FACE MASK DETECTION USING DEEP CONVOLUTIONAL NEURAL NETWORK

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AGENDA

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- Limitations of Existing System
- Proposed System
- Advantages
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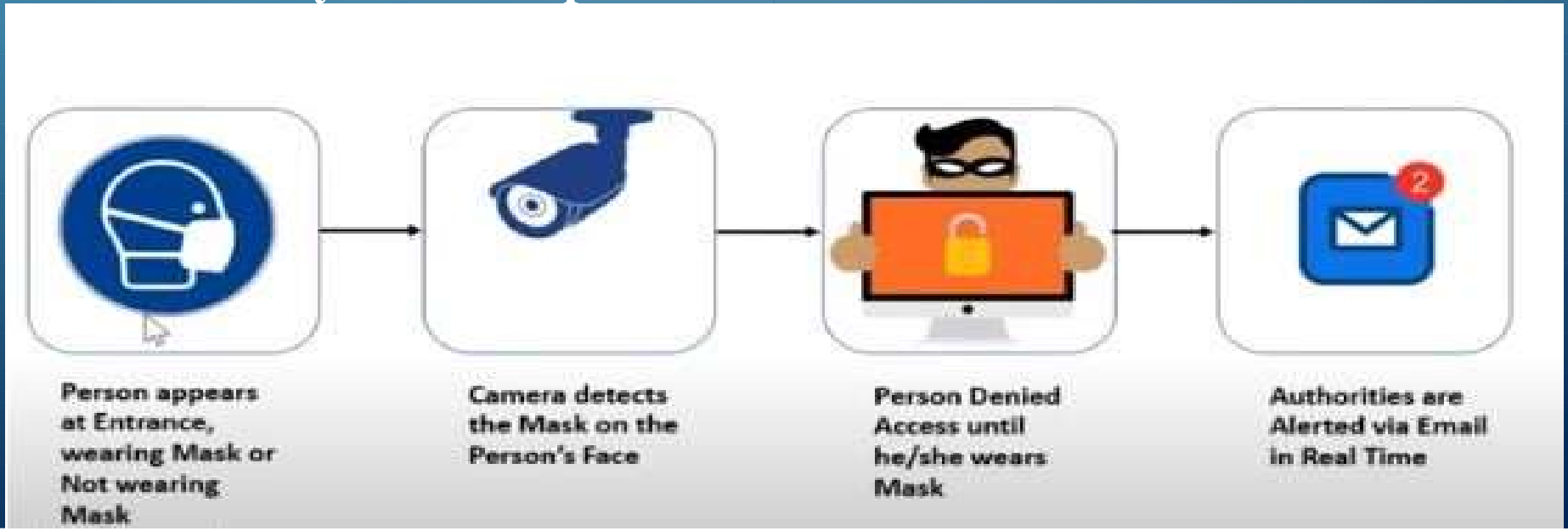
ABSTRACT

- Tensor Flow and OpenCV to detect face masks on people.
- A bounding box drawn over the face of the person describes weather the person is wearing a mask (Green Color)/ not(Red Color).
- Detects the name of the person who is not wearing face mask and a SMS will be sent to that person, warning them that they are not wearing a mask so that they can take precautions.



INTRODUCTION

- Wearing face masks in public is rising due to the pandemic of corona virus epidemic all over the world.
- People used to wear masks to protect their health.
- Detecting facemask based on computer vision and deep learning techniques
- We use OpenCV, Tensor flow and Keras for implementation.
- Achieve the highest accuracy and consume the least time in the process of training and detection.

EXISTING SYSTEM

- No computerization to identify the people wearing mask or not.
- Individuals need to check physically.
- Difficult process.
- Accuracy is less.
- Consumes more time.

LIMITATIONS OF EXISTING SYSTEM

- Requires lot of manual work.
- Can't able to reveal all people.
- Humans need to work 24/7.

PROPOSED SYSTEM

- Identify the person on image/video stream wearing face mask.
- Using Computer vision and deep learning algorithm
- Using OpenCV, Tensor flow, Keras and numpy.
- Three-stage CNN architecture.
    i. First stage detects human faces,
    ii. Second stages uses classify the faces with Mask or No Mask
    iii. Alert message sent to the person without mask

ADVANTAGES

- Intelligent Alerts.
- Facial Recognition.
- Easy Implementation.
- Staff Friendly.
- No New Hardware Needed.

