Vehicle vacant seat identification and mask detection using image processing

Mr. Shubham Ingole[1], Dr. P.D. Gawande[2], Dr. P.R. Gumble[3]
[1]*M.E. (Digital Electronics) Department of Electronics and Telecommunication, Sipna C.O.E.T., Maharashtra, India*
[2]*Associate Professor, Department of Electronics and Telecommunication, Sipna C.O.E.T., Maharashtra, India*
[3]*Associate Professor, Department of Electronics and Telecommunication, Sipna C.O.E.T., Maharashtra, India*

Abstract **- This article describes the technique of real-time face detection, mask detection, and vacant seat available in the vehicle. There are so many technologies for finding seat availability in the vehicle. But image processing technology is very popular today. Face detection is part of image processing. It is used to find the face of a human being in a certain area. Face detection is used in many applications, such as facial recognition, people tracking or photography. In this paper, the face detection technique is used to detect the vacant seat availability in the vehicle and also to detect whether the passenger wear the mask on his face or not. The webcam is installed in the vehicle and connected with the Raspberry Pi 3 model B. When the vehicle leaves the station, the webcam will capture images of the passengers in the seating area. The webcam will be mounted on the vehicle. The images will be adjusted and enhanced to reduce noise made by the software application. The system obtains the maximum number of passengers in the vehicle that processes the images and then calculates the availability of seats in the vehicle. In covid-19 situation mask detection is necessary. so this system also used to detect the mask on face.**

Index Terms **- Python OpenCV, webcam, Raspberry pi 3, USB connecting wires, face detection etc.**

INTRODUCTION

These days, many people utilize open vehicle rather than individual auto because of the ascending of fuel costs and car influxes. Open organization has been building up the framework for showing the situation of the passenger vehicle for accommodation of clients. Nonetheless, those frameworks just demonstrate the situation of the vehicle however not demonstrate the accessibility of seats in the vehicle. Clients will squander a period for holding up the following passenger vehicle and can't deal with the time travel or exercises accurately. On the off chance that clients know both of the situation of the passenger vehicle and opportunity of seats, clients can utilize the opportunity to different exercises previously the passenger vehicle arrives. Clients can design their movement better. In this examination, the seat opening ID framework is planned by utilizing picture handling strategy. Webcam is associated with Raspberry Pi 3 in the vehicle for distinguishing the question on vehicle and sending the information to the server by means of 3G correspondence. This framework utilizes Open-Source Computer Vision (OpenCV) to break down and process the information at that point figured the opportunity of the vehicle by utilizing the most extreme face discovery information. The programming part is divided in two frames which is 1A and 1B. In which output is generated on the command. The face is detected by webcam and transfer to this image through the server.

Implementation: The captured video is serialized, and then a frame-by-frame analysis of the video is done. The face detection and head shoulder detection algorithms are used to detect human presence in a seat. Image overlaying methodology is then used to classify the seats. If a human presence is detected, then the vacant seat count is not disturbed otherwise the count is incremented accordingly as shown in fig. (1).

This paper proposes the Ada boost algorithm to detect the human faces automatically and helps in effective facial feature detection. Ada boost is sensitive to noisy data and outliers. The challenges mainly lie in efficient

hardware architecture design, since most published vision algorithms do not take into consideration hardware characteristics and parallel processing. Thereby, Ada boost is commonly used in conjunction with other tracking algorithms to improve their performance. Cam shift is based on the colour, as because the RGB is sensitive to light intensity changes, in order to reduce the effect of intensity of light changes, Cam shift converse the colour space of the image from RGB to HSV. Cam shift can be divided into three parts reverse projection calculation, Mean shift, Cam shift implementation.

