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HEAD COUNT ESTIMATION FROM DIGITAL IMAGES

Aarohi Rastogi & Dr. Parmanand Asthiya

M. Tech Scholar, Computer Engineering (CSE), School of Engineering and Technology, Sharda University, Greater Noida, Uttar Pradesh

Guide, Computer Engineering (CSE), School of Engineering and Technology, Sharda University, Greater Noida, Uttar Pradesh

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ABSTRACT

Information based strategies are one of the face recognition techniques created in view of the tenets of the analyst's learning of human appearances. In light of the produced rules the appearances are recognized. One of the issues with this approach is that to produce very much characterized rules. In the event that guidelines are not strict then may neglect to distinguish faces. It is hard to amplify this face finder so that distinctive stances are not identified as various.

Layout coordinating techniques utilize a standard example of face, predefined for the most part for frontal face .To show a face it utilizes sub layouts for eyes, nose, mouth and face shape.

At the point when a picture is given utilizing the standard example of face, ascertain the relationship esteem for face shape, eyes, nose, mouth, freely.

Keywords: Face Detection ,Blob Analysis, Viola - Jones.

I. INTRODUCTION

1.1 Overview

Image processing techniques like face detection play a significant role in counting the number of people present at any given location which is under surveillance of a camera or any face detection system. This data collected can be processed and analyzed to deduce important findings. Data Mining plays a major role in analysis of this data and production of important statistics. Based on these statistics important decisions are made. This paper proposes one such system that uses Viola Jones face detection algorithm to keep a count of number of visitors at railway station throughout the day and heuristic data mining technique to analyze this stored data and suggest the required action

Today, a great deal of research has been distributed keeping in mind the end goal to determine such issue which is check individuals utilizing camcorder. This is not a straightforward assignment; there are a few circumstances hard to settle even with today's PC speeds (the calculation needs to work progressively so it makes limits for the multifaceted nature of strategies for location and following). Possibly a standout amongst the most troublesome, is individuals impediments. At the point when individuals entering or leaving of the field of view in gathering, it is difficult to recognize every one of the people in this gathering.

1.2 Background Subtraction Method

Many individuals checking looks into have been made in light of video picture preparing. In paper [1], the creator utilized face discovery to find confronts, then utilized Kalman channel to gauge the development ways of individuals, at long last checked individuals by the classifier of development ways. In paper [2], the camera ought to be swung from the roof of the door, utilizing foundation estimation and distinction to concentrate and track people, then tally them when they passes the numbering line. In paper [3], foundation subtraction technique is utilized to concentrate all frontal area articles, and matrix based layout coordinating plan is utilized to heartily confirm every person on foot. In paper [4], the creator utilized power profile examination to arrange each pixel of a casing as moving, stationary or foundation pixel, then ordered all non-shadow pixels as

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stationary or moving structure blobs, finally contrasted blob size and conventional individuals size to evaluate the general population number.

1.3 System Framework

The general population including framework proposed this paper primarily contains five capacity modules, including a region setting module, a face discovery module, a skin identification show, a zone following module and a people numbering module.

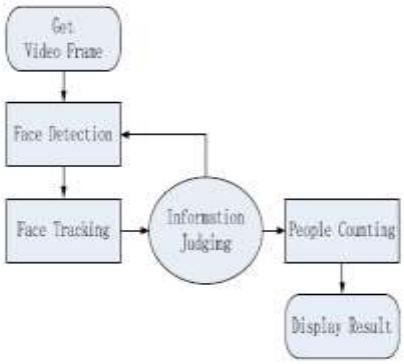


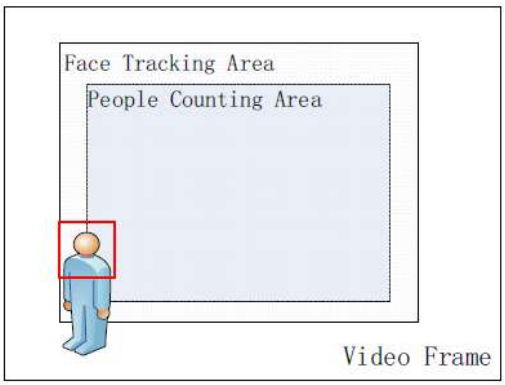
Figure.1 System Framework

The working procedure of the framework is as per the following, right off the bat set following territory and tallying zone for the video outline got from observing gadget, then identify confronts in identification and following region. With a specific end goal to dodge the false recognition, skin identification is utilized to enhance location exactness, and after that track the appearances after discovery, then judge if the general population has gone into the room or not through video examination, finally show the checking result. The framework structure is appeared in Fig. 1.

