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Easy Travel: A Smart Way to Travel in City Bus and Counting Number of Passengers

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***Abstract*— This system counts numbers of travellers through cameras that are settled at an overhead position. The identified head checks are refreshed to the server intermittently. The framework consolidates worldwide situating framework information and standard time to build up the quantity of travellers at each transport stop at various timeframes and ascertains the quantity of travellers to give business-related data. The goal of this paper is to build up an ideal transport task technique. An android application that helps the resident to track a transport and can check the quantity of travellers inside the transport. A red, green and yellow sign is to demonstrate the present status of the transport that helps the travelers to choose in which transport to get into. We have broke down the crowed in the transports in a specific transport course. This examination result helps the administration to move the transports starting with one course then onto the next.**

Keywords*— Head detection, people tracking, Public Bus Transport, Android application, Haar cascade classifier ,LBP classifier

I. INTRODUCTION

There have been a number of people counting systems available that provide greater efficiency and lower prices. According to the number of cameras, the existing passenger counting systems can be roughly classified into four categories: methods based on single cameras, methods based on multiple cameras, methods based on stereo camera, and fusing the depth and color image. Moreover, there are different application environment, such as station, hospital, department store, and vehicle. Obtaining depth image from a stereo camera makes people counting system more tolerant to different challenges. In this paper, an automatic people counting system is proposed. To remove object occlusion, one needs to mount the camera used by the system at an overhead position. The people detection algorithm attempts to identify every head covered by the camera. Bus scheduling is one of the operations planning process in bus Transport Company that deals about the proper assignment of buses to serve the expected passenger demand. The planning process in public transportation consists of shifting buses from one route to another to make the overall system cost efficient.

There have been various individuals checking frameworks accessible that give more noteworthy productivity and lower costs. As per the quantity of cameras, the current traveler checking frameworks can be generally arranged into four classifications: techniques in light of single cameras, strategies in view of numerous cameras, techniques in light of stereo camera, and intertwining the profundity and shading picture. Numerous studies have addressed the problem of people counting [1], [2].

II. RELATED WORK:

This framework plays out the check qualification amongst information and yield of individuals traveling through the regulated region. the counter requires two stages: discovery and following. the recognition depends on discovering individuals' heads through preprocessed picture relationship with a few round examples. following is made through the use of a kalman channel[3] to decide the direction of the applicants. Our imaginative proposition are the utilization of an annular channel bank to rapidly identify heads in the scene and the versatile determination of make a beeline for tackle worldly blunders or impediments by utilizing the evaluations given by the Kalman channel. Their is drawback Not having the capacity to recognize gatherings of individuals.

Reference [5] presents a system based on a support vector machine classifier to perform head detection. To track detected people, they also use a Kalman filter, but there is no feedback from the prediction of the tracking for the head detection. As the authors state, this system has a problem with occlusions that cannot be resolved.

Other authors [4] propose the fundamental thought is to screen the quantity of travelers getting in or out open transportation implies like transports and metros after some time thus figuring dependable estimations keeping in mind the end goal to enhance vehicle's entryway control. The framework here depicted will be introduced tried on an Ivecobus Citelis vehicle in the structure of the Italian Industria 2015 Ecoautobus activity[4]. A stereo vision framework is displayed, it has been created considering its future establishment over transport entryways; a component based individuals numbering calculation and a protest following framework are utilized to forget about individuals getting in or of a particular area of intrigue.

In the current transport benefit applications, travellers can check the transport's present area. On the off chance that the transport is crowed they have to get into the transport in light of the fact that there is no assurance that next transport will be free or not. Indeed, even we are confronting issues like, in a particular transport course the quantity of travellers are more than the quantity of transports working or the other way around.

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In the existing bus service applications, passengers can check the bus's current location. If the bus is crowed they need to get into the bus because there is no guarantee that next bus will be free or not. Even we are facing problems like, in a specific bus route the number of passengers are more than the number of buses functioning or vice versa.

