FACIAL MASK DETECTION USING-MACHINE LEARNING

OM RASTOGI
B. TECH (CSE)
GALGOTIAS UNIVERSITY
UTTAR PARADESH, INDIA
rastogiom28@gmail.com

AMAN SRIVASTAVA
B. TECH (CSE)
GALGOTIAS UNIVERSITY
UTTAR PARADESH, INDIA
Amansrivastava181@gmail.com

ABSTRACT- The development of the computer vision systems has focused a lot on efficient and precise object detection. In order to achieve high accuracy and real-time performance , the project aim to incorporate cutting-edge object detection techniques. In this project, we take an end-to-end approach to solving the object detection problem that is entirely based on deep learning. The most difficult publicly accessible dataset (PASCAL VOC), on which an annual project detection challenge is conducted, is used to train the network. The resulting system helps applications that need object detection because it is quick and precise. Identification of people based on the distinctive features of their face is known as face(or facial) recognition. The fastest and least intrusive biometric technology is face recognition. This undertaking. The goal of the project "FACE MASK DETECTION USING MACHINE LEARNING" is to develop a tool that can recognise an image of a person and determine whether or not that person is wearing a mask. Wearing a face mask is essential for your safety due to COVID. Face mask have become a crucial part od our daily lives as the country begins to go through various stages of reopening in order to stay safe. Face mask must be worn in order to interact with others or conduct business. Therefore, this application uses a camera to determine whether or not someone is wearing a mask.

KEYWORDS:- Computer Vision, Neural Network, Deep Learning, Machine Learning, Open CV.

1. INTRODUCTION-

This work involves developing software for real time crowd behaviour analysis, object detection, and face recognition. This work's initial implementation is service oriented. The analysis and design, however are carried out to highlight the work's product based nature. Realtime based surveillance system is the title of the project. Before a decade there were numerous issues with computer vision that were saturating its accuracy. However the accuracy of these significantly increased with the development of deep learning techniques. Image classification which is defined as determining the class of the image was one of the main issue. Image localization presents a slightly challenging problem

where the system must predict the location class for a single object in the image.

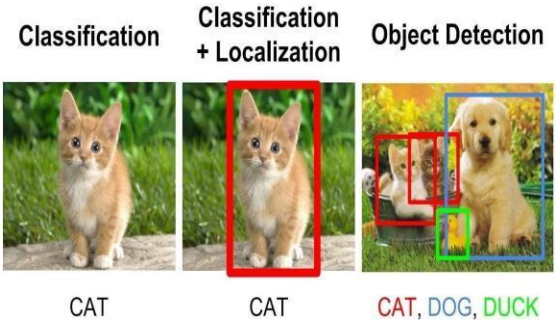


Fig. 1.1 Computer vision task

2. LITERATURE REVIEW-

Gaurav Prajapati, Savan Patel, Hinal Shah, Payal Panchal, Jitendra Nasriwala International journal for research in emerging science and technology, volume2, issue1, January 2015,"A review on object detection and tracking methods". The methodologies used in this paper are background subtraction technique pattern matching the background method produces inaccurate results because it detects objectas amid noise. When there are any obstructions in front of the object, a problem arises during object identification. An object in an image cannot be recognized of the camera is not correct position or is not properly captured.

- **ANALYSIS-** According to several literature reviews, there are four fundamentals steps that must be taken in order to implement this project.
  - Preprocessing
  - Face Recognition
  - Facial Feature extraction
  - Bounding-box formation and Mask recognition & Mask detection

2.1- PREPROCESSING- Preprocessing is the lowest level of abstract for image operations, input and output are intensity images. The primary goal of preprocessing is to lower the amount of noise in the image that will be processed. The pixel brightness in charged after the image is cinverted to grayscale.

2.2- FACE RECOGNITION- it is the technology used to count the faces in the live video feed. To find a path where the mask is to be worn, a face detection is required.

2.3-FACIAL FEATURE EXTRACT- It will compare to the face of the person who is not hiding. These characteristics will make it easier to identify a mask wearing person.

2.4- BOUND BOXING- The face area will be identified by a bounding box, which will create a box shape around it. Based on mask's detection this box will either be red or green in color.