II. PEOPLE COUNTING SYSTEM

2.1 Area-setting

With regards to the ongoing video outline gotten from the checking gadget, we have to set location and following range and individuals numbering zone as per the position of the passageway first. In a casing, we don't have to distinguish and track all zones, and setting related regions can help us enhance discovery speed and exactness.



The area-setting in this paper is shown in Fig.2.

Since we need to consider the range of following segment (the red box), and the framework will consider long as the centroid of following segment passes the numbering zone, the following territory and the tallying zone are not precisely coordinated. Through zooming out 10% in view of numbering territory we can get following range.

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2.2 System overview

Our kin checking framework is intended to give exact, ongoing execution in swarmed situations. We adopt an apparatus strategy to the outline of our framework, imagining a circulated observation framework where every machine speaks with a focal reconnaissance motor executing rationale for worldwide observation and asset streamlining errands. For instance, an extensive retail chain may wish to screen individual inflow and surge at given times of the day.

(a)RGB frame (b) Incorrect blob detection
Figure 3: Example of incorrect blob labeling in crowd.

Every entryway can be outfitted with our kin counter that imparts what number of clients enter or leave the store. Another situation could be identified with open security, where police office might need to screen the introduction of agglomerates of individuals in delicate open ranges.

2.3 Skin Detection

Skin shading [7] is a standout amongst the most essential elements of countenances, and has great heartiness against revolution, change and view point. As a rule, it can be very much recognized from foundation shading. Shading spaces normally utilized incorporate RGB, YUV, HSV, YCrCb, and so forth. The shading space picked in this paper is YCrCb. Subsequent to picking the shading space, we will set up skin shading model to isolate the shading picture into skin and nonskin areas. Regarding many-sided quality and location impact, we pick Chroma Space Model to separate skin shading.

The consequence of skin recognition is appeared in Fig.4.

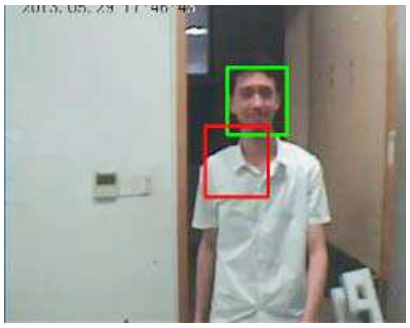

Figure 4-face and skin detection

2.4 Skin detection result

The figures above demonstrate the aftereffect of skin location. The false recognition is signified by red box and the correct discovery is indicated by green box, and the outcome demonstrates that the false identification rate is enormously lessened.

2.5 Face Area-tracking

Among these strategies, camshift (Continuously Adaptive mean-move) calculation is a following strategy in light of shading data. Since the skin shading does not change in complex situation and it is of awesome distinction with the foundation shading, this calculation is generally utilized as a part of face following. Skin

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shading conveys relative focus in shading space, on the grounds that RGB shading is touchy to lighting and shine, keeping in mind the end goal to lessen the impact of lighting and splendor on following, right off the bat we have to change over the video outline from RGB shading to HSV shading space, then split the H shading segment from HSV shading space and figure the shading histogram of H shading part in following range, at long last ascertain the shading likelihood appropriation demonstrate by back projection.

2.6 People Counting

The result of people counting can be gotten through the analysis of tracking information. According to the result, we judge if the centroid of tracking window has passed the counting area.

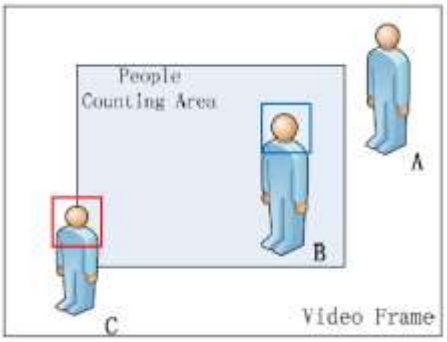

Fig.5 People counting sketch

III. VIOLA - JONES METHOD

In this part we introduce the different face location techniques that were examined and assessed so as to pick the one that suits our objectives best. Clearly, we focus for the most ideal exactness however the computational effectiveness is of extraordinary significance. On the last segment of this part (3.5) we investigate the technique that is in the long run utilized on our structure.