III. ANALYSIS OF SCENARIO AND REQUIREMENTS

In the proposed transport data framework, we are utilizing head check instrument to figure the quantity of travelers inside the transport. For effortlessness, we are expecting that all the transport seats are possessed if our calculation will distinguish any head number, as we will put the camera to recognize the traveler's make a beeline for cover the center section. Each transport has estimated limit with respect to travelers to stand. This limit alongside the transport data is put away in the server. The quantity of head checks distinguished alongside the present area of the transport is refreshed occasionally to the server. The natives who are holding up at the transport stops can utilize an android based application to get the transport data drawing closer towards the transport stop. Clients can even choose a particular transport course and check the accessible transports in that course. To make it helpful for the client, we have utilized 3 shading signs like Red, Yellow and Green in light of the rate of group inside the transport.

Figure 1 shows framework of public bus transportation. We have examined the measurements of the transports working in the city, the course on which they work and the quantity of normal travellers in the middle of 2 back to back stoppage along the way. These records help the administration to move or present transports in a specific course. The key features of this work

- Proper swarm data inside the transport.
- Convenient for the clients holding up in the transport stops.
- Passengers can pick their vehicle relying upon the transports drawing closer.
- Proper usage of the transports.
- Cost Efficient
- You can check the less swarmed transport and their area.

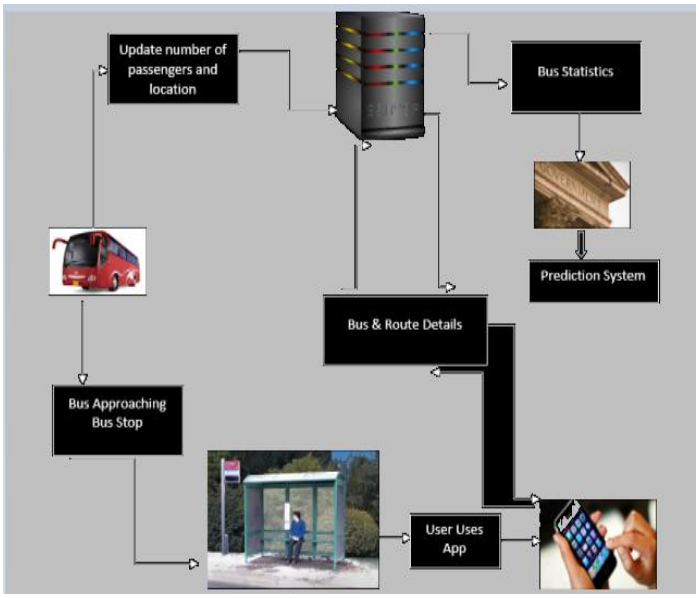

Figure1.Framework of public bus transportation system.

A. Flow Chart

A output text appears here is an system is an interaction diagram that shows how process operates with one and other and in what order. It's a construct of a message flow chart. Its depicts the objects and classes involved in the scenario and sequence of messages exchange between the objects needed to carry out the functionality of the scenario.

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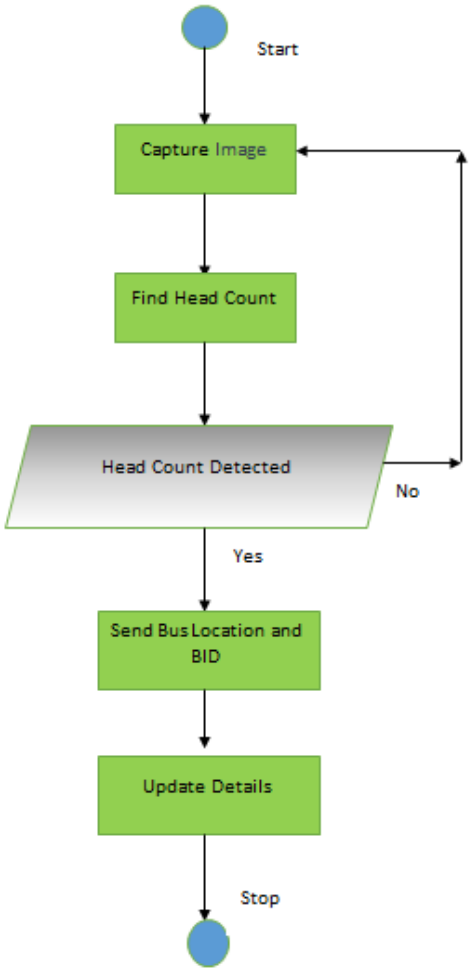

Figure2 : the flow cahrt diagram

Focal length, sensor image size, and camera height configure the supervised area. To cover larger zones, the scalability of the system should be possible.The source video was captured by webcams at a frame rate of 30 frames/s, with a resolution of 320 × 240 pixels. We implemented our algorithm in java and android studio using the OpenCV library and developed the people counting system process for two cameras on a notebook computer with a 2.5 GHz CPU. the monocamera system captures 60–120 images of a person, which should be enough to perform a robust people tracking. The algorithm has been executed on a Any Processor over 500 megahertz ,RAM 2 GB ,Hard Disk 80 GB,Android Phone and a high definition cameraCamera.