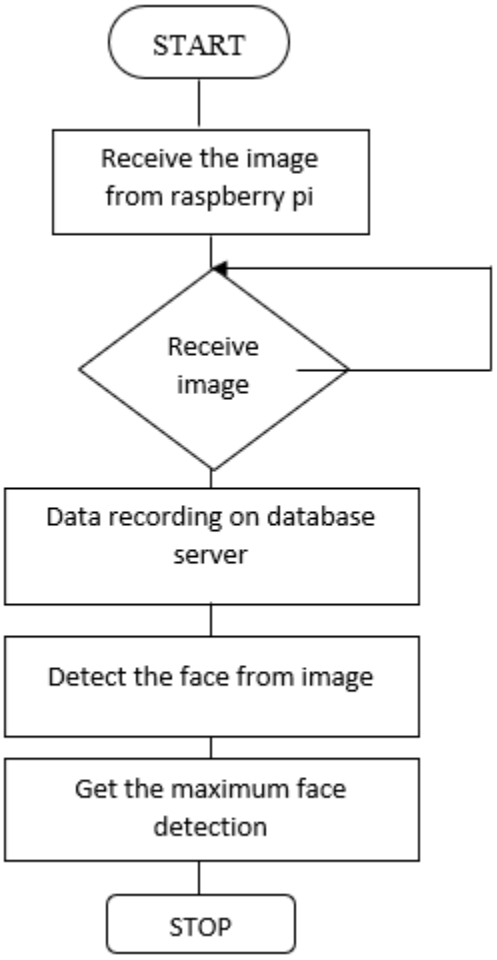


Fig. (1) face detection algorithm

The Cam shift algorithm is capable of real-time tracking of objects, not affected by noise, has good robustness and real-time performance is also good. But there are some weaknesses: Trace window must be manually selected, if the face is not appropriate, it will directly affect the results obtained, and may even lead to failures. Therefore, the combination of Ada boost face detection algorithm with the Cam shift is used to automatically detect the human faces in the video sequence, and then according to the probability distribution of color, effective human detection is achieved with Cam shift technique.

Adaptive head shoulder tracking algorithm

In order to track the trajectory of the head, this paper presents Ada boost to detect the human faces first and then uses Cam shift technique for the human tracking. Combination of these two techniques ensures accuracy, speed and can effectively overcome the occlusion as well as interference of skin colour.

Initially, the video is captured and serial to obtain individual frames. Then, detect the human faces, from the first frame, Ada boost may take the results as: (i) Detect multiple faces; (ii) detect the fault target (non-face).

Detection of the human presence

Ada boost is used to detect the target area through the three fitting functions to model the human body. First obtain the minimum vertical rectangle of the body and extract the human body from the rectangular area, we define the height of the rectangle as h; we use the horizontal line h to capture the body contour from the highest point of the body. As there are a group of people sitting in the hall, we adopt the approach which is based on the contour feature to locate the human head, since the human head is shown as an oval contour. There exists a certain ratio between the human head and shoulder in physical.

Detection of mask on human face

The rapid worldwide spread of Coronavirus Disease 2019 (COVID-19) has resulted in a global pandemic. Correct facemask wearing is valuable for infectious disease control, but the effectiveness of facemasks has been diminished, mostly due to improper wearing. However, there have not been any published reports on the automatic identification of facemask-wearing conditions. In this study, we develop a new facemask-wearing condition identification method by combining image super-resolution and classification networks (SRC Net), which quantifies a three-category classification problem based on unconstrained 2D facial images. The proposed algorithm contains four main steps: Image pre-processing, facial detection and cropping, image super-resolution, and facemask-

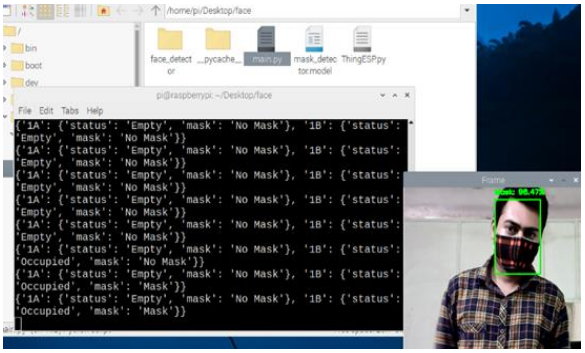
wearing condition identification. Our method was trained and evaluated on the public dataset Medical Masks Dataset containing 3835 images with 671 images of no facemask-wearing, 134 images of incorrect facemask-wearing, and 3030 images of correct facemask-wearing.

