PROJECT REPORT

MASK DETECTION PROJECT

TOPICS COVERED

- Tools used – Software & Hardware

- Algorithm used

- Modules & Process

- Data Flow Diagram

- Working advantage and disadvantage

- Future Work & Conclusion

TOOLS USED – SOFTWARE & HARDWARE

- This project is mostly software based.

- This project is platform independent i.e. it works on Windows, Mac, Linux etc.

- <u>The software requirements are as below : -</u>

  - Python 3.6 or above

  - Anaconda Navigator

  - Installation of the Python frameworks that are used

  - Python Frameworks : OpenCV, TensorFlow, Keras, NumPy

- <u>Hardware Requirements :-</u>

  - As we need to detect the mask on the given image, so Webcam or CCTV Camera will be required

ALGORITHM USED

- In this project we have used pre-trained caffe model for Face Detection.

- From the input image frame, OpenCV framework will use the Caffe Model and detect the face from the image.

- Once the face is detected, our next goal is to detect the MASK on the person's face.

- To detect the mask, we will be using the TENSORFLOW KERAS to train the Neural Network Model.

- This convolutional neural network (CNN) model is stored in the .h5 format for doing the prediction.

- The detected face blob is then passed to KERAS h5 model. As further step the face blob (input face frame) is converted to array and CNN is used to get the Prediction Probability.

- Based on the obtained Prediction Probability we'll judge that whether the person has FACE MASK or not.

MODULES & PROCESSES

- This project includes 3 step process :

1. Collecting Dataset for Mask & Non-Mask

- In this step we will need to collect the images of various persons with 2 categories. Firstly, those who have worn the mask and secondly, those who haven't wore the mask. In our case we have collected around 1300+ images to both the categories. These images will be used in our next step.

2. Training the Model :

- Now we have the required dataset for Mask & Non Mask. Moving further we will start training our Deep Learning Model on the dataset which we collected in the previous step. For training our model we will use Python's Framework : KERAS. This module of python is widely used for training our Convolutional Neural Network (CNN). The code & hyperparameter details for training is given in further sections.

3. Using the model to Detect Mask :

- Once the model is trained now it's time to deploy it for detection of MASK & NON MASK. For that we will give the image and using OpenCV we will do necessary image processing on that input image. After that the image is converted into an array which will be passed to model for MASK DETECTION. Also we can use OpenCV to process the video frames either from webcam or from a video file. Each frame will be converted into an array and then the model will predict the label of MASK/NO MASK.