SYSTEM REQUIREMENTS

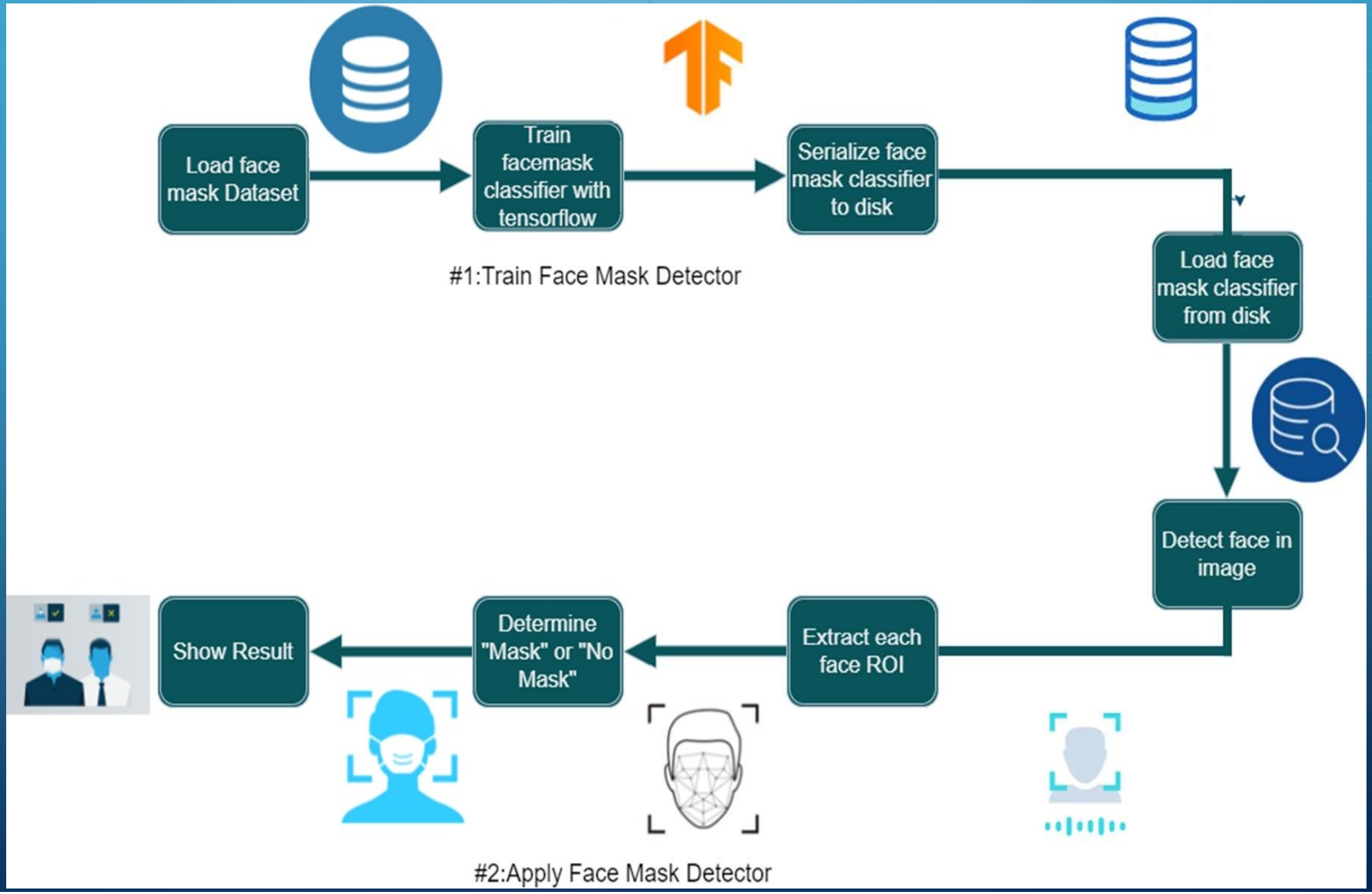
HARDWARE REQUIREMENTS

- **Intel i3 processor**
- **4GB RAM DDR4**
- **500GB Hard disk**
- **Nvidia 210 GPU**
- **Camera**

