

Intelligent Crowd Counting System with Gender Classification

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ABSTRACT

Evaluating the quantity of individuals in exceptionally bunched swarm scenes is an amazingly testing task because of genuine impediment and non-consistency dispersion in one group picture. Human Counting innovation can be summed up into two sorts of writing: identification strategies and tallying techniques. Conventional methodologies for swarm tallying from pictures depended available made portrayals to remove low-level highlights. These highlights were then mapped for checking or creating thickness maps by means of different tallying procedures. The identification-based model commonly utilizes sliding window-based recognition calculations to include individuals in a picture. This Project likewise correlation of various sex grouping strategies and utilization of various racial highlights, for example, eyes, nose, and mouth, and so on for Gender orientation characterization its applications in numerous regions like observing, reconnaissance, and business profiling, and human-PC cooperation video order assignments.

Keywords : Crowd, Classification, Cascading, HoG, HMM, Haarlick, SVM

I. INTRODUCTION

This task means to build up a framework for identifying moving individuals and order them. To tally individuals, the calculation just looks the situation of the base section of each jumping confine two continuous edges. Movement identification is a procedure that distinguishes the moving articles in the video. We characterize the focal region of the screen as location region. At the point when individuals experience the recognition territory, the movement identification capacity will produce a progression of edge that contain movement regions. We discover that the normal of movement region and the quantity of casings are identified with number of individuals who experience the identification territory. Tally and Gender of individuals that have gone through a given passageway/exit.

These days, organizations have been beating them to a pulp attempting to think what to do to raise the business volume. Moving article discovery and following are fundamental to a scope of security and business insight reconnaissance video applications. The data got from the procedures can be utilized to assemble positive factual data identifying with client practices. This task expects to build up a framework for distinguishing moving individuals and sort them. Video based individuals tallying and Gender orientation acknowledgment are significant yet testing undertakings. An AI strategy for video-base individuals checking and Gender orientation acknowledgment is proposed in this task.

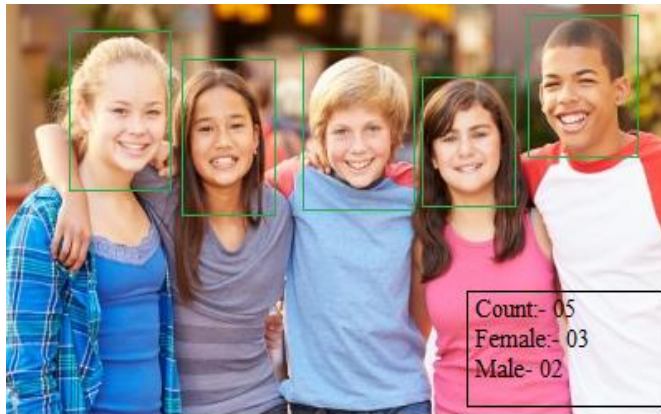


Figure 1. Counting People

II. RELATED WORKS

Minglei Tong, Lyuyuan Fan, Hao Nan, and Yan Zhao presented in Smart Camera Aware Crowd Counting by means of Multiple Task Fractional Stride Deep Learning, the programmed examination of the group has been a specific security method in the current clever observation writing [1], which will forestall serious mishaps by giving pivotal data about the number of individuals and group thickness in a scene. Along these lines, swarm tallying and examination has become a functioning theme in the PC vision writing because of its broad application video reconnaissance, traffic checking, open wellbeing, and urban arranging [2]. Be that as it may, the current smart reconnaissance framework is as yet unequipped for taking care of an enormous scope swarmed condition with serious impediment and non-consistency [3]. Human Counting innovation can be summed up into two sorts of writing: recognition techniques and relapse strategies. Customary methodologies for swarm checking from pictures depended close by created portrayals to extricate low-level highlights. These highlights were then mapped for checking or creating thickness maps by means of different relapse methods. A portion of the early strategies [4] depended on passerby location in a roundabout way, for example, HOG (Histograms of arranged slopes) highlights, can get an increasingly exact number of individuals when the group is scanty or there is no evident cover

between individuals, however, the outcomes will be flawed when the gathering gets denser. The discovery-based model commonly utilizes sliding window-based identification calculations to include individuals in a picture.

