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A Review on Real Time Integrated CCTV System Using Face Detection for Vehicle Seat Vacancy Identification with Image Processing Technique

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***Abstract*—-** We are describes the technique for real time human face detection and counting the number of passengers in vehicle and also gender of the passengers.The Image processing technology is very popular,now at present all are going to use it for various purpose. It can be applied to various applications for detecting and processing the digital images. Face detection is a part of image processing. It is used for finding the face of human in a given area. Face detection is used in many applications such as face recognition, people tracking, or photography. In this paper,The webcam is installed in public vehicle and connected with Raspberry Pi model. We use face detection technique for detecting and counting the number of passengers in public vehicle via webcam with the help of image processing and Raspberry Pi.

Keywords- *Raspberry Pi, Face detection, Haar classifier, Morphological image processing, Contrast limited adaptive histogram equalization*.

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I. INTRODUCTION

In day to day life most people use public vehicle instead of personal car due to the rising of gasoline prices and traffic jams. Public company has been developing the system for displaying the position of the passenger vehicle for convenience of customers. However, those systems only indicate the position of the vehicle but not show the availability of seats in the vehicle. Customers will waste a time for waiting the next passenger vehicle and cannot manage the time travel or activities correctly. If customers know both of the position of the passenger vehicle and vacancy of seats, customers can use the time to other activities before the passenger vehicle arrives. Customers can plan their travel better. In this research, the seat vacancy identification system is designed by using image processing technique. Webcam is connected with Raspberry Pi in the vehicle for detecting the object in vehicle and sending the data to the server via communication system. This system use Open Source Computer Vision (OpenCV) to analyze and process the data then calculated the vacancy of the vehicle by using the maximum face detection data.

II. LITERATURE SURVEY

Literature review is carried out to gain knowledge and skill to understand this topic thoroughly. The main source for this paper is the previous publications related to this topic. And other sources are journals and articles. Therefore the analysis of the topic did by other researchers; there is possibility to know the deficiencies in their research work.[1] proposed "Analyzing Impact of Image Scaling Algorithms on Viola – Jones Face Detection Framework", this research studies the Viola – Jones algorithm about the problem from low quality of the image and find the optimize solution from Viola – Jones algorithm. The system uses two methods to scaled image that are window scaling and image scaling. The image scaling has 5 techniques that is Nearest Neighbor, Bi-Linear, Bi-Cubic, Extended Linear, and Piece-Wise Extended Linear. The system uses 5 difference face database for comparing the performance of 5 different image scaling techniques. The system was developed by using C++, Visual studio 2010, and Open Source Computer Vision (OpenCV). They used confusion matrix that compose of True Positive, False Positive, and False Negative to evaluate the performance of each technique. From the result, they found that the analysis in format of the window scaling is better than image scaling.[2]"FACE DETECTION USING COMBINATION OF SKIN COLOR PIXEL DETECTION AND VIOLA-JONES FACE DETECTOR", this research studies the detection of the human skin. It uses a combination of two techniques that are a novel hybrid color models and Viola – Jones algorithms. Its purpose is to identify the object is human or not. The system is designed in MATLAB and use ECU face and skin database to evaluate the accuracy. From the result, this method has high performance more than another. When use this method with Viola – Jones face detector, it will be

more efficient. [3] Haar-like features are a popular technique for detecting the face of human in the present. They are a method that has fast processing and high accuracy. The method is proposed by Paul Viola and Michael Jones in 2001. [4] Algorithms of Haar-like features are separating the image from input image to the sub window and scanning for detecting the face. They use integral image technique for finding the summation of the pixel inside the image and then use the detector that can change the size and the position for finding the difference of white and black areas. When finish from integral image process, the next step is calling Adaptive Boosting or AdaBoost. Vacant seat detection system aims at detecting the presence of vacant seats in a crowded hall [1]. Individual frames obtained from the captured video are analysed to detect human presence, this data is used to find the number of vacant seats in the hall. In this paper, the AdaBoost [2] a boosting algorithm is used to detect the human faces automatically [3], and then the extracted human face is subjected to the Cam shift algorithm [4]. It avoids the subjectivity of the artificial selected objects, combines the merits of the two algorithms and forms an efficient and accurate vacant seat detection algorithm. Using the AdaBoost algorithm the background of the image is separated. The face detection is performed to check for human presence in a seat. The Cam shift algorithm performs RGB to HSV conversion, followed by the head shoulder detection to give the ratio between head and shoulder. The range of the head shoulder ratio obtained is used to confirm human presence in the seat [5]. This paper gives us extended form of the algorithm and uses them for detecting human presence using the mentioned techniques. The extension helps in identifying if any of the seats with in a particular place is vacant or occupied and thus the number of vacant seats in that place could be easily identified [6]. It enhances the speed of organization of people in a place and reduces the unwanted waiting time. The system is used to indicate the number of seats occupied in a hall quickly. It efficiently detects the number of empty seats there by enabling the people outside the hall to know the number of vacant seats available. Thus the system plays a vital role in crowd monitoring and management [7]. Detecting face is an essential step and usually the first one in various computer vision and biometric applications such as face recognition, criminal investigations, security access systems, video surveillance, and intelligent human computer interaction. Numerous researches were performed in the field of face detection and generally can be classified into four categories: feature invariant approaches, template matching, knowledge-based and appearance-based methods. Comprehensive surveys on face detection in images can be found in [8- 10]. Among feature-based face detection methods, skin colour has been used and proven to be an effective feature to increase detection rate [11].