3.1 Viola Jones face detection algorithm:

One such popular algorithm which can be used is the Viola Jones face detection algorithm. This algorithm has three main contributions for face detection:

- It makes use of integral images. Integral images allow the faces to be detected quickly.[5] Integral images are constructed by making use of Haar wavelets.
- It makes use of AdaBoost, which boosts certain intensities in an image for better feature selection.
- The third feature of this algorithm is that it provides Attentional Cascade for fast rejection of non-face windows. This provides better user interface.[6]

3.2 Program implementation of Viola Jones face detection algorithm:

This algorithm can be implemented in Matlab for detection of faces. For this, the Computer vision system toolbox is required. This toolbox contains a vision. Cascade Object Detector system object, which detects objects based on this algorithm.

3.3 Viola - Jones Method The Viola

Jones [2] technique is dependably a contender for strong face discovery. The technique processes set of Haar-like elements at various scales and areas and utilizations them to arrange a picture fix as a face or not. A basic, yet proficient, classifier is worked by picking a couple of compelling components out of the total arrangement of the Haar-like elements that can be created utilizing the AdaBoost [36] technique. Various classifiers, running from an exceptionally straightforward 2-highlights one up to more mind boggling layers containing many elements, are joined in a course structure to give both exactness and ongoing preparing. More data about the technique can be found at Appendix A.

3.4 Detecting faces in an image

Rather than one fell classifier, really three were prepared. One utilizing the first 24x24 pixels window, one having 32x32 pixels window and one with window measure 40x40. To identify confronts in new pictures, the traditional sliding window approach is utilized. A straightforward picture pyramid is assembled where each

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level is a large portion of the measure of the past one. For each level of the pyramid, the 24x24 window slides along the picture and the elements are checked. To check for the half-size and quarter-measure highlights, the two pyramid levels underneath are utilized. A similar method is rehashed for the 32x32 and 40x40 identifiers. The union of the considerable number of location of the 3 identifiers in all levels of the pyramids are the subsequent identifications. Comparable location are joined into one.

3.6 Deformable detector

We likewise assessed the deformable finder from [9] which gives cutting edge execution. The proposed technique depends on a classifier that can adaptively distort to recognize the objective question. It depends on an arrangement of posture listed elements [37] enlarged with a group of stance estimators. Conversely with other comparable question discovery strategies in view of posture recorded components, it doesn't require marking for inflexible revolutions and disfigurements. A group of stance estimators gives evaluations of inflexible pivots and disfigurements from different ranges of the picture. A learning strategy in view of AdaBoost picks the best blend of posture recorded elements and stance estimators. This implies a posture listed element may acquire the stance evaluate frame an alternate territory of the picture than the one that the reaction is registered on. At long last, an adaptable locator is produced by weighted components, each streamlined with the best posture evaluate.