2.5- MASK RECOGNITION- If a person is wearing a mask, a bounding box will form that is green and if they are not a box form that is red. This will show whether or not someone is hiding their identity.

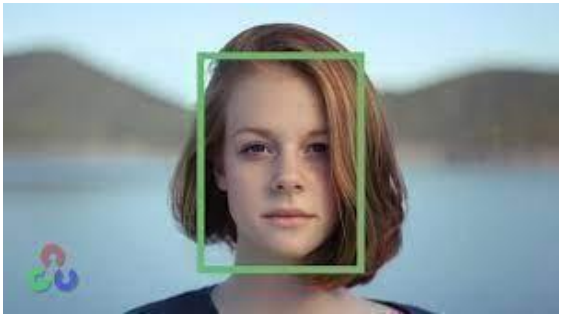


Fig. 2.5.1 MASK RECOGNITION.

3. SOFTWARE REQUIREMENTRS-

- Python (3.7)
- Tensor flow
- Keras
- OpenCV
- Microsoft Visual Studio

3.1- HARDWARE INTERFACE-

1. **Processor:** Intel CORE i5 processor with minimum 2.9 GHz speed.
2. **RAM:** Minimum 4 GD
3. **Hard Disk:** Minimum 500 GB

3.2- SOFTWARE INTERFACES-

1. Microsoft Visual Studio
2. Database Storage: Microsoft Excel 3.
3. Operating System: Windows 10 or 11.

3.3- FEASIBILITY ANALYSIS-

1. **Model Performance:** Our model uses various efficient algorithm and is aimed to produce efficient results.
2. **Technological Considerations:** The analysis will be performed on a large dataset and only reliable sources are taken into consideration.
3. **Resource Feasibility:** The model is primarily dependent on large datasets. So, having large resources will maximize the effective results.

4. METHODOLOGY-

In this paper we present a clever framework for facemasks detection. As the number of cases of COVIG-19 declines more and more workplaces with half or all employees open. Even educational institutions are expected to open. This system can be installed at the entrances of business, educational institutions and public and private offices to screen out people who are not wearing masks. The system will generate a bounding box around a person's face if it detects that they are not wearing a mask.

5. PROPOSED WORK-

- **OBJECT DETECTION-** Numerous efforts have been made to detect objects using conventional computer vision technologies. They are not as accurate as deep learning based methods through two broad categories of methods two stage detection (RCNN, FAST RCNN, FASTER RCNN) and unified detection represents the majority of deep learning based techniques.

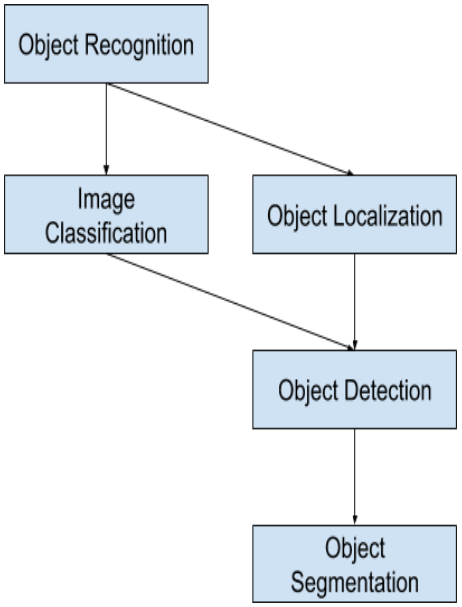


Fig. 5.1Block diagram of object detection.

5.1 BOUNDING BOX-

The face area will be identified by a bounding box, which will create a box shape around it. Based on mask's detection this box will either be red or green in color.