SOFTWARE REQUIREMENTS

- Tensorflow
- Keras
- OpenCV-python
- Numpy

SYSTEM ARCHITECTURE



MODULES

i. Collection of dataset

ii. Data pre-processing

iii. Training up of Convolution Neural Network Algorithm CNN

iv. Detection of face mask

v. Processing the output with high accuracy.

COLLECTION OF DATASET

- This experiments on two different datasets:
- The images were collected from the website as github. The images were taken as with and without wearing face masks.
- The final version of our dataset included images labeled as with mask and without mask. The second dataset used in our experiments was taken and some from random sources. This dataset contains 4436 images belonging to two classes (i.e., with mask and without mask).

DATA PREPROCESSING

Preprocessing steps as mentioned below was applied to all the raw input images to convert them into clean versions, which could be fed to a neural network machine learning model.

1. Resizing the input image (256 x 256)
2. Applying the color filtering (RGB) over the 3 channel image
3. Scaling / Normalizing images using the standard mean of Python build in weights.
4. Center cropping the image with the pixel value of 224x224x3
5. Finally Converting them into tensors (Similar to NumPy array)

TRAINING UP OF CNN ALGORITHM

- A Convolutional neural network(CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data.
- CNNs are powerful image processing, that use deep learning to perform both generative and descriptive tasks, often using machine vision that includes image and video recognition, along with recommender systems and natural language processing(NLP).