Yingying Zhang, Desen Zhou, Siqin Chen, Shenghua Gao, and Yi Ma in their work Single-Image Crowd Counting through Multi-Column Convolutional Neural Network, it intends to build up a technique that can precisely assess the group tally from an individual picture with subjective group thickness and self-assertive viewpoint. To this end, they have proposed a basic yet compelling Multi-segment Convolutional Neural Network (MCNN) engineering to outline a picture to its group thickness map. The proposed MCNN permits the information picture to be of subjective size or goals. By using channels with responsive fields of various sizes, the highlights learned by every segment CNN are versatile to varieties in individuals/head size because of viewpoint impact or picture goals. Moreover, the genuine thickness map is registered precisely dependent on geometry-versatile bits which needn't bother with knowing the point of view guide of the information picture. Since leaving swarm checking datasets don't sufficiently cover all the difficult circumstances considered in their work, they have gathered and marked a huge new dataset that incorporates 1198 pictures with around 330,000 heads clarified. On this difficult new dataset, just as all current datasets, they directed broad trials to confirm the viability of the proposed model and strategy. Specifically, with the proposed straightforward MCNN model, their strategy outflanks every single existing technique. Moreover, tests show that their model, when prepared on one dataset, can be promptly moved to another dataset.

Mohammed Abul Hassan, Indratno Pardiansyah, Aamir Saeed Malik, Ibrahima Faye, and Waqas Rasheed in their paper Enhanced People Counting System based Head-Shoulder Detection in Dense

Crowd Scenario, they contemplated swarm investigation has been progressing for quite a while by numerous analysts. There are two unique methodologies that have approached to deal with a few issues on individuals tallying framework. One is known as an immediate methodology (identification based) and another is a circuitous methodology (map-based or estimation based). This paper presents an improved method to include individuals in any group situation. The framework is proposed by utilizing incorporated element vectors of two-component extraction systems, Histogram of Oriented Gradients (HOG) and Completed Local Binary Pattern (CLBP), to recognize head-shoulder district in any group situations. This technique expressively improves the discovery pace of the framework. In addition, an improved intertwined highlights strategy dependent on certainty measure is utilized to expand the precision execution of the SVM classifier.

Tianchun Xu, Xiaohui Chen, Guo Wei, and Weidong Wang In their work Crowd Counting Using Accumulated HOG, they present middle of the road approach. their methodology removes neighborhood highlights from partitioned cell locales and just a single relapse model is prepared. In every cell district, HOG highlights are separated and summarized to create the aggregated HOG highlight of that picture. The aggregated HOG include holds all the upsides of HOG. In contrast to worldwide methodologies, the aggregated HOG highlight is restricted to get the spatial distinction. Rather than nearby methodologies, our technique doesn't have to prepare an enormous number of regressors, which is increasingly adaptable and versatile. To outline, the primary advancements and commitments of our examination are centered around the accompanying three viewpoints:

- Since they separate the picture into cells where the highlights are extricated, the spatial data is held. In the interim, just a single relapse model is utilized for a picture, which beats the deficiency of nearby methodologies.

- as far as anyone is concerned, this is the first occasion when that HOG highlight is utilized for relapse based group checking. Also, the HOG include is more strong than low-level highlights existing relapse based techniques for the most part use.

- Their methodology has advancement in swarm checking precision and analyses on five open datasets have shown the heartiness. Moreover, the proposed technique is quick enough for viable applications.

Aylin Coúkun¹, Anil Kara, Mustafa Parlaktuna, Metin Ozkan in their paper People Counting System by Using Kinect Sensor, individuals tallying framework is required to guarantee security and to acquire factual data. The framework decides the in/out individuals' number in a particular tallying zone. The specialist cops may screen travelers in a transportation framework or purchasers in shopping centers, exhibition halls, emergency clinics, etc. There are different sensors utilized for the individuals tallying frameworks. Vision sensors, infrared sensors, ultrasonic sensors, and profundity cameras are a few guides to these sensors. A few methodologies utilize the camera introduced in different areas with various cameras sees. A camera mounted with a slanted view has preferences. The camera might be utilized for both observation and individuals tallying purposes. In any case, this methodology needs to take care of impediment issue. To take care of this issue, a few methodologies like to mount the camera on the roof descending. In the proposed framework, the vertical profundity data created by minimal effort Kinect sensor is utilized. The leaders of the individuals are controlled by utilizing water filling calculation [4] in the wake of performing picture upgrade. To catch profundity data from the Kinect sensor, the Robot Operating System (ROS) is utilized. The picture handling is performed by utilizing open source library OpenCV. The proposed approach has two commitments for individuals checking. The individuals are followed while they are in the district of view point of the camera. At the point when an individual goes into the field of vision, an ID is

allocated to him. Until leaving the field of vision, the individual is checked only a single time. The other commitment is that an individual might be distinguished when he/she gets lost out of nowhere and shows up not long after. For instance, the leader of a short individual may not be showed up in the event that he/she strolls near long individuals for a brief timeframe while going through the field of perspective on the camera. The proposed framework is introduced by genuine investigations.