III. PROPOSED WORK

The architecture of the system includes Raspberry Pi 3, Web camera, Vehicle, Face detection module. The Block Diagram of this Vehicle Seat Vacancy Identification System is as Follows.

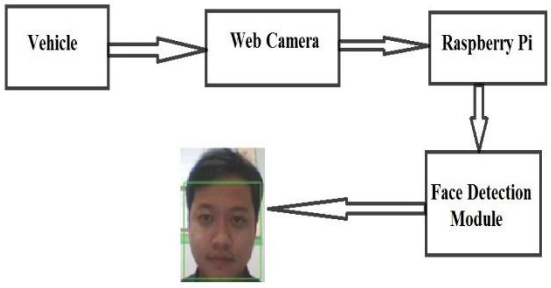

Fig: Proposed System Structure

A. Hardware Description

1) Raspberry-Pi 3: The Raspberry Pi is nothing but a series of small single-board computers developed by Raspberry Pi Foundation of United Kingdom to provide low cost solution for teaching of basic computer science in schools and in developing countries. The processor used in Raspberry Pi 3is a Broadcom BCM2837 SoC with a 1.6 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB L2 cache. It has potentially fast enough to decode H.265-encoded videos in software. The GPU in the Raspberry Pi 3 runs at higher clock frequencies of 300 MHz or 400 MHz than previous versions which run at 250 MHz The Raspberry Pi primarily uses Raspbian, a Debian-based Linux operating system. Raspberry Pi 3 has the functions over other models of Raspberry Pi such as

Fig. 2: Raspberry Pi 3

2) Web Camera: Input from camera is given to the raspberry pi module via USB cable. For Web camera, we are using high quality wide angle lens. Snapshot button for still image capture is provided. This captured image then will be the main source of data for our system.

3) Detection of the human presence: AdaBoost 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 counting 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.

B. Software Description

1) Open Source Computer Vision (Open CV): Open CV is uses to reduce the noise from the image which is captured by web camera and stored in Raspberry Pi. Open Source Computer Vision (Open CV) is use to analyse and process the data then calculated the vacancy of the electric vehicle by using the maximum face detection data.

2) Haar-like features : A Haar-like feature considers neighboring rectangular regions at a specific location in a detection window sums up the pixel intensities in each region and calculates the difference between these sums. This difference is then used to categorize subsections of an image. An example of this would be the detection of human faces. Commonly, the areas around the eyes are darker than the areas on the cheeks. One example of a Haar-like feature for face detection is therefore a set of two neighbouring rectangular areas above the eye and cheek regions.

IV. WORKING

When the public vehicle leaves from the station, the system will capture the image in the passenger seat area (1image per second) and send to Raspberry Pi module by using communication system, image get stored in the Raspberry Pi module. In this system, the Web camera is used to capture the real time image of the product. Which is the given to the main module. The main module is of raspberry pi which is on its own a mini-computer, which processes the image captured by the camera. Raspberry pi module, which contains the image processing code loaded, optical character recognition technique, is used to process the image. The raspberry pi hardware processes the image internally and counting the number of passengers in vehicle and also calculate the seat vacancy. Webcam will capture passenger's images in the seating area. The images will be adjusted and improved to reduce the noise which is done by software application.

V. CONCLUSION

The System proposed the design of a new concept for managing time in busy lifestyle while waiting for public vehicle. Haar classifier for face detection and recognition is very efficient tool for image processing. Raspberry Pi its worked as an minicomputer and its size also as an credit card type, low cost device with good specification to efficient for human face detection and recognition efficiently. In this paper, we studied human face recognition system that will capable of processing images using Raspberry Pi with various classifiers and algorithm. The system improve quality of images by using contrast limited adaptive histogram equalization and morphological process.

REFERENCES

[1] Paul viola, and michael jones, "rapid object detection using a boosted cascade of simple features", mitsubishi electric research labs, Compaq cambridge research lab, 2001.

[2] M.-H. Yang, d. J. Kriegman, and n. Ahuja, detecting faces in images: a survey, ieee transaction on pattern analysis and machine learning, 24 (1) (2002) 34-58.

[3] R.-l. Hsu, m. Abdel-mottaleb, and a. K. Jain, face detection in color images, ieee transaction on pattern analysis and machine learning, 24 (5) (2002) 696-706.

[4] Damien lefloch, "real-time people counting system using video camera", department of computer science and media technology, gjovik university college, 2007.

[5] z. S. Tabatabaie, r. W. Rahmat, n. I. B. Udzir and e kheirkhah, a hybrid face detection system using combination of appearance-based and feature-based methods, international journal of computer science and network security, 9 (5) (2009) 181-185.

[6] C. Zhang and z. Zhang, a survey of recent advances in face detection, technical report, msr-tr-2010-66, microsoft research, microsoft corporation, june 2010.

[7] K. Sreedhar, and b. Panlal, "enhancement of images using morphological transformations", international journal of computer science & information technology (ijcsit), vol4, no1. feb2012.

[8] Guan-chunluh, "face detection using combination of skin color pixel detection and viola-jones face detector", department of mechanical engineering, tatung university, 2014.

[9] Himanshu sharma, sumeet saurav, sanjay singh, anil k. Saini, and ravi saini, "analyzing impact of image scaling algorithms on viola- jones face detection framework",advanced electronics system,academy of scientific and industrial research, 2015.

[10] Cyrel o. Manlises, jesus m. Martinez jr., Jackson l. Belenzo, czarleine k. Perez, and maria khristina 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.

[11] "breast cancer detection by evaluating spiculated mass for computer-aided diagnosis in hospital patients", faculty of informatics, burapha university, 2015.