACT

Customer happiness is vital for businesses and organisations these days. There are manual techniques, such as conducting surveys and handing out questionnaires to clients. However, using Artificial Intelligence / Machine Learning, marketers and businesses are seeking for rapid solutions to receive effective and efficient feedback outcomes for their potential.

Everything in today's world is dependent on human effort. Artificial intelligence, on the other hand, makes human labour simple. It will not exactly depend on how we train the algorithm to think like a person. One of the most difficult tasks is face emotion recognition. Artificial intelligence will be able to predict human emotion without the need for human interaction. Image processing, deep learning, and machine learning are examples of artificial intelligence concepts. These subjects contain a variety of methods, some of which are used to classify text data and others which are used to detect images. We can see how the CNN (convolutional neural network) method is used to predict face emotion in this video. The concept revolves around a few primary face expression categories such as annoyance/anger, sadness/unhappiness, smiling/happiness, fear, and surprised/astonished.

The owner learns about the feedbacks of how customers respond depending on numerous things such as late serving of meals, food quality, and over invoicing costs based on human emotions filmed utilising cctv surveillance cameras in restaurants. The model is trained using a dataset consisting of pixel sets of photos of people with various emotions. The proposed model is a real-time model that detects the face using a live video stream and determines the emotion, age, and gender of the consumer, allowing it to assess whether or not the customer is satisfied. The proposed system's key benefit is that it employs a real-time live video stream via cctv. The usage of AI/ML techniques is the central principle of this system is to use AI/ML techniques to determine Emotion and also include feature like age gender etc.

INTRODUCTION

The Customer satisfaction can be done by Manual approaches such as satisfaction surveys, interviews, and focus groups to gauge customer satisfaction. These strategies are ineffective in terms of cost, time, and data reliability. Nonverbal communication is done with facial expressions. They are a unique means of expressing our feelings and gratitude. Negative feedback is frequently associated with a poorer perceived quality of service in the context of customer satisfaction. Facial expressions account for 55% of communication when using words. Furthermore, 70-95 percent of negative criticism can be verbally understood.

Companies have long been interested in gaining a better knowledge of how consumers make purchasing decisions. The goal of this project is to use facial expression analysis to detect positive or negative sentiments in clients. This type of information is beneficial in this way. We can, for example, calculate product statistics as well as the replacement of their exposures. Appreciated products must be highlighted, whereas unappreciated ones must be improved in much better ways. As a result, we've come up with a novel way for face emotion identification that uses facial expression and AI/ML techniques to recognise consumer pleasure.

Face recognition has seen major breakthroughs in the last couple of years, with new results by multiple groups surpassing human performance on the leading Labelled Faces in the Wild benchmark and achieving near perfect results. Is face recognition solved? Many applications require accurate identification at planetary scale, i.e., finding the best matching face in a database of billions of people. This is truly like finding a needle in a haystack. Face recognition algorithms did not deliver when the police were searching for the suspect of the Boston marathon bombing. Similarly, do you believe that current cell-phone face unlocking programs will protect you against anyone on the planet who might find your lost phone? These and other face recognition applications require finding the true positive matches with negligible false positives. They also require training and testing on datasets that contain vast numbers of different people.

In image processing and computer vision, face identification is a critical problem. The goal of this system is to determine the identification of a human being in an image using any set of inputs, such as a camera. Humans can effortlessly detect any thing in the actual world without any effort; machines, on the other hand, are incapable of doing so. One of the most basic tasks in computer vision is object detection, and now facial recognition is helping to advance the technique.

Face recognition is the process of collecting important features and minute deviations from a picture, converting them to a useable representation format, and classifying them. Face recognition based on a face's geometric features is perhaps the most natural method of human identification. The entire concept or procedure may be broken down into three primary parts, the first of which is to find a database of faces with several photographs for each individual for training purposes, with the more images the better. The next stage is to discover faces in the database images and use them to train the face recognizer. Finally, the face recognizer is put to the test. Feature-based approaches start by removing noise from the input image, then extracting distinctive facial features like the eyes, mouth, nose, edges, and so on, followed by geometric relationships between those facial points and facial expression, reducing the input facial image to a vector of geometric features. Face detection and recognition techniques are then utilised to match faces in this database using face matching algorithms.

Problem Statement

Face recognition technology is being used all over the world, and it is having a positive impact. Why is India being left out? This technology has a lot of potential in India, and it can help the country progress in a variety of ways. The technology and its applications can be used in a variety of industries across the country.

In India, duplicate voters are being reported so to tackle this problem ComputerVision can be used to verify the voter’s valid detail with the predicted detail of voter through cctv. Verification of passports and visas can also be done using this technology. This technique can also be used for this.

The same method can also be used to verify a driver's licence. Technology can be utilised to improve surveillance and security in the defence ministry, airports, and other key locations. It can also be used to identify candidates during examinations such as the Civil Services Exam, SSC, IIT, MBBS, and others.

This method can be used to verify and track attendance in a variety of government and corporate settings. It can also be implemented in bank lockers and vaults for access control verification and authentication of authentic users. The technique can potentially be utilised by police forces to identify offenders.

Market / Customer / Business Need Assessments

Many restaurants receive feedback from customers, which may be positive or negative, and it is inefficient to gain insights into customer expectations. Customer satisfaction is key factor for growth. In order to keep the customer satisfied you need to provide the product as per customer expectation. Usually, customer will not be satisfied to buy something that is costlier than its original price.

Restaurants/hotels owners may fail to fulfil customer obligations and may experience difficulties in a variety of ways, including a decrease in the number of customers who visit, the inability to pay employees/staff who work there despite the issues, and the possibility of running out of money.

To address this, we are employing a **Customer Satisfaction based on facial recognition system**, which not only eliminates issues that customers may encounter, such as slow food service, overbilling, or low-quality food, but also allows us to save the paper feedback that we previously collected from customers based on their review, which may or may not be accurate. It assists restaurant operators in gaining insights and improving client behaviour through the use of technology, and it may acquire appeal in the market.

This ability to boost customer satisfaction may aid in attracting new clients and generating money for many hotels and restaurants, and it is extremely beneficial to the sector's growth.

Target Specifications and Characterization

- To switch from a paper-based consumer feedback system to an automated facial recognition system.
- To increase the number of consumers and to establish healthy relationship between customer and business.
- Using this proposed approach, minimise verbal input and replace it with no-contact feedback.
- To deploy Artificial Intelligence approaches to capture user expressions based on the food/service they receive and gain insights without having to deal with them directly.
- To develop one's business and make an effect in the market by using the proper and efficient algorithms and predicting user needs based on data acquired.

External Search (Information Sources / references)

Machine learning is a branch of Artificial Intelligence that employs a variety of statistical, probabilistic and optimization techniques that allows computers to learn from past examples and to detect hard-to-discern patterns from large, noisy or complex data set. These datasets can be found in open-source platforms.

- Fragopanagos, N.; Taylor, J.G. Emotion recognition in human–computer interaction. Neural Netw. 2005, 18, 389–405. [CrossRef] [PubMed]
- Cowie, R.; Douglas-Cowie, E.; Tsapatsoulis, N.; Votsis, G.; Kollias, S.; Fellenz, W.; Taylor, J.G. Emotion recognition in human-computer interaction. IEEE Signal Process. Mag. 2001, 18, 32–80. [CrossRef]

- Busso, C.; Deng, Z.; Yildirim, S.; Bulut, M.; Lee, C.M.; Kazemzadeh, A.; Lee, S.; Neumann, U.; Narayanan, S. Analysis of emotion recognition using facial expressions, speech and multimodal information. In Proceedings of the 6th International Conference on Multimodal Interfaces, State College, PA, USA, 14–15 October 2004; ACM: New York, NY, USA, 2004; pp. 205–211
- https://www.researchgate.net/publication/343994692_Customer_Satisfaction_Recognition_Based_on_Facial_Expression_and_Machine_Learning_Techniques
- https://medium.com/@khushibhoj/how-do-face-recognition-system-actually-work-6624d52c10b9
- https://www.pathpartnertech.com/challenges-faced-by-facial-recognition-system/
- https://fedtechmagazine.com/article/2013/11/4-limitations-facial-recognition-technology

Bench Marking Alternate Products

With the advancement of technology, the demand for face recognition is growing by the day. Every sector has embraced face recognition software for authentication purposes. Many software product brands such as Ageitgey, is the most popular free face recognition software and it also has 37.6k stars on GitHub. This software can be used through Python API or their binary command line tool. This platform has all instructions with regard to the installation which makes it more interesting and popular.

CompreFace , was published on GitHub in 2020 and has about 900 stars. It is one of the few self-hosted REST API free face recognition software that can be used with just one docker-compose command. This software recognizes faces on several video streams. CompreFace also has a UI for managing user roles and face collections.