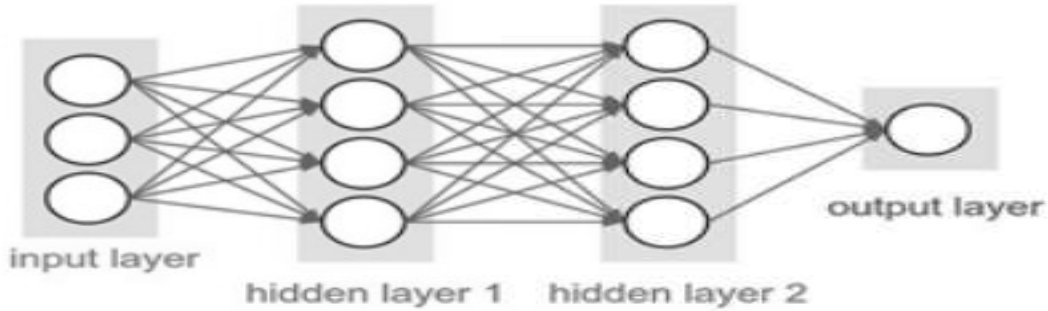


Fig 3.2: Convolutional network

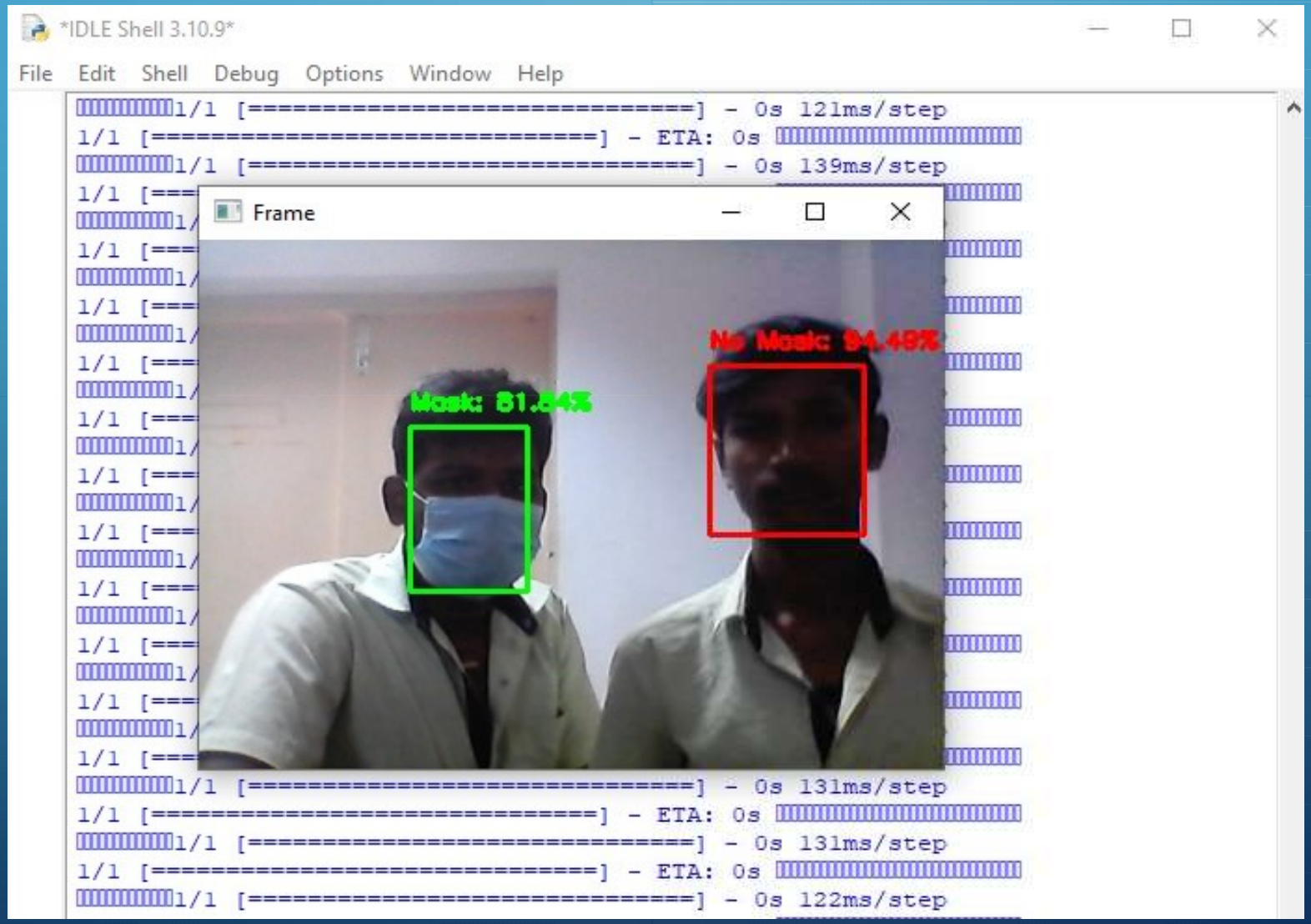
DETECTION OF FACE MASK

- The flow to identify the person in the webcam wearing the face mask or not.
- The process is two fold.
    i. To identify the faces in the webcam.
    ii. Classify the faces based on the mask.
- Identify the face in the Opencv by pre-trained model.

PROCESSING THE OUTPUT WITH HIGH ACCURACY.

- The face is captured, detected and the model predicts the output
- Providing us bounding boxes around the region showing us whether the person is wearing mask or not
- High accuracy by using CNN

RESULT


IDLE Shell 3.10.9
File Edit Shell Debug Options Window Help
1/1 [==============================] - 0s 121ms/step
1/1 [==============================] - ETA: 0s
1/1 [==============================] - 0s 139ms/step
Frame
Mask: 81.84%
No Mask: 94.49%
1/1 [==============================] - 0s 131ms/step
1/1 [==============================] - ETA: 0s
1/1 [==============================] - 0s 131ms/step
1/1 [==============================] - ETA: 0s
1/1 [==============================] - 0s 122ms/step

CONCLUSION

- In this project, a machine learning model is created for face mask detection using Python, Keras, and OpenCV. We developed the face mask detector model for detecting whether if the person is wearing a mask or not.
- We trained the model using Keras with network architecture.
- Training the model was the first half of our project and testing it using the webcam using OpenCV the second half. This system can therefore be used in real-time applications and places where required face mask detection for safety purposes due to outbreak of covid-19.

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THANK YOU