IV. ALGORITHM DESCRIPTION

A. Background Model

- *Haar cascade classifier*

A recognition system could an opportunity to be extensively more compelling In it might be needy upon those recognizable proof about components that encode A rate greater part of the information around those populace with make recognized. This is the occasion of Haar-like elements that encode those nearness from asserting arranged complexities between territories on the photo. A set for these Characteristics could be utilized to encode those differences displayed Eventually Tom's scrutinizing A human face and their spacial associations. Haar-like offers would thusly approached record of they would enlisted similar of the coefficients done Haar wavelet changes.

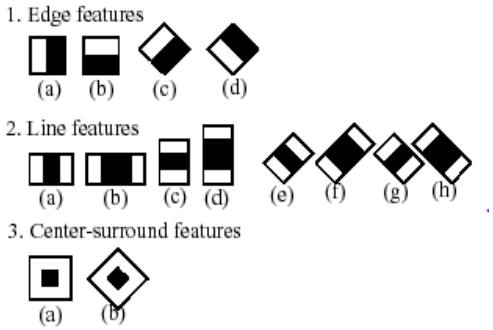

Figure 3:common haar features

Those transformed crucial analytics picture that point those key analytics picture is enlisted similarly shown carried out scientific articulation 2 a illustrated clinched alongside figure 3.

The essential analytics picture is a show holding the sums of the pixels' force level qualities spotted straightforwardly to the left of a pixel and straightforwardly over those pixel toward area (x, y) comprehensive. Along these lines In A[x,y] may be those first picture Furthermore AI[x,y] is the essential analytics picture then the essential analytics picture may be registered Similarly as indicated clinched alongside mathematical statement 1 What's more illustrated Previously, figure 4(A).

$$AI[x,y] = \sum_{x' \le x, y' \le y} A(x', y') \qquad (1)$$

if A[x,y] is the original image and AR[x,y] is the rotated integral image then the integral image is computed as shown in equation 2 an illustrated in Figure 3.

$$AR[x,y] = \sum_{x' \le x, x' \le x - |y' \le y|} A(x,y) \qquad (2)$$

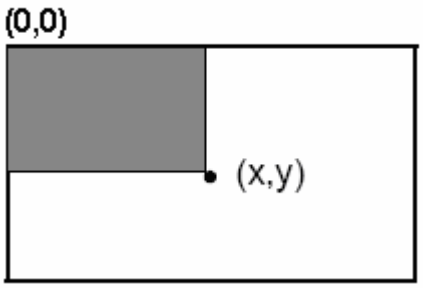

Figure 4(a):summed area of integral image

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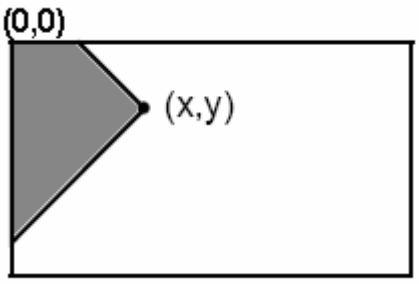

Figure 4(b):summed area of rotated image

- *Local binary pointer*

Neighborhood double example (LBP) offers features have performed exceptionally great in distinctive applications, including surface characterization and division, picture recuperation and surface examination. Those To begin with LBP director marks those pixels of a picture Toward thresholding those three by three neighborhood from claiming each pixel with the inside pixel regard What's more acknowledging the Conclusion Likewise An matched amount.