DeepFace was published on Github in 2020 and has about 1,100 stars. This free face recognition software supports different face recognition methods like FaceNet and Insightface. FaceNet is a free face recognition program created by Google researchers and an open-source Python library that implements it.

FaceNet has great accuracy but the only drawback of this is that it doesn't have a REST API. InsightFace is another free face recognition software that has about 8,00 stars. This software uses the most recent and accurate methods for face recognition. InsightFace is also accurate as the below software.

Applicable Patents

- https://patents.google.com/patent/US7203346B2/en
- https://patents.google.com/patent/US6301370B1/en
- https://ipindia.gov.in/writereaddata/Portal/IPOGuidelinesManuals/1_34_1_guidelines-draftSearch-examination-04march2015.pdf
- https://ncrb.gov.in/sites/default/files/tender/AFRSRFPDate22062020UploadedVersion.pdf

Applicable Regulations

- Govt. Regulations for Facial Recognition
- Informational privacy regulations
- Reasonable security practices and procedures
- Maintaining data in accordance with government regulations and without disclosing it.
- The direct implementation of such technologies has not been recognized by law. As such, there is a need for having in place detailed legal frameworks passed by the Parliament of India which authorize the implementation and maintenance of such automated facial recognition technologies.

Applicable Constraints

- Customers' data is collected using a survival camera.
- Data gathering and maintenance on a continuous basis.
- Pose changes are quite sensitive to facial recognition systems. When a person's head moves and their viewing angle shifts, the pose of their face changes.

- Application development and integration on continuous basis.
- High definition cameras must be installed rather than the normal ones.
- **Occlusion,** means "blockage," and it occurs when one or more sections of the face are blocked, preventing the entire face from being used as an input image. Occlusion is one of the most difficult problems to solve in a face recognition system. It is common in real-world scenarios and is caused by beards, moustaches, and accessories (goggles, caps, masks, and so on). The existence of such components diversifies the subject, making computerised facial recognition a difficult nut to crack. Face is one of the most important biometrics since its distinctive traits are critical in determining human identity and emotions. Varied conditions lead to diverse moods, which lead to different emotions and, eventually, changes in facial expressions.
- **Low Resolution,** Any typical image should have a minimum resolution of 16*16 pixels. A low resolution image is one having a resolution of less than 16*16 pixels. These low-resolution images are captured by small-scale standalone cameras such as street-level CCTV cameras, ATM cameras, supermarket security cameras, and restaurant security cameras. These cameras can only record a small portion of the human face, and because the camera is not very close to the face, they can only capture a 16*16 face region. Because the majority of the pixels are lost in such a low quality image, it doesn't convey much information. The process of recognising faces can be extremely difficult.
- **Ageing,** Face appearance/texture changes over time and reflects ageing, which adds to the difficulty of facial recognition systems. Human face characteristics, shapes/lines, and other things change as people become older. It's used for long-term visual monitoring and picture retrieval. The dataset for a separate age group of persons over a period of time is calculated for accuracy verification. The recognition method is based on feature extraction, which includes wrinkles, markings, brows, haircuts, and other basic traits.

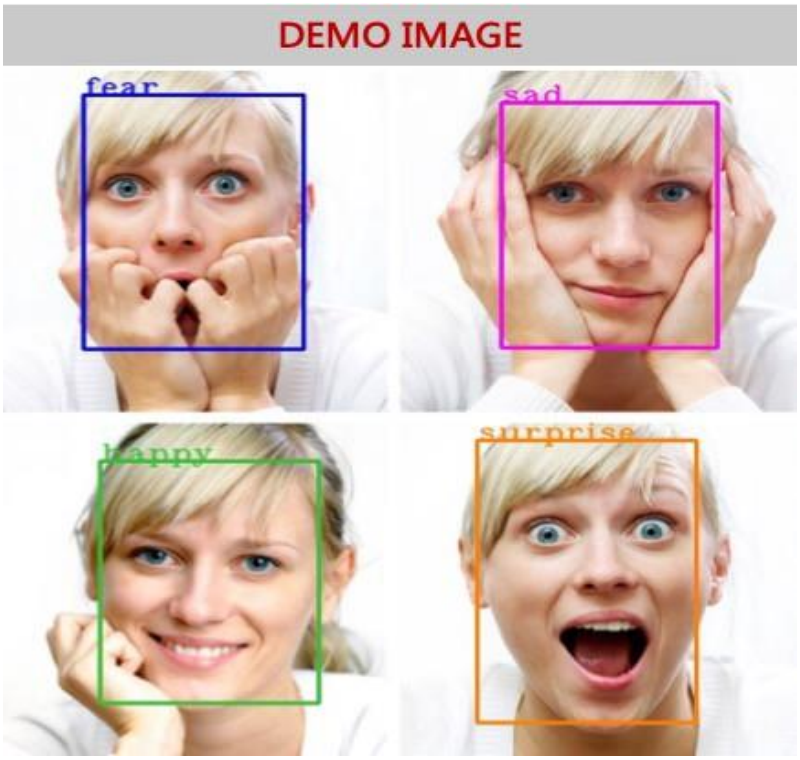
- **Model Complexity,** Existing state-of-the-art facial recognition systems rely on a sophisticated and inappropriate for real-time performance on embedded devices Convolutional Neural Network (CNN) architecture that is "too deep". Variations in illumination, emotion, position, and occlusion should all be tolerated by an ideal face recognition system. It should be scalable to a large number of users with a need for capturing minimal images during registration while doing away with complex architecture at the same time.
- **Protects businesses against theft**, Anti-shoplifting software such as facial recognition software can be an effective preventative tool. The software and security cameras are used by business owners to identify known or suspected thieves, and the existence of the cameras deters theft in the first place. If a firm is robbed, the software can assist in identifying and tracking the perpetrators.
- Different Face Angles Can Throw Off Facial Recognition's Reliability.
- Small Image Sizes Make Facial Recognition More Difficult.
- The thought of putting this full model on software that uses cameras to capture the face is still a long way off, as many corporations are unable to do so due to government constraints, and this field is still in investigation.

Business Opportunities

India is one of the most essential business markets for expanding a company. Automated face recognition is a technology that allows a person's facial features and contours to be captured in order to create a database for future comparison. If this technology is used in the future in compliance with government rules, it has the potential to boost economic growth.

By utilising data that will be dynamically stored using cctv cameras put up in the site, any restaurant or small hotel can acquire a true review of client happiness. It may reduce the cost of paper feedbacks, which are not always real, and without any direct encounters, we may be aware of any shortcomings in the business (hotel services / restaurant services).

Concept Generation



- Nowadays, most people prefer to eat restaurant cuisine rather than cooking at home, however it appears that when they visit a hotel or restaurant, they may or may not be satisfied with the hotel staff's service, overcharging, or the food itself.
- Despite the fact that restaurants provide paper surveys to clients, there are no efficient or valid findings from these surveys because the information could be real or false.
- As a result of this, restaurant and hotel operators are failing to meet customer expectations, potentially resulting in market loss and financial ruin.
- To solve this problem, we devised the concept of real-time facial recognition, which employs cctv cameras to capture customers' expressions (happy/sad/surprised/angry etc.) and gives restaurant operators with information on customer’s happiness.

- To begin, whenever a customer visits a restaurant/hotel, their expressions are captured using a cctv camera, which provides quick results based on his expressions, and these expressions of face are stored in a database to obtain overall customer insights about how many people were actually satisfied with restaurant/hotel food or services, allowing hotel/restaurant operators to meet customer expectations and correct any mistakes that may have occurred.
- In addition to the customer's satisfaction, this project uses cctv cameras to detect any suspicious activity that may be useful to the police department or others.
- This model can be implement in various restaurants in market with the govt. norms. When once successful can create huge impact on the business market and many of restaurants can gain popularity and positive reviews based on the customer’s satisfaction.

Product details

How does product work in this?

1. Data Acquisition is the initial phase defined in the architecture because machine learning is predicated on accessible data for the system to make a conclusion. Data collection, preparation and segregation of case scenarios depending on particular features involved in the decision-making cycle, and transfer of the data to the processing unit for further categorization are all part of this process.

   This stage is sometimes called the data pre-processing stage. The data model expects reliable, fast and elastic data which may be discrete or continuous in nature. The data is then passed into stream processing systems (for continuous data) and stored in batch data warehouses (for discrete data) before being passed on to data modelling or processing stages.
2. Data Processing, Processing of Information The data acquired by the data acquisition layer is subsequently transmitted to the data processing layer for advanced integration and processing, which includes data normalisation, data cleaning, transformation, and encoding.

The sort of learning that is utilised has an impact on the data processing. If supervised learning is utilised, for example, the data must be separated into various phases of sample data required for system training, and the data so formed is referred to as training sample data or simply training data. Furthermore, data processing is depending on the type of processing required and may include options ranging from continuous data action to the usage of a specific function-based architecture. Lambda architecture, for example. It may also entail action on discrete data, which may necessitate memory-bound computation. The data processing layer determines whether data in transit or at rest will be processed in memory.