RESULT

For real-time detection python code were used. The image is capture through the webcam and passes message to the server via raspberry pi. There are two frames which used their that is 1A and 1B.

The webcam and ethernet cable connected to the raspberry pi. Raspberry pi takes 3-4 sec. delay for processing the output.

This system detect number of passengers present in the vehicle who are mask. And also detect the availability of seat in the vehicle in real-time.



{‘1A’: {‘status’: ‘Empty’, ‘mask’: ‘No mask’}, ‘1B’: { ‘status’ : ‘Occupied’ , ‘mask’ : ‘mask’}}

‘Status’ is used for whether the seat is empty or occupied and ‘mask’ is used for checking the passenger present in the vehicle that perfectly masked or not.

The webcam is detected by the images in real-time. The status can see on WhatsApp by using a number +1415 523-8886. The sandbox for WhatsApp allows you to test and prototype messaging via WhatsApp using the Twilio API.

CONCLUSION

From the available result it is concluded that this image processing technique is capable of identifying vacant seat and also for detection of mask on the face of the passangers. With the advancement the real time face detection in remote monitoring is help for building much efficient application. Real-time information on reservations and seat occupancy, Various sensor and display technologies tailored to individual requirements, fully modular and scalable solutions, Integration in existing Ethernet infrastructure, Integration of data from third party systems etc. The future scope of this is to improve the database of public where the large public database is available.

REFERENCES

[1] Cyrel O. Manlises, Jesus M. Martinez Jr., Jackson L.Belenzo, Czarleine K. Perez, and Maria KhrsStina Theresa A. Postrero, “Real-Time Integrated CCTV Using Face and Pedestrian Detection Image Processing Algorithm for Automatic Traffic Light Transitions”, School of Electrical, Electronics and Computer Engineering, Mapua Institute of Technology, 2015

[2] Himanshu Sharma, Sumeet Saurav, Sanjay Singh, Anil K Saini, and Ravi Saini, “Analysing Impact

of Image Scaling Algorithms on Viola- Jones Face Detection Framework", Advanced Electronics System, Academy of Scientific and Industrial Research, CSIR-Central Electronics Research Institute, 2015

[3] Gun-Chun luh, "face detection using combination of skin colour pixel detection and viola-jones face detection", Department of Mechanical Engineering, Tatung University, 2014

[4] Paul Viola, and Michael Jones, "Rapid Object Detection using a Boosted Cascade of Simple Features", Mitsubishi Electric Research Labs, Compaq Cambridge Research Lab, 2001

[5] Detection by Evaluating Speculated Mass for Computer-aided Diagnosis in Hospital Patients", Faculty of Informatics, Buraphas University, 2015

[6] K. Sreedhar, and B. Panalal, "enhancement of image using morphological transformation", International Journal of Computer Science & Information Technology (IJCSIT), Vol 4, No 1, pp.33-50, Feb 2012

[7] Paul Viola, and Michael Jones, "Rapid Object Detection using a Boosted Cascade of Simple Features", Mitsubishi Electric Research Labs, Compaq Cambridge Research Lab, 2001

[8] Vehicle Control Using Raspberry pi2 and Image Processing Rohit Tiwari, Dushyant Kumar Singh Lovely Professional University, Punjab.

[9] Vehicle seat identification in image processing Sumit R. Wange, Department of electronics and telecommunication engineering, (IRJET), Oct 2018

[10] Raspberry Pi Based Security System for Automotive Theft Detection by Shejina v Asil a International Journal of Science and Research

[11] Moghaddam B. and Yang M.-H., "Gender classification with support vector machines", in IEEE Proceedings on Automatic Face and Gesture Recognition, page. 306-311, March 2000.

[12] Implementation of Attendance Management System using SMART-FR G.Lakshmi Priya, M.Pandimadevi, G.Ramu Priya, P.Ramya Assistant Professor, Department of ECE, Sethu Institute of Technology, Virudhunagar, India.