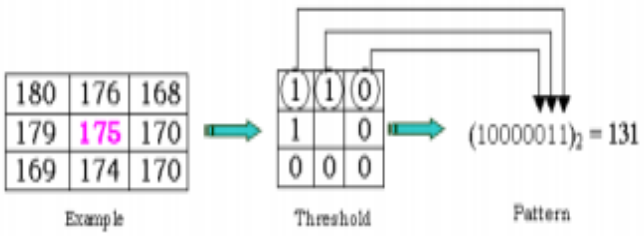

Figure 5:examples of LBP calculation

The LBP histograms extracted from each sub-region are then concatenated into a single, spatially enhanced feature histogram defined as:

$$H_{i,j} = \sum_{x,y} I(f_l(x,y) = i) I((x,y) \varepsilon R_j) \qquad (3)$$

where i = 0, ... , L-1, j = 0, ..., M-1. The LBP histograms concentrated from each sub-region need aid At that point concatenated

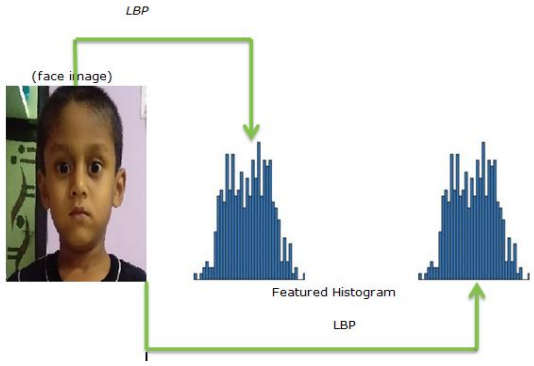

Figure 6. LBP based facial representation.

B. Object Tracking and Counting

This segment displays the routines we used to achieve the last comes about and additionally the purposes behind which theneed aid utilized. They are separated under three principle Categories

- Image Enhancement
- head Detecttion
- people Tracking

The current state of the specialty systems commonly main recognize those mind of the man utilizing strategies for example, Haar Also LBP. That point An window on spread the full figure will be made. This worth of effort [6] primarily depends with respect to An head identifier with check people from a wellspring picture. For identifying those heads from those hotspot picture primary those perspective from claiming investment may be distinguished utilizing gradient majority of the data starting with those ash scale picture. This pretty nearly locates top banana parcel of the leader locale will minimize the look locale. An closer view territorial space acquired utilizing foundation subtraction strategies including haar What's more LBP. After that An sub-window will be set coating those focuses of premium In light of data ahead point of view alignment and classifies as leader alternately non-head area settling on utilization of a classifier. Numerous close-by detections are At long last consolidated to get bring about shortages which is those no about confronts. The diagram steps of the suggested framework [5] are indicated over fig 6.

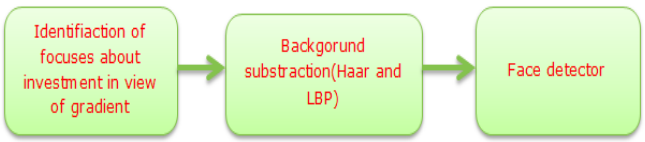

Figure 6. Steps of head Detection.

RESULTS AND DISCUSSION:

Some of face detection results are shown in Figure 7. Implement a face detector which uses trained face classifier. A face detection which use LBP-based classifier took 3.2 second to process whole image while Haar-like feature based classifier took 6.3 seconds to process image.as compared between haar and lbp classifier haar provides maximum features for face detection

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Figure 7.Face detection results.

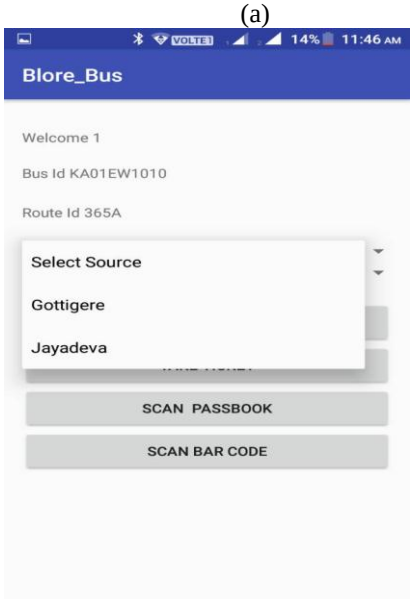
Table I shows the counting results of the proposed system depending on the number of people entering into the bus.It shows the percentage of detection and counting for each category as illumination ,dark skin color and head which is not visible in camera. These values have been obtained without discriminating the counting errors.