3. Data Modelling This layer of the architecture involves the selection of different algorithms that might adapt the system to address the problem for which the learning is being devised. These algorithms are being evolved or being inherited from a set of libraries. The algorithms are used to model the data accordingly, this makes the system ready for the execution step.
4. Experimentation, testing, and tuning are all part of the execution step of machine learning. The overall purpose is to improve the algorithm in order to extract the desired machine result and improve system performance. The step's result is a refined solution that can provide the data needed for the machine to make decisions. CNNs are a type of Deep Neural Network that can recognise and classify specific features in images and are commonly used in image analysis.

   Image and video recognition, image classification, medical image analysis, computer vision, and natural language processing are only a few of their uses. The mathematical function of convolution, which is a special sort of linear operation in which two functions are multiplied to produce a third function that expresses how the shape of one function is modified by the other, is denoted by the term "convolution" in CNN. Simply put, two matrices are multiplied to provide an output that is used to extract features from the image.

Methodology and Algorithm

The convolutional neural network is the most widely used image processing technique (CNN). Convolutional layers, which are secret layers, distinguish CNN from a multi-layer perceptron (MLP). The proposed method is based on a two-level CNN framework. Background removal is the initial level, and it is used to eliminate emotions from an image. In this scenario, the primary expressional vector is retrieved using the standard CNN network module (EV). By tracing down major facial traits, the expressional vector (EV) is created. EV is closely linked to changes in speech. On a facial image with the backdrop removed, the EV is calculated using a simple perceptron unit.

The suggested FERC model also includes a non-convolutional perceptron layer as the last level. Each convolutional layer receives the input data (or image) and alters it before sending it on to the next level. A convolution operation is used in this modification. Any of the convolutional layers can be utilised to identify patterns. Within each convolutional layer, four filters were utilised. The input image sent to the first-part CNN contains shapes, edges, textures, and objects, as well as the face (used for background removal). The edge detector, circle detector, and corner detector filters are employed at the start of the convolutional layer 1. After the face has been detected, the second-part CNN filter recognises facial characteristics such as eyes, ears, mouth, nose, and cheeks are identified. The second-part CNN is made up of layers with 3 3 kernel matrices, such as [0.25, 0.17, 0.9; 0.89, 0.36, 0.63; 0.7, 0.24, 0.82]. These numbers are picked from a range of 0 to 1 at first. These numbers were optimised for EV detection based on the ground truth we had in the supervisory training dataset.

We used minimal error decoding to maximise filter values. The filter is added to the background-removed face (i.e., the output picture of the first-part CNN) after supervised learning has fine-tuned it for detection of different facial components. Frames from the supplied video are extracted. Both image and video input are supported by FERC. The difference between different frames is computed when the FERC receives video as an input.

The frames are optimally stable when the intra-frame difference is zero. After that, all of these steady frames were subjected to a Canny edge detector, and the total number of white pixels was calculated. The frame with the largest aggregated sum is picked after a comparison of the aggregated sums for all stable frames since it has the most information in terms of edges (more edges more details). This frame is then used to choose the input to FERC. Because fuzzy photos contain few or no edges, the decision to utilise this image was made. The proposed CNN recognition algorithm's block structure is shown. The algorithm is broken down into three parts, as shown below:

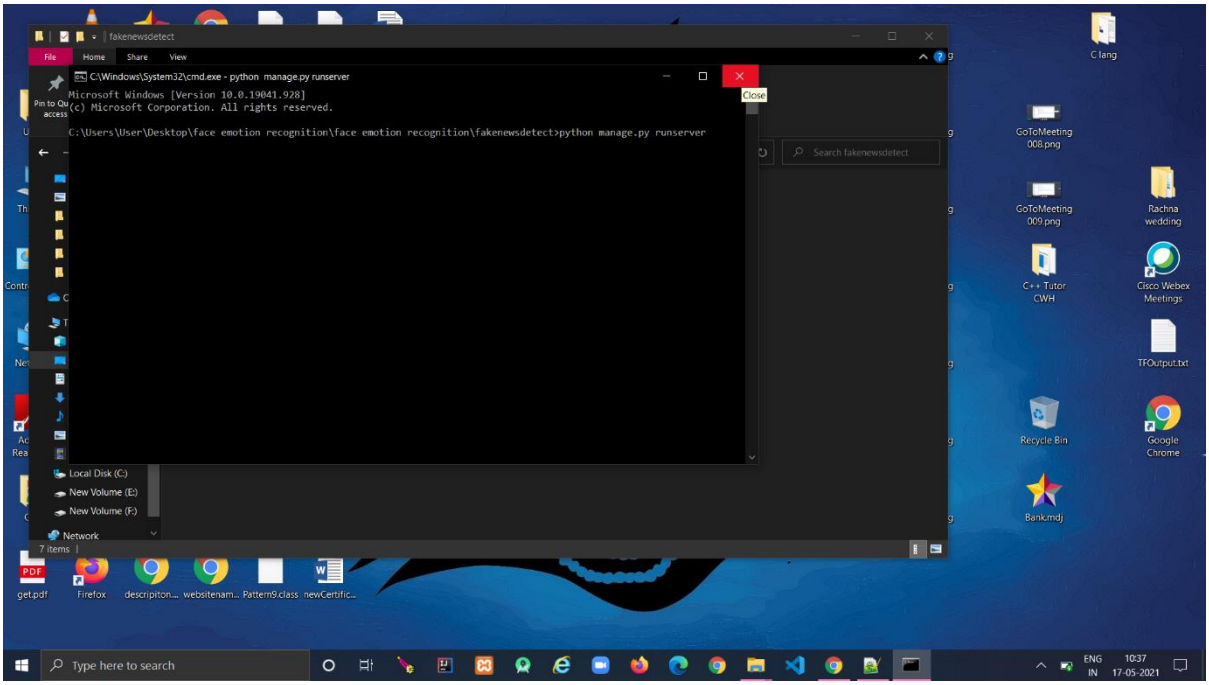
- Resize the input images as 16x16x1, 16x16x3, 32x32x1, 32x32x3, 64x64x1, and 64x64x1.
- Build a CNN structure with eight layers made up of convolutional, max pooling, convolutional, max pooling, convolutional, max pooling, convolutional, and convolutional layers respectively.
- After you've extracted all of the characteristics, use the Softmax classifier to classify them CNN Softmax Classifier Result Pre-processing Feature Extraction

Implementation

Note:-

This is just trail and many more things to be concerned about this project keeping in mind about the rules of government regarding the project and data leaks or breach.