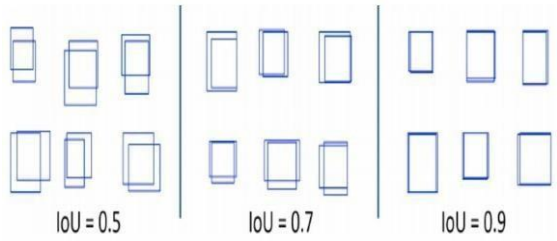
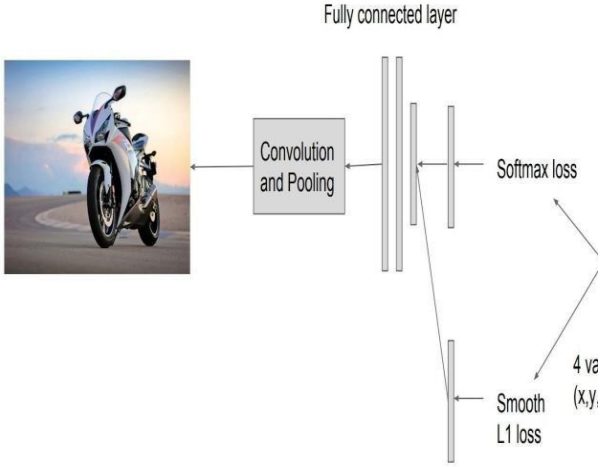


Fig.5.2 Jaccard Distance

5.3 CLASSIFICATION+REGRESSION-

Regression is used to predict the bounding box and classification is used to predict the class that resides inside the bounding box. Fig. depicts the architecture's overall layout.



5.3 Architecture Overview

6. LIMITATIONS AND FUTURE SCOPES-

The main issue with this problem is the variable output dimensions which is brought on by the potential presence of a variety of objects in any given input image.

I. The model cannot give accurate detection in heavy rain conditions another natural calamities.
II. Another important obstacle is failure in the detection od occluded objects. It ignores the occluded objects a compile objects.
III. The more complex the model is the more time it require for interference and the less complex the model is less is the accuracy.
IV. Other common challenge is dtata and equipments are susceptible to the same security challenges that threaten other areas of IT system.

7. CONCLUSION-

In order to stop the Coronavirus from spreading throughout the community, a deep learning based method for spotting masks over faces in public spaces is represented in the work. The suggested method employs an ensemble of single and two stage detectors at the pre-processing level to handle occlusion in dense environment effectively. The ensemble approach significantly increase detection speed while also assisting in achieving high accuracy. Additional a highly reliable and affordable system was produces by applying transfer learning to pre trained models along with extensive experiments on an unbiased dataset. The system utility for the benefit of the public is increased by the identity detection of faces that further violated the mask norms finally the research opens up exciting new avenues for study. First off the suggested method can be incorporated.

8. REFERENCES-

1. Ms. Payal Panchal, Mr. Gaurav Prajapati,Savan, Mr. Patel,Hinal Shah and Mr. Jitendra Nasriwala "A Review on Object Detection And Tracking Methods" International Journal for

Research in Emerging Science and Technology, Volume 2, Issue 1, January 2015

2. Pawan Kumar Mishra, G.P. Saroha. A Study on Video Surveillance System for Object Detection and Tracking. 2016 3rd International Conference on "Computing for Sustainable Global Development".

3. Pawan Kumar Mishra, G.P. Saroha. A Study on Video Surveillance System for Object Detection and Tracking. 2016 3rd International Conference on "Computing for Sustainable Global Development".

4. Joseph Redmon, Santosh Divvala, Ross Girshick, and Ali Farhadi. You only look once: Unified, real-time object detection. In the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2016.

5. Md.Anwar Hossain and Md.Shahriar Alam Sajib. "Classification of Image using CNN". Volume 19 Issue 2 Version 1.0 Year 2019

6. Baohua Qiang, Ruidon Chen : "CNN based Object detection algorithm by Joining Semantic Segmentation for Images.

7. V. Varshney, "CNNs: The Key to Computer Vision," Data Driven Investor, 14 February 2020. [Online]. Available: https://medium.datadriveninvestor.com/cnns-the-key-tocomputer-vision-29c6fe1c6fdc.

8. V. Gupta and S. Mallick, "Face Recognition: An Introduction," Learn OpenCV, 16 April 2019. [Online]. Available: https://learnopencv.com/face-recognition-an-introduction-forbeginners/.

9. A. Othman, "What Is A Biometric System, and How To Secure It," Veridium, 19 July 2018. [Online]. Available: https://www.veridiumid.com/biometric-system-secure/.

10. S. Patnaik, "Face mask detector," 2021. [Online]. Available: https://www.kaggle.com/spandanpatnaik09/face-mask-detectormask-not-mask-incorrectmask.