People/route	Total people	%cases from total	% detection
1	25	83%	80%
2	28	93%	70%
3	18	60%	90%
4 or 5	10	33%	94%

Table 1: statistics on the number of people entering into the bus.

This system combines the results of passenger counting and GPS data to record the number of passengers at each bus stop (Fig.2). Such dynamic information can provide the passenger arrival time of a bus and how many people are on the bus. Additionally, bus operators can arrange bus schedules based on the number of passengers at each bus stop at different times.

(a)



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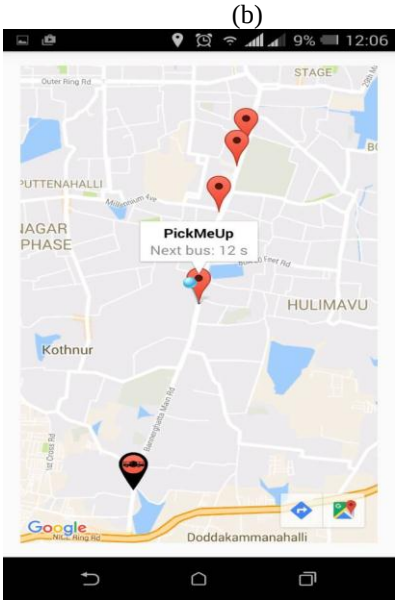

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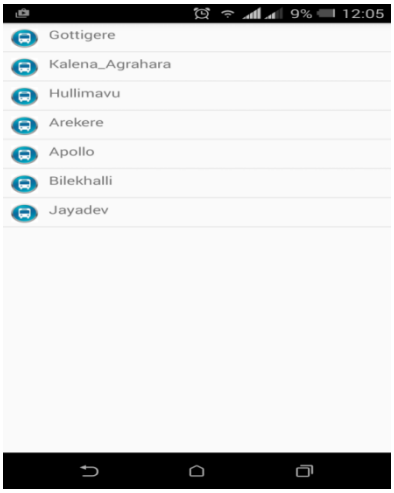

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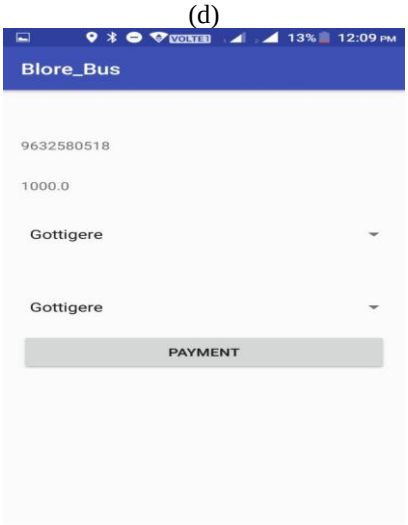