These Screenshots describes about various expressions captured


fakenewsdetect
File
Home
Share
View
C:\Windows\System32\cmd.exe - python manage.py runserver
Microsoft Windows [Version 10.0.19041.928]
(c) Microsoft Corporation. All rights reserved.
C:\Users\User\Desktop\face emotion recognition\face emotion recognition\fakenewsdetect>python manage.py runserver
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Search fakenewsdetect
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New Volume (E:)
New Volume (F:)
Network
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C lang
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GoToMeeting 009.png
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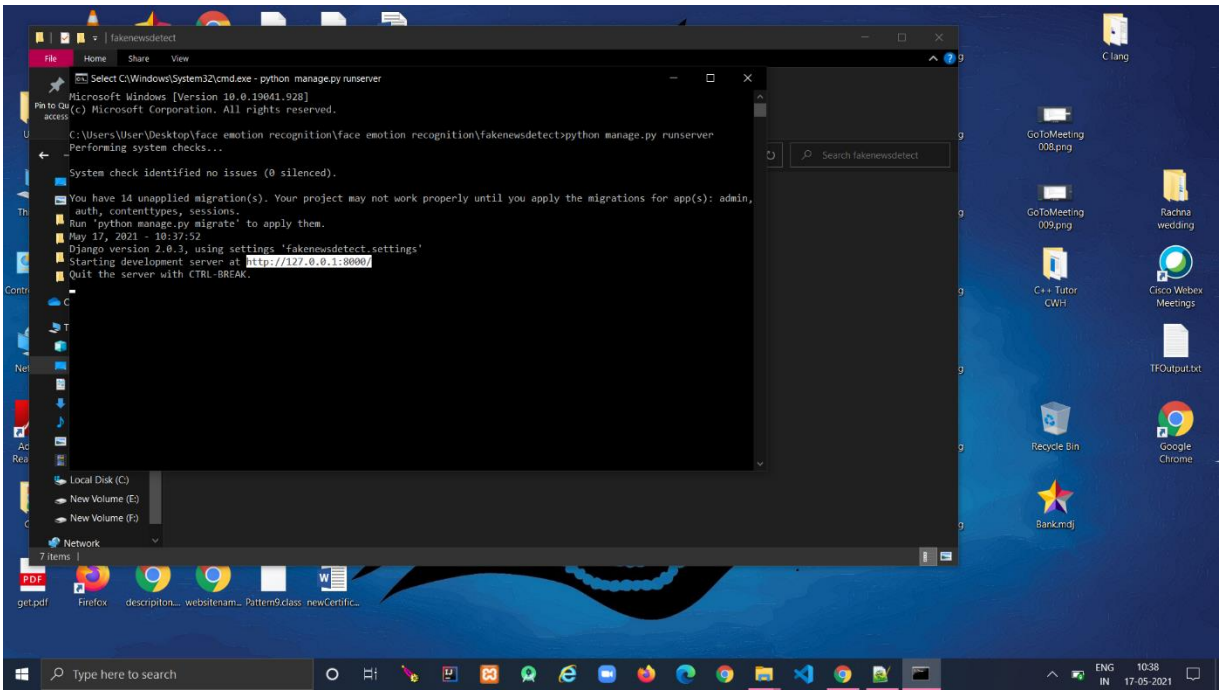
fakenewsdetect
File
Home
Share
View
Select C:\Windows\System32\cmd.exe - python manage.py runserver
Microsoft Windows [Version 10.0.19041.928]
(c) Microsoft Corporation. All rights reserved.