IV. PROPOSED METHODOLOGY

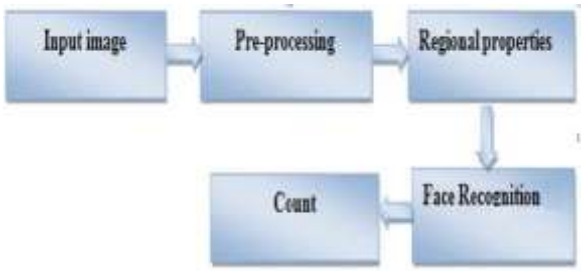

Fig 6

A. Input Image For this algorithm we required color image as we are using RGB color space.

Figure 7. Original image in RGB color space

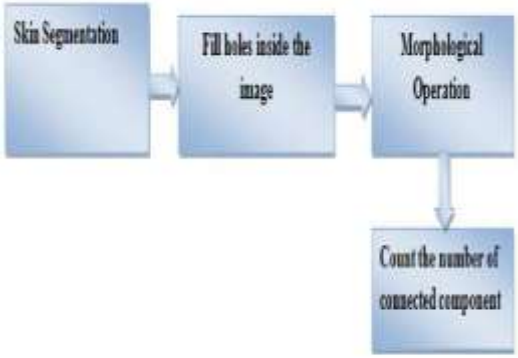

Figure-8 Pre-processing steps

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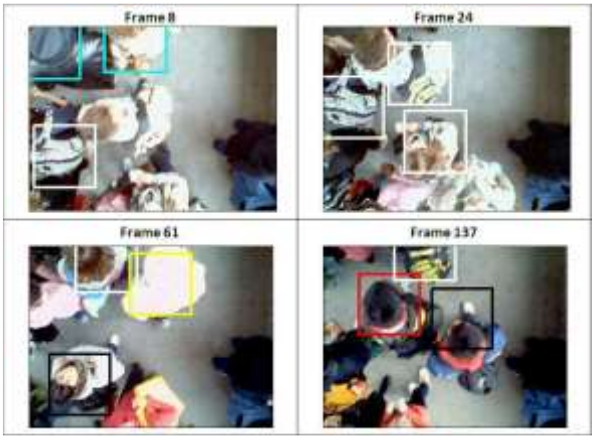
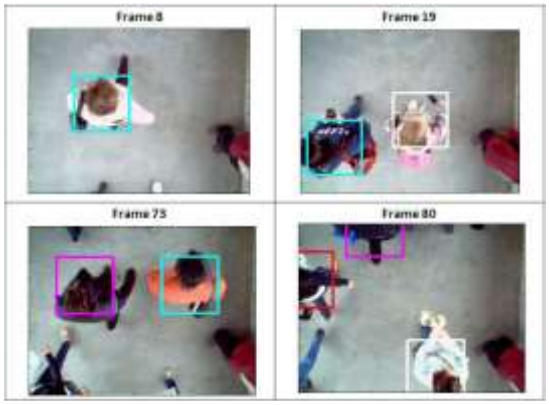
V. RESULTS FOR WHOLE

Body Views The structure is tried on 10000 casings of a video where individuals were strolling down or coming up the stairs of a LRT station. The general population were moving predominantly in two headings and they wore diverse sorts of shaded dresses. Some of them were notwithstanding conveying sacks with them. Some visual outcomes are outlined in Figure 3.12. Foundation subtraction strategy is decided for the underlying division of human.



(a) Dense crowd



(b) Sparse crowd

Algorithm

1. Apply aggregate functions on the webcam.
2. After aggregation, the total number of people over the entire month is obtained. This many number of people are divided by 30 (Number of days in a month). This will give the average crowd at a particular station for a train in specific direction in a specific time interval. It is denoted as AC (Actual Crowd).

3. The AC is then compared with a 'threshold' value.
   If (AC > threshold)
   Then (Surplus = AC – threshold)
   Else
Deficit=threshold – AC
   - Surplus=No. of people greater than the train capacity
   - Deficit=No. of people in trains which are sparsely occupied.

4. Similarly, the Surplus or Deficit are calculated for all the time intervals. These surplus or deficit is then compared with the threshold surplus and deficit values.

If (Surplus > Threshold (surplus))
Then (frequency should be increased)
If (Deficit > Threshold (deficit))

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Then (frequency can be decreased)

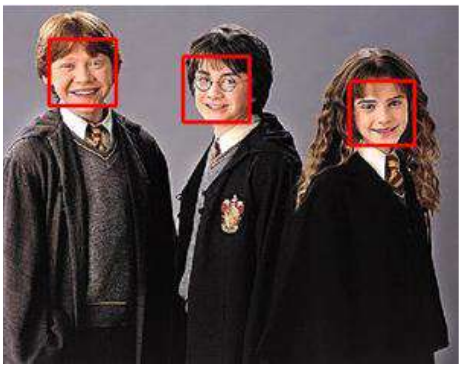

Figure-10 Sample Output of the above algorithm

BB =

52 38 73 73
379 84 71 71
198 57 72 72

Presently by including the quantity of lines BB, we will get the quantity of individuals in a photo. This esteem would then go into the 'No. of. Individuals' field in our database. As connected to the picture over, this calculation can likewise be connected to a huge horde of individuals, getting yield as appeared in the picture. Along these lines we will get the quantity of individuals from this calculation.

VI. CONCLUSION

Our work is about introducing a system that uses image processing techniques to solve the problem of crowd management. We have proposed a crowd counting system, which counts the number of people passing through Viola-Jones. The system detect the faces at every interval using Viola-Jones detector. To the best of our knowledge, our work is the first published work on counting people. The accuracy of the detection is 77% for low dense, 82% for medium dense and 79% for high density crowd of people

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