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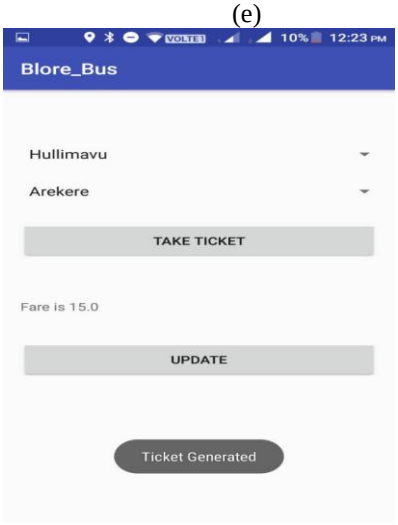
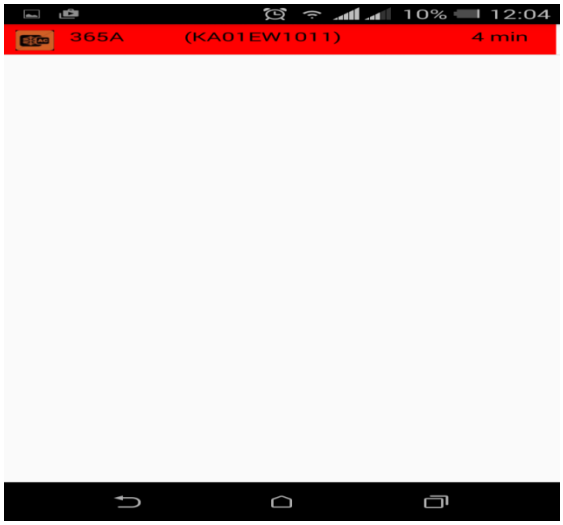
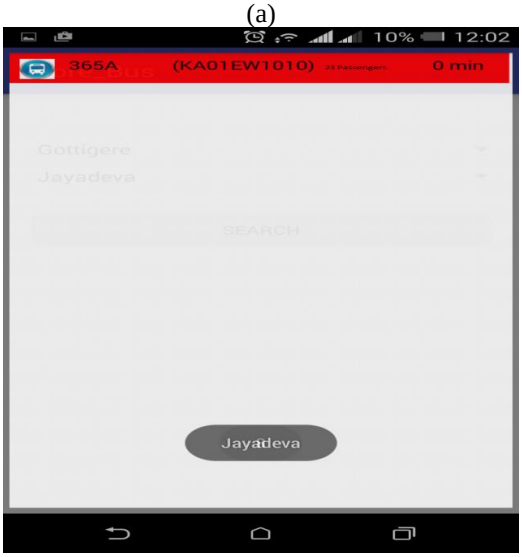


(f)

Fig 8(a-f): User interface for bus dynamic information

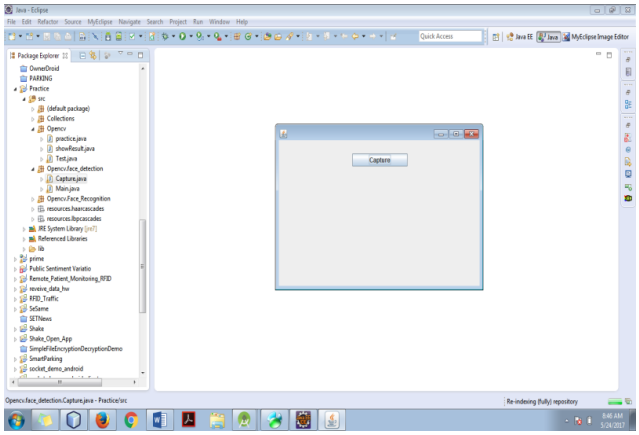


(a)



(b)

Figure 9(a-b): results in android app with number of passengers



(a)

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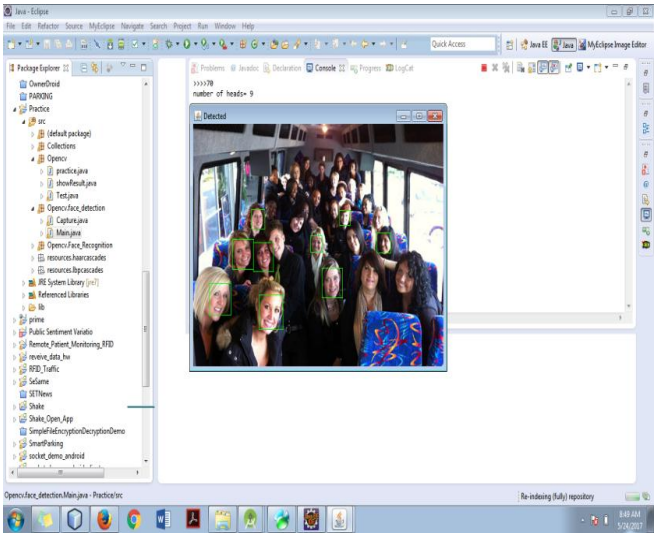

(b)

Figure (a-b): head detection results in web application

CONCLUSION

We have experimented our concept in few buses and hundred of users are using the application we have tested our experiment in particular bus route in Bangalore and found the mobile app is very useful for the bus passengers. The passengers waiting in bus stop can check the buses approaching towards the bus stop an approximate no of passenger in the approaching buses.

FUTURE SCOPE

Future development might make will model also take care of the issue to at chance slots. Simultaneously adjust the result of the particular issue. Like counting number of children heads, and counting of non travellers are there,quality of the routes if the integrality restrictions on the recourse variables are removed.

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