C:\Users\User\Desktop\face emotion recognition\face emotion recognition\fakenewsdetect>python manage.py runserver
Performing system checks...
System check identified no issues (0 silenced).
You have 14 unapplied migration(s). Your project may not work properly until you apply the migrations for app(s): admin, auth, contenttypes, sessions.
Run 'python manage.py migrate' to apply them.
May 17, 2021 - 10:37:52
Django version 2.0.3, using settings 'fakenewsdetect.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CTRL-BREAK.
Search fakenewsdetect
Local Disk (C:)
New Volume (E:)
New Volume (F:)
Network
7 items
C lang
GoToMeeting 008.png
GoToMeeting 009.png
Rachna wedding
C++ Tutor CWH
Cisco Webex Meetings
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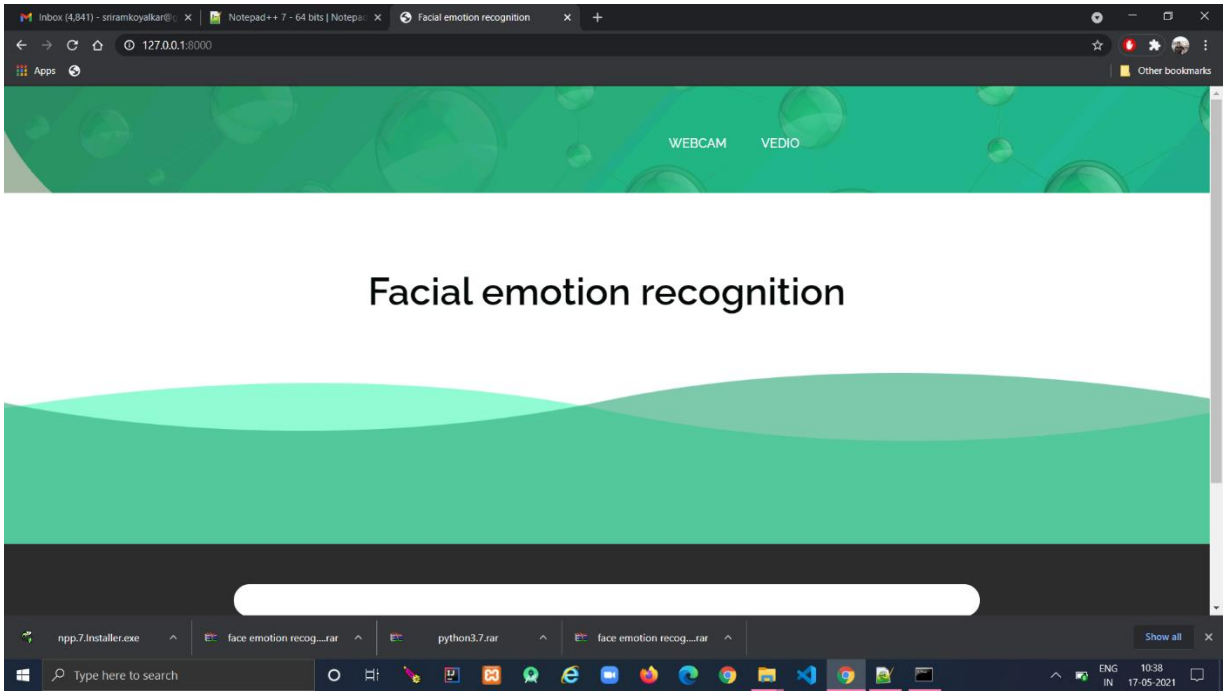
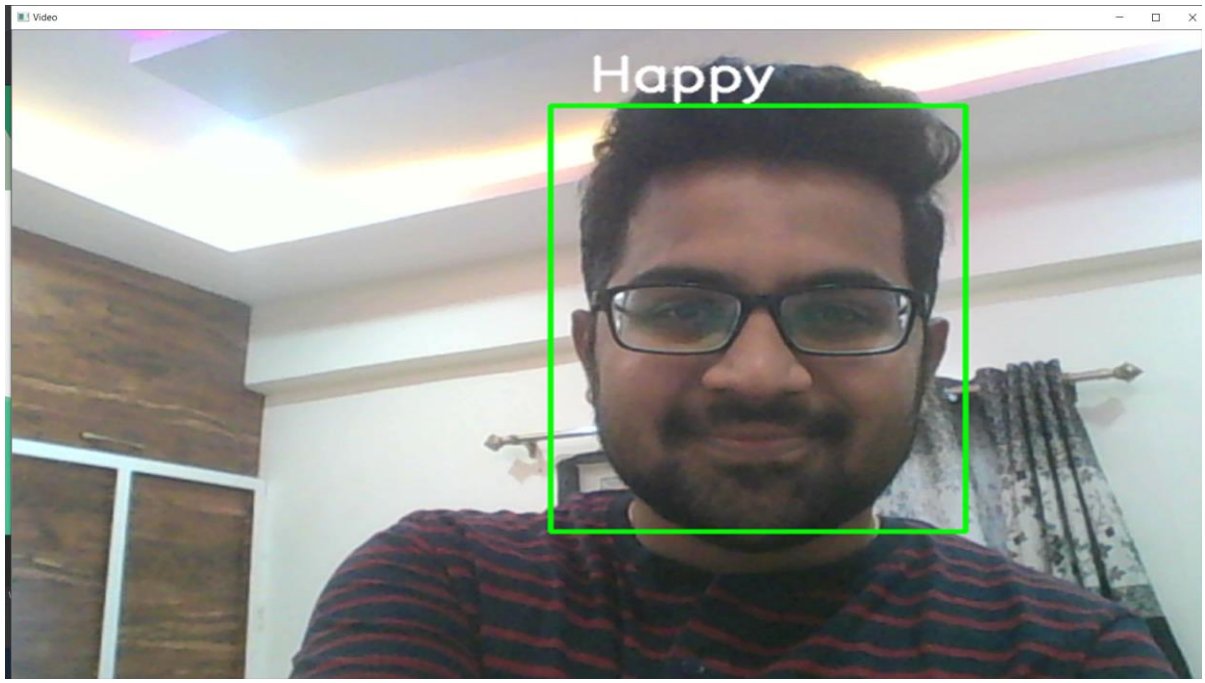
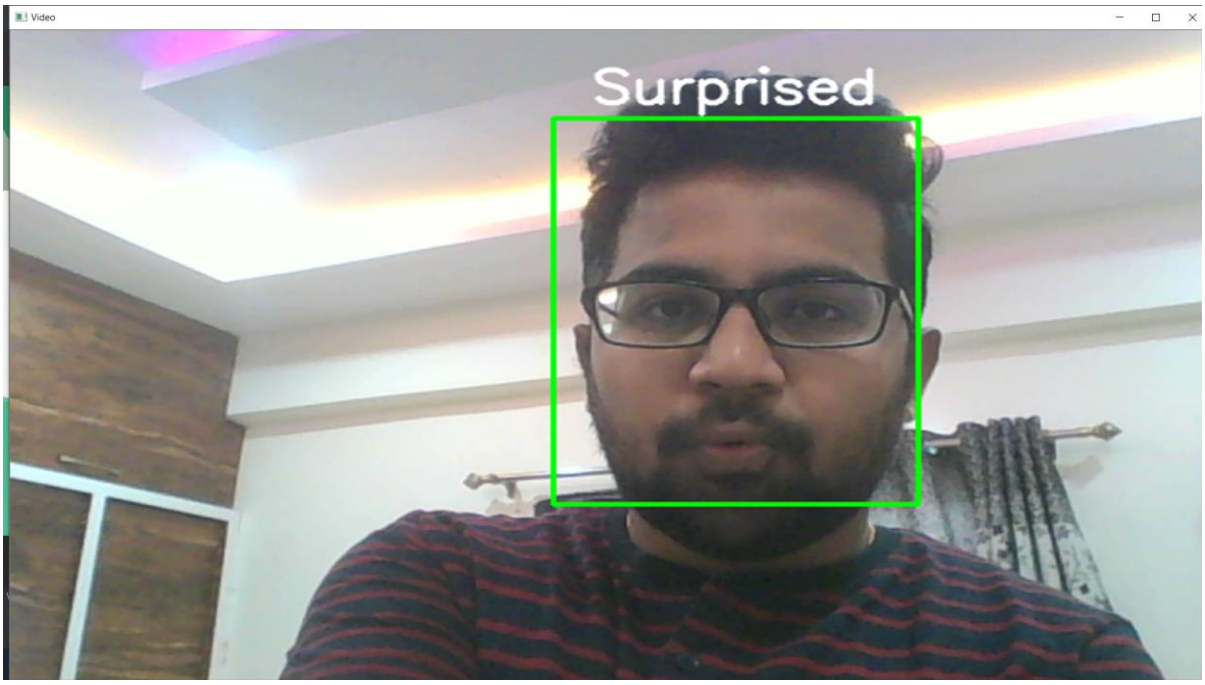
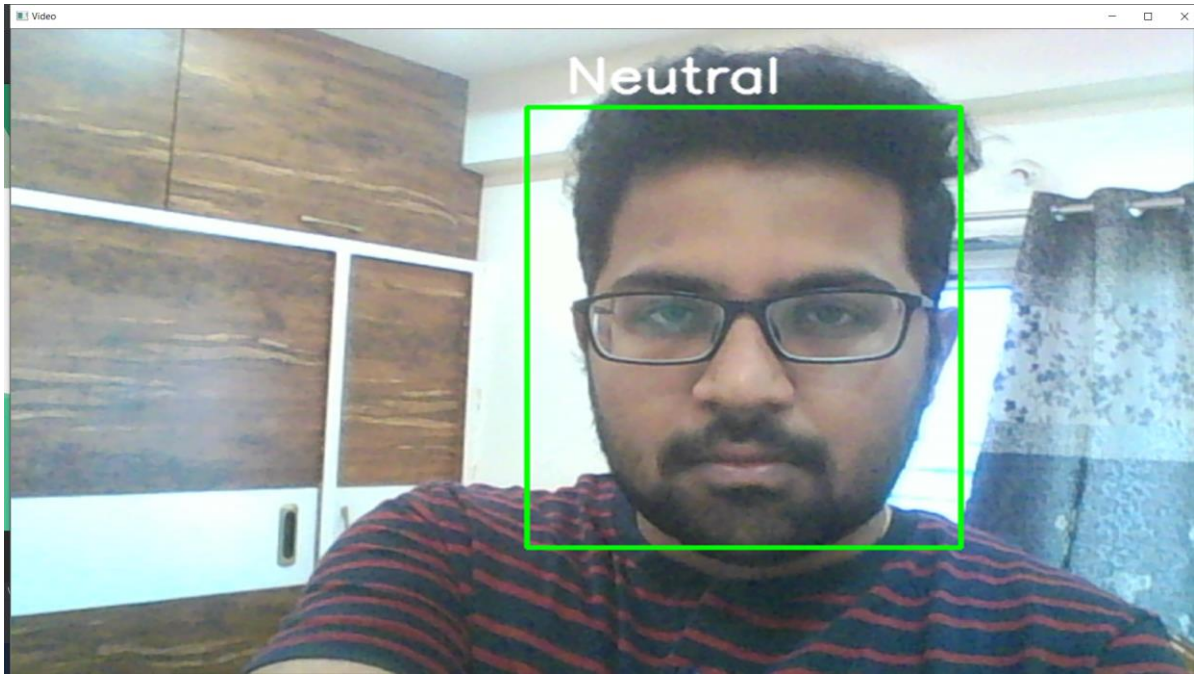