WORKING ADVANTAGE AND DISADVANTAGE

- Advantages
  - In the present pandemic situation, this AI Enabled system will help in remote areas where police officials aren't available physically.
  - As the architecture used for training and prediction is very light weight, so we can get results in less time.
  - The DNN model is trained on more than 1300 image dataset. So that will yield much better accuracy for prediction.
  - This project is Python based. So we can extend its horizon to IoT using hardware components like Raspberry Pi.
- Disadvantages
  - Installation of Python & its framework dependencies might incur some flaw in the system.
  - Here if we need to upgrade the model for new dataset, then re-training is required for the same.
  - Face Detection accuracy plays vital role in this MASK Prediction. So if face of any person isn't detected, then our model wouldn't we able to detect the MASK.
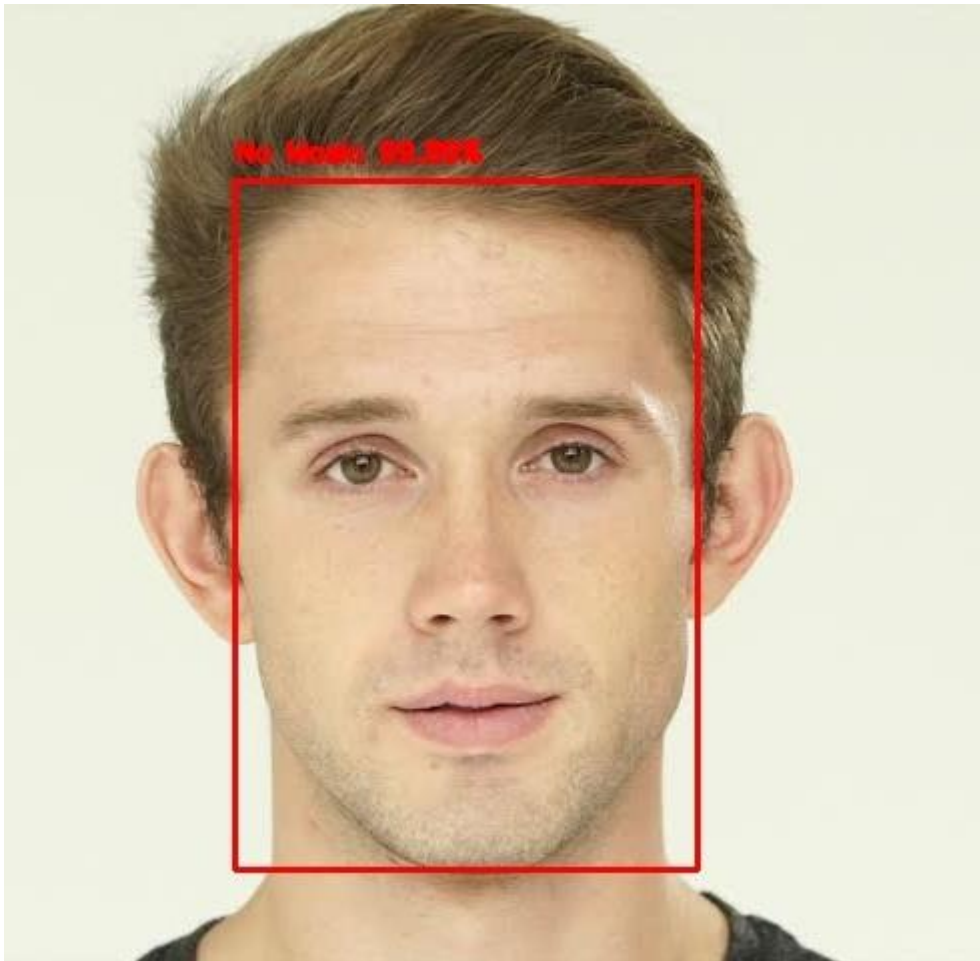
DATA FLOW DIAGRAM
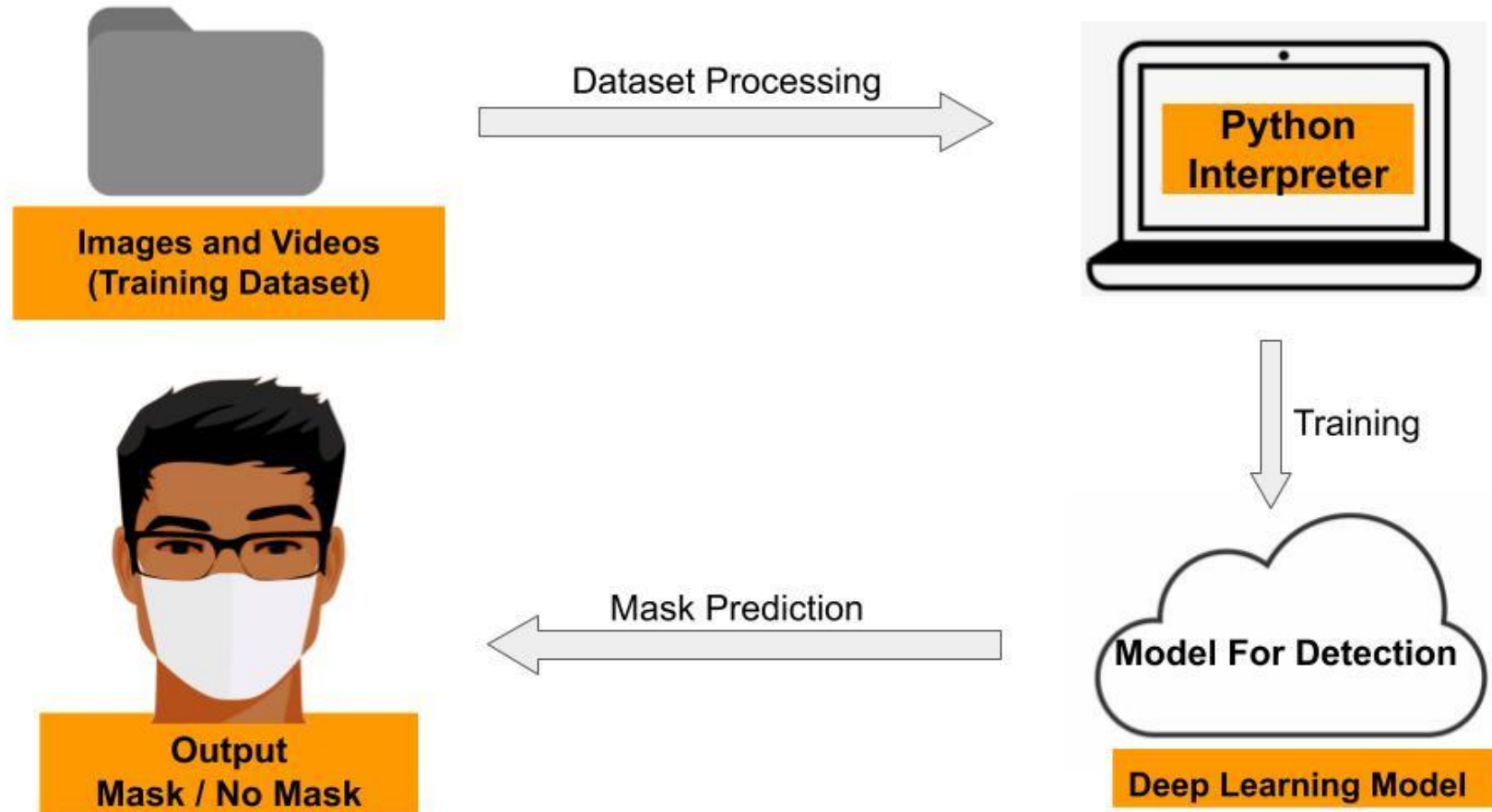
OUTPUT SNAPSHOTS
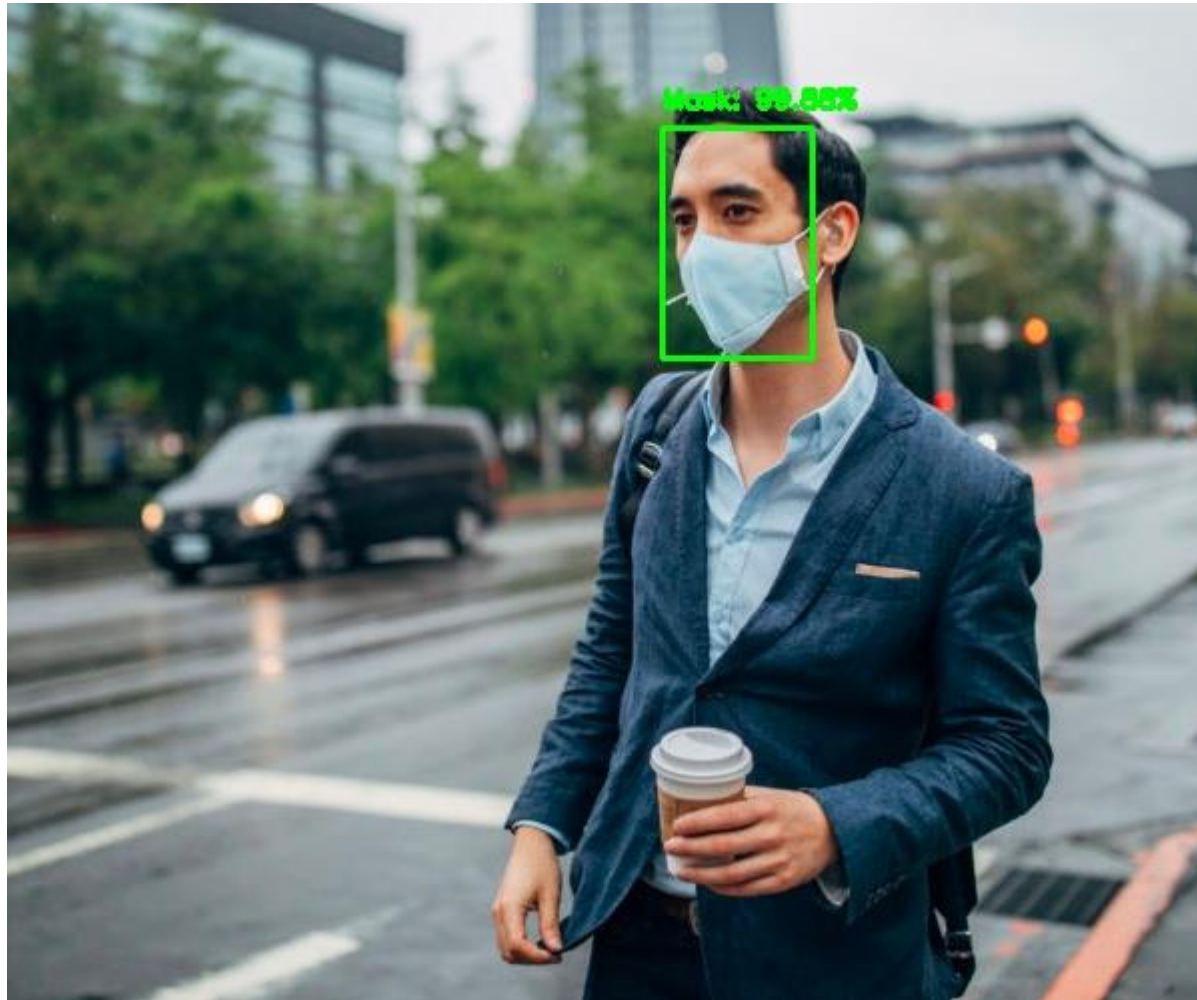
Our model prediction :
Person is wearing MASK

Indication : Green Bounding
Box with label

OUTPUT SNAPSHOTS contd.

Our model prediction : Person is NOT wearing MASK

Indication : Red Bounding Box with label

FUTURE WORK & CONCLUSION

FUTURE WORK

- This project can be further extended in many domains for monitoring the MASK at Public Places.

- Right now Police are using drones to monitor Social Distancing. We can integrate this project with that. And by drone we can detect the Mask Violation.

- The project can be used at companies/colleges/schools during attendance or at entrance. CCTV cameras will monitor the people coming in/going out. And whenever a person without a mask is detected : Siren or Buzzer is blown to warn the concerned person.

CONCLUSION

- Finally, we conclude that this project is very useful in today's scenario. And proper implementation of this system will help our nation to decrease the spread of Coronavirus. This Artificial Intelligence system will help to monitor violations of MASK at open/closed environments.

Thank You