Facial emotion recognition
WEBCAM
VEDIO


Video
Happy


Video
Surprised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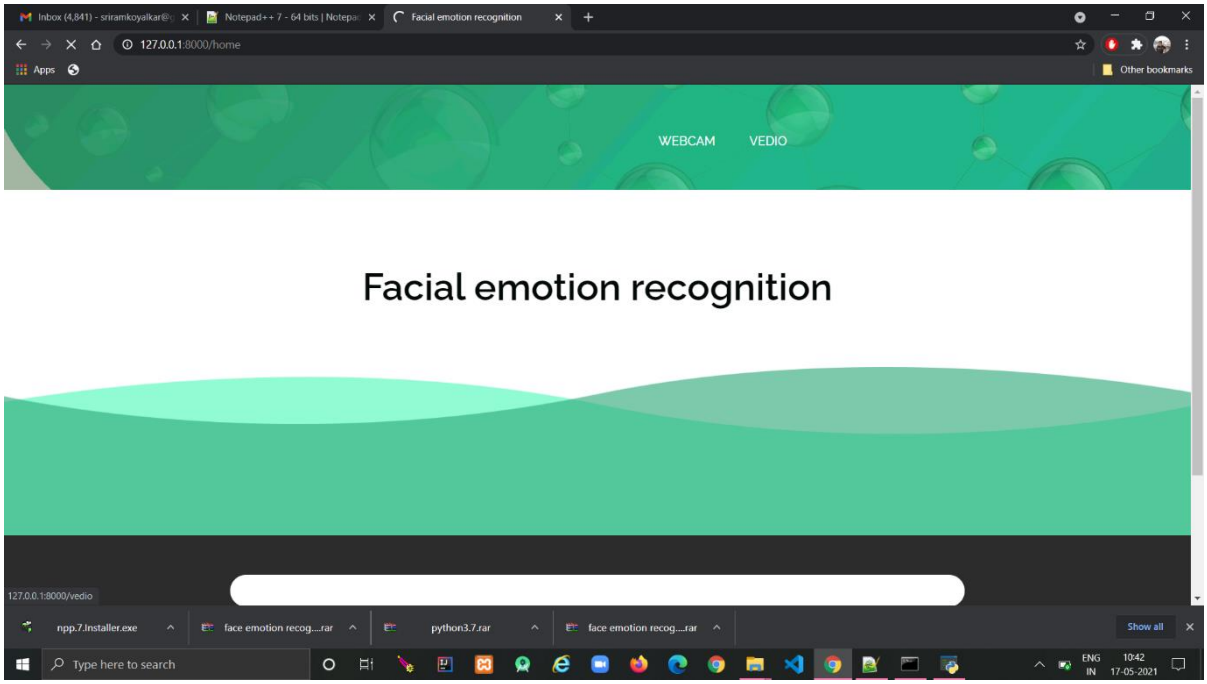
Neutral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Notepad++ 7 - 64 bits | Notepa
Facial emotion recognition
127.0.0.1:8000/home
Apps
Other bookmarks
WEBCAM
VEDIO
Facial emotion recognition
127.0.0.1:8000/vedio
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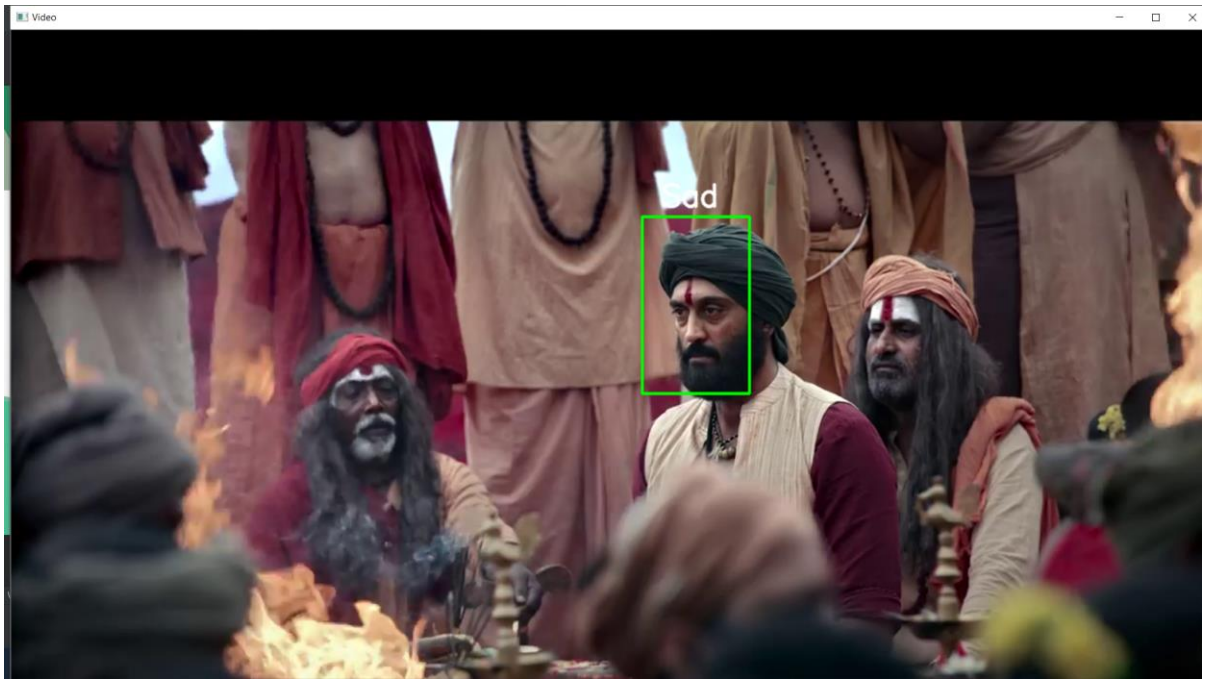
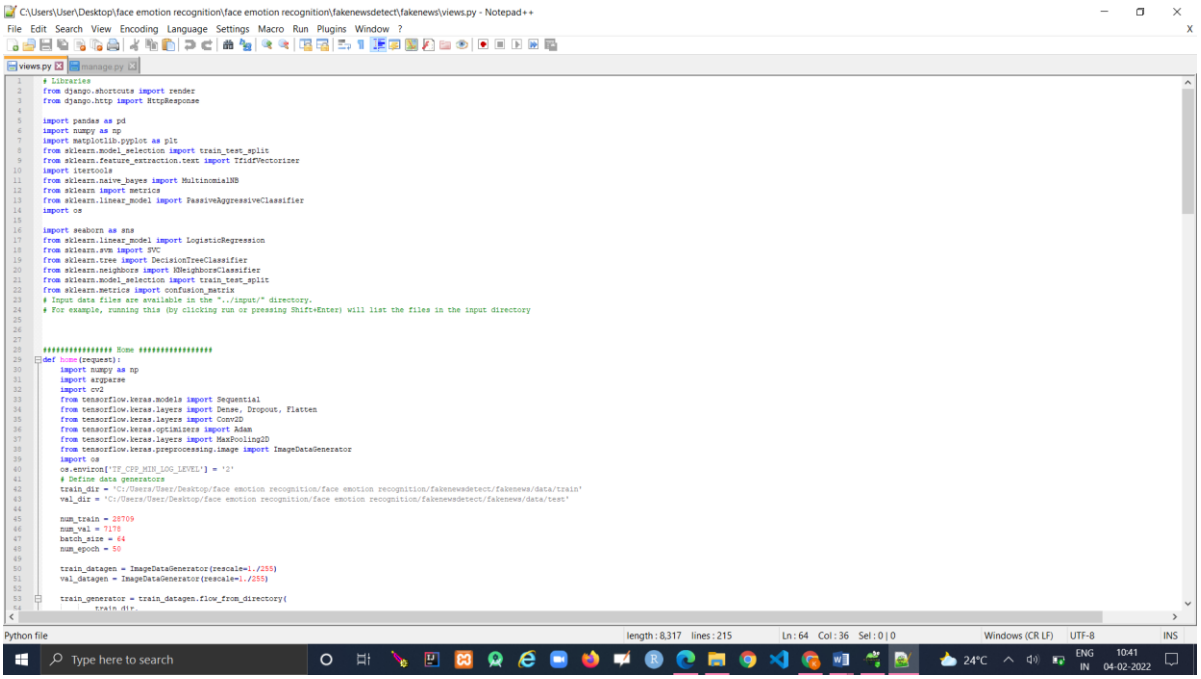
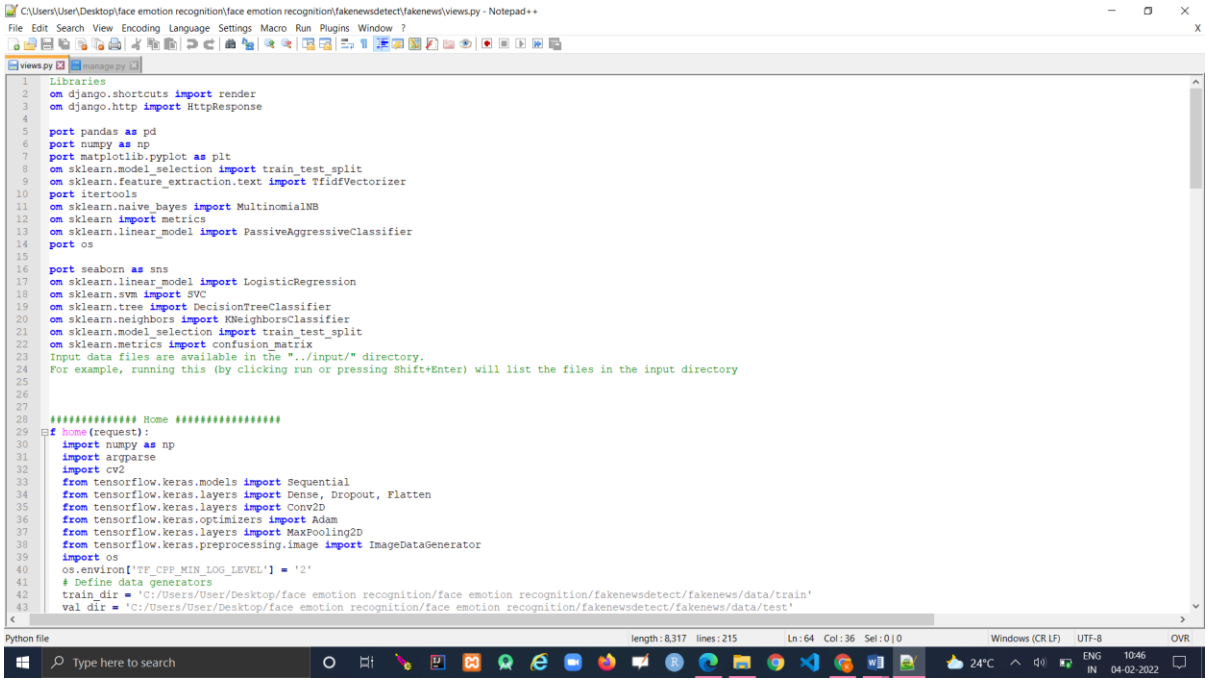
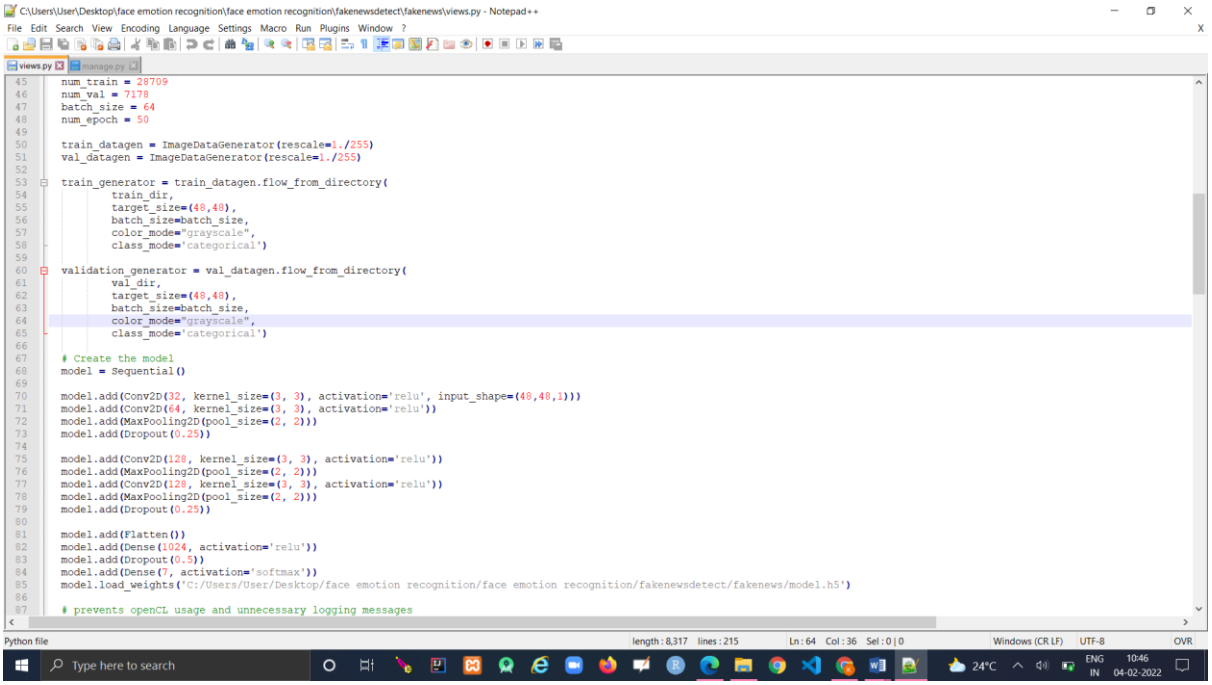
17-05-2021


Video

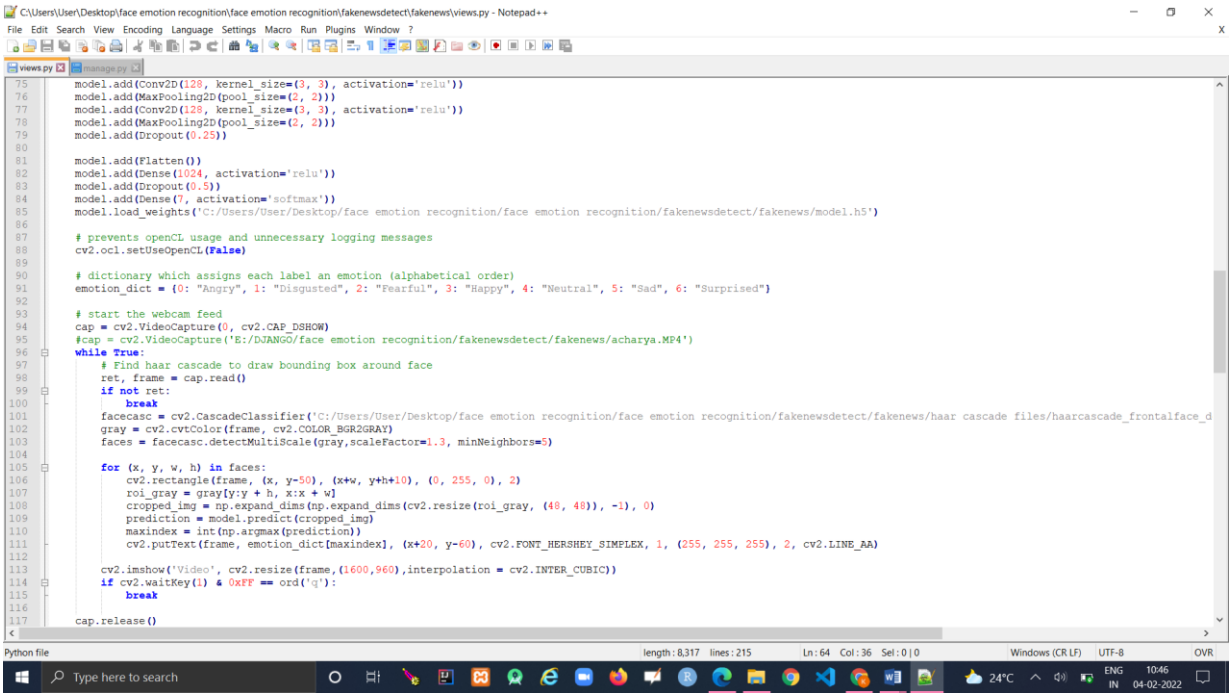
Code Snippets



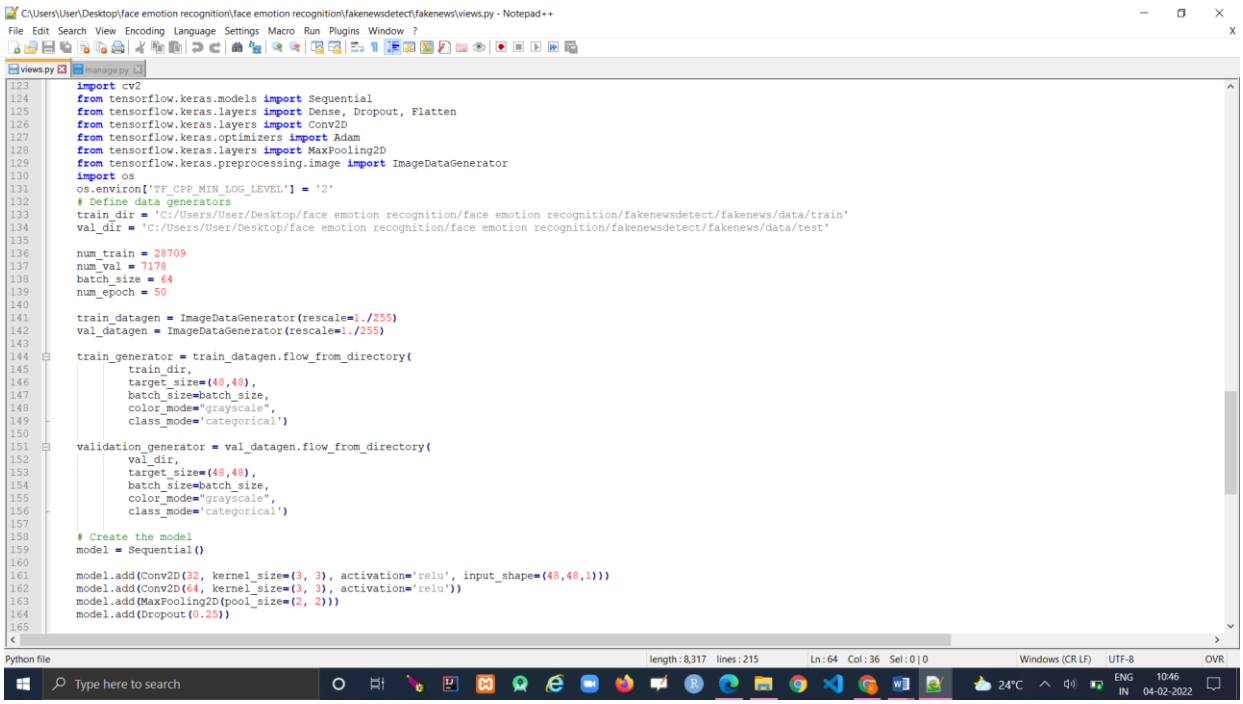




```
num_train = 28709
num_val = 7178
batch_size = 64
num_epoch = 50

train_datagen = ImageDataGenerator(rescale=1./255)
val_datagen = ImageDataGenerator(rescale=1./255)

train_generator = train_datagen.flow_from_directory(
        train_dir,
        target_size=(48,48),
        batch_size=batch_size,
        color_mode="grayscale",
        class_mode='categorical')

validation_generator = val_datagen.flow_from_directory(
        val_dir,
        target_size=(48,48),
        batch_size=batch_size,
        color_mode="grayscale",
        class_mode='categorical')

# Create the model
model = Sequential()

model.add(Conv2D(32, kernel_size=(3, 3), activation='relu', input_shape=(48,48,1)))
model.add(Conv2D(64, kernel_size=(3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))
model.add(Dropout(0.25))

model.add(Conv2D(128, kernel_size=(3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))
model.add(Conv2D(128, kernel_size=(3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))
model.add(Dropout(0.25))

model.add(Flatten())
model.add(Dense(1024, activation='relu'))
model.add(Dropout(0.5))
model.add(Dense(7, activation='softmax'))
model.load_weights('C:/Users/User/Desktop/face emotion recognition/face emotion recognition/fakenewsdetect/fakenews/model.h5')

# prevents openCL usage and unnecessary logging messages
```



```
model.add(Conv2D(128, kernel_size=(3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))
model.add(Conv2D(128, kernel_size=(3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))
model.add(Dropout(0.25))

model.add(Flatten())
model.add(Dense(1024, activation='relu'))
model.add(Dropout(0.5))
model.add(Dense(7, activation='softmax'))
model.load_weights('C:/Users/User/Desktop/face emotion recognition/face emotion recognition/fakenewsdetect/fakenews/model.h5')

# prevents openCL usage and unnecessary logging messages
cv2.ocl.setUseOpenCL(False)

# dictionary which assigns each label an emotion (alphabetical order)
emotion_dict = {0: "Angry", 1: "Disgusted", 2: "Fearful", 3: "Happy", 4: "Neutral", 5: "Sad", 6: "Surprised"}

# start the webcam feed
cap = cv2.VideoCapture(0, cv2.CAP_DSHOW)
#cap = cv2.VideoCapture('E:/DJANGO/face emotion recognition/fakenewsdetect/fakenews/acharya.MP4')
while True:
    # Find haar cascade to draw bounding box around face
    ret, frame = cap.read()
    if not ret:
        break
    facecasc = cv2.CascadeClassifier('C:/Users/User/Desktop/face emotion recognition/face emotion recognition/fakenewsdetect/fakenews/haar cascade files/haarcascade_frontalface_d
    gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
    faces = facecasc.detectMultiScale(gray,scaleFactor=1.3, minNeighbors=5)

    for (x, y, w, h) in faces:
        cv2.rectangle(frame, (x, y-50), (x+w, y+h+10), (0, 255, 0), 2)
        roi_gray = gray[y:y + h, x:x + w]
        cropped_img = np.expand_dims(np.expand_dims(cv2.resize(roi_gray, (48, 48)), -1), 0)
        prediction = model.predict(cropped_img)
        maxindex = int(np.argmax(prediction))
        cv2.putText(frame, emotion_dict[maxindex], (x+20, y-60), cv2.FONT_HERSHEY_SIMPLEX, 1, (255, 255, 255), 2, cv2.LINE_AA)

    cv2.imshow('Video', cv2.resize(frame,(1600,960),interpolation = cv2.INTER_CUBIC))
    if cv2.waitKey(1) & 0xFF == ord('q'):
        break

cap.release()
```


C:\Users\User\Desktop\face emotion recognition\face emotion recognition\fakenewsdetect\fakenews\views.py - Notepad++
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views.py
manage.py
import cv2
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Dropout, Flatten
from tensorflow.keras.layers import Conv2D
from tensorflow.keras.optimizers import Adam
from tensorflow.keras.layers import MaxPooling2D
from tensorflow.keras.preprocessing.image import ImageDataGenerator
import os
os.environ['TF_CPP_MIN_LOG_LEVEL'] = '2'
# Define data generators
train_dir = 'C:/Users/User/Desktop/face emotion recognition/face emotion recognition/fakenewsdetect/fakenews/data/train'
val_dir = 'C:/Users/User/Desktop/face emotion recognition/face emotion recognition/fakenewsdetect/fakenews/data/test'
num_train = 28709
num_val = 7178
batch_size = 64
num_epoch = 50
train_datagen = ImageDataGenerator(rescale=1./255)
val_datagen = ImageDataGenerator(rescale=1./255)
train_generator = train_datagen.flow_from_directory(
train_dir,
target_size=(48,48),
batch_size=batch_size,
color_mode="grayscale",
class_mode='categorical')
validation_generator = val_datagen.flow_from_directory(
val_dir,
target_size=(48,48),
batch_size=batch_size,
color_mode="grayscale",
class_mode='categorical')
# Create the model
model = Sequential()
model.add(Conv2D(32, kernel_size=(3, 3), activation='relu', input_shape=(48,48,1)))
model.add(Conv2D(64, kernel_size=(3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))
model.add(Dropout(0.25))
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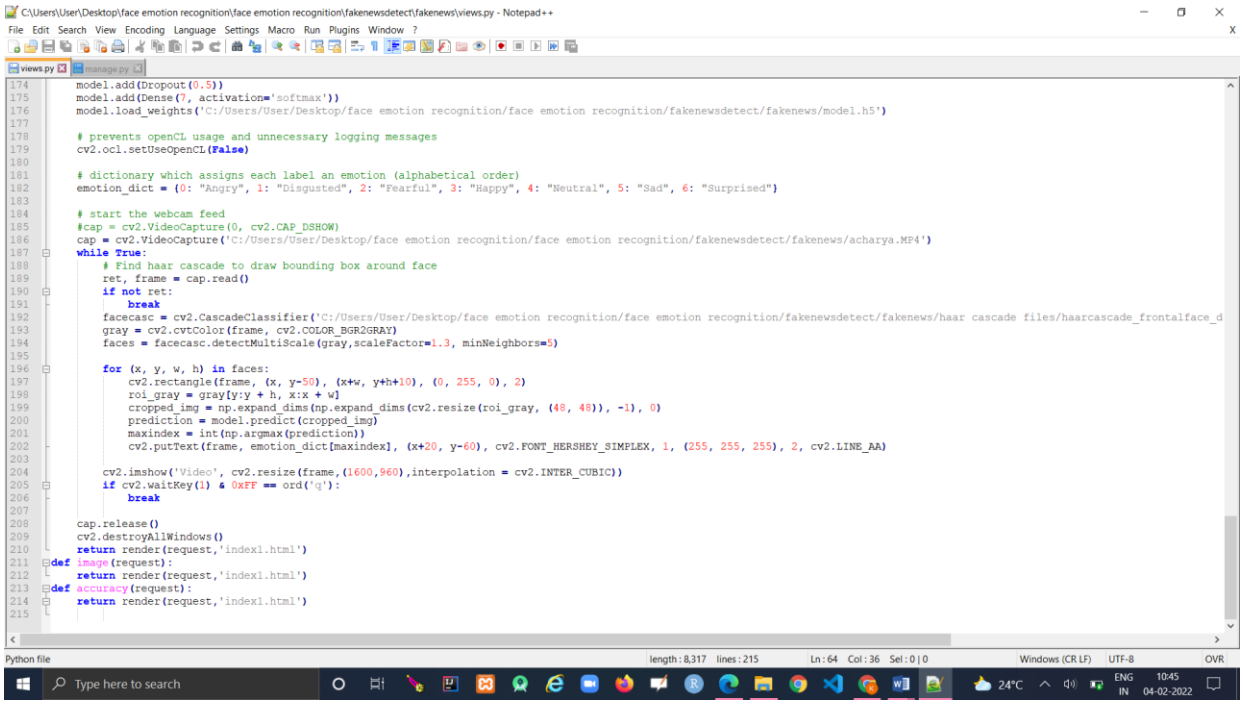
C:\Users\User\Desktop\face emotion recognition\face emotion recognition\fakenewsdetect\fakenews\views.py - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
views.py
manage.py
model.add(Dropout(0.5))
model.add(Dense(7, activation='softmax'))
model.load_weights('C:/Users/User/Desktop/face emotion recognition/face emotion recognition/fakenewsdetect/fakenews/model.h5')
# prevents openCL usage and unnecessary logging messages
cv2.ocl.setUseOpenCL(False)
# dictionary which assigns each label an emotion (alphabetical order)
emotion_dict = {0: "Angry", 1: "Disgusted", 2: "Fearful", 3: "Happy", 4: "Neutral", 5: "Sad", 6: "Surprised"}
# start the webcam feed
#cap = cv2.VideoCapture(0, cv2.CAP_DSHOW)
cap = cv2.VideoCapture('C:/Users/User/Desktop/face emotion recognition/face emotion recognition/fakenewsdetect/fakenews/acharya.MP4')
while True:
# Find haar cascade to draw bounding box around face
ret, frame = cap.read()
if not ret:
break
facecasc = cv2.CascadeClassifier('C:/Users/User/Desktop/face emotion recognition/face emotion recognition/fakenewsdetect/fakenews/haar cascade files/haarcascade_frontalface_d
gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
faces = facecasc.detectMultiScale(gray,scaleFactor=1.3, minNeighbors=5)
for (x, y, w, h) in faces:
cv2.rectangle(frame, (x, y-50), (x+w, y+h+10), (0, 255, 0), 2)
roi_gray = gray[y:y + h, x:x + w]
cropped_img = np.expand_dims(np.expand_dims(cv2.resize(roi_gray, (48, 48)), -1), 0)
prediction = model.predict(cropped_img)
maxindex = int(np.argmax(prediction))
cv2.putText(frame, emotion_dict[maxindex], (x+20, y-60), cv2.FONT_HERSHEY_SIMPLEX, 1, (255, 255, 255), 2, cv2.LINE_AA)
cv2.imshow('Video', cv2.resize(frame,(1600,960),interpolation = cv2.INTER_CUBIC))
if cv2.waitKey(1) & 0xFF == ord('q'):
break
cap.release()
cv2.destroyAllWindows()
return render(request,'index1.html')
def image(request):
return render(request,'index1.html')
def accuracy(request):
return render(request,'index1.html')
Python file
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Conclusion

Customer happiness is one of the most difficult tasks in the marketing era. We suggested a new way based on the classification of numerous facial expressions to gauge customer satisfaction using AI/ML techniques and expand business in the market with positive feedback.

Although the technology is new and there are concerns about data breaches, if it is managed within government laws and privacy regulations, it can achieve greater heights in a variety of areas, from police verification to customer happiness.

In the field of computer vision, face identification remains a difficult subject. It has attached a lot of attention in recent years due to its numerous uses in various fields. Despite the fact that there is a lot of research going on in this area, face recognition algorithms are far from perfect in terms of performing well in all real-world circumstances. There is much work to be done in order to realise methods that reflect how humans recognise faces and optimally make use of the temporal evolution of the appearance of the face for recognition.

To evaluate the output of various CNNs for a face expression recognition query, we applied various post-processing and visualisation techniques. Deep CNNs are efficient, according to the findings. Studying facial traits can help in facial expression recognition. Furthermore, the hybrid feature sets had no effect on model accuracy, showing that convolutional networks could learn essential facial features from raw pixel data alone.