Sen Jia, Thomas Lansdell-Welfare and Nello Cristianini in Gender Classification by Deep Learning on Millions of Weakly Labeled Images, proposed the great assignment of face Gender orientation acknowledgment has as of late pulled in new consideration, generally because of the accessibility of huge arrangements of pictures gathered "in nature". Applications are promptly found in numerous zones, for instance in the investigation of sex inclination in news media content [1], [2]. The accentuation of this new period of research is on staying away from pictures gathered under controlled conditions (for example in foundation, posture, or light), and concentrating endeavors on the additionally testing instance of normal pictures. In this paper, they explore the impacts of joining the intensity of CNNs with the data contained in gigantic, feebly marked datasets, gathered from the web. They gathered 5,000,000 openly accessible face pictures that are feebly marked utilizing sex explicit questions got from the Internet Movie Database (IMDB), following the method in [3]. These pictures are utilized as our preparation information for three unique investigations, detailing execution on the LFW dataset [9] and the GROUPS dataset [10] for equivalence. The principal test is planned for exploring the distinction in execution for shifting profundities of CNN, and contrasting straightforwardly and a Support Vector Machine (SVM) utilizing Local Binary Pattern (LBP) highlights approach utilizing a similar preparation and test sets. In the second analysis, they examine utilizing a bigger

bounding box for the face area, on the very same information as the primary examination, and show that we can additionally expand execution utilizing the extra relevant data that the bigger jumping box contains. At last, in the third investigation, they utilized an as of late proposed face locator [11] to supplant the Viola Jones (VJ) calculation.

Xiaofeng Wang, Aziza Mohd Ali, and Plamen Angelov proposed Gender and Age Classification of Human Faces for Automatic Detection of Anomalous Human Behavior which is a programmed recognition that assumes a significant job in identifying bizarre conduct in information and can profit in forestalling wrongdoing. The framework portrayed in [1] may make a caution or sign if there is irregular conduct. Atypical conduct can happen in broad daylight places, for example, air terminals, tram stations, or shopping centers; occurrences are episodes of suicide besieging in Brussels Airport and Ataturk Airport, Turkey in 2016 and the ongoing London assault. Subsequently, having a programmed.

III. BACKGROUND THEORY

In this part brief explain about tumor features. Mainly two types of feature shape and texture are used for stage tumor classification.

A. Feature Extraction:

- **Haar like**

Each human face shares barely any properties like, the upper cheeks are more brilliant than the eye district and the eye locale is darker than the nose connect area. The similitudes in every single human face can be coordinated by utilizing Haar highlights. The highlights coordinated by this calculation are then looked for in the picture of a face. Viola and Jones utilizes square shape highlights.

The square shape include: Value = Σ (pixels in dark territory) - Σ (pixels in white zone).

Each element is identified with an extraordinary area in the sub-window.

• **HOG**

Histogram of arranged inclinations (HOG) is an element descriptor utilized in PC vision and picture handling with the end goal of item identification. The strategy includes events of slope direction in limited segments of a picture.

This strategy is like that of edge direction histograms, scale-invariant element change descriptors, and shape settings, yet vary in that it is processed on a thick network of consistently dispersed cells and utilizations covering nearby difference standardization for improved precision.

$$M(x, y) = \sqrt{dx(x, y)^2 + dy(x, y)^2}$$

$$\theta(x, y) = \begin{cases} \tan^{-1} \left(\frac{dy(x, y)}{dx(x, y)} \right) - \pi & \text{if } dx(x, y) < 0 \text{ and } dy(x, y) < 0 \\ \tan^{-1} \left(\frac{dy(x, y)}{dx(x, y)} \right) + \pi & \text{if } dx(x, y) < 0 \text{ and } dy(x, y) > 0 \\ \tan^{-1} \left(\frac{dy(x, y)}{dx(x, y)} \right) & \text{otherwise} \end{cases}$$

• **PCA**

Head segment investigation (PCA) utilizes a symmetrical change procedure. It is utilized to change over a lot of perceptions of conceivably related factors into a lot of estimations of straightly uncorrelated factors called head segments. PCA is touchy to the overall scaling of the first factors.

• **Gabor feature**

Gabor highlights is utilized for some, reason like surface examination and division and so on. Subsequent to finding the parameters of each channel, process the convolution of each channel and picture, the mean and standard deviation of the first picture and each separated picture.

B. Classification

• **SVM**

An assistance vector machine (SVM) will be an overseen machine taking in the calculation that camwood be used to the two requests Also backslide purposes. SVMs is that is just a glimpse of something larger normally used over request issues Furthermore in that capacity, this is what we will focus on in this post. SVMs are considering those ideal from professing to discover a hyperplane that best parcels a dataset under two classes, comparably as exhibited in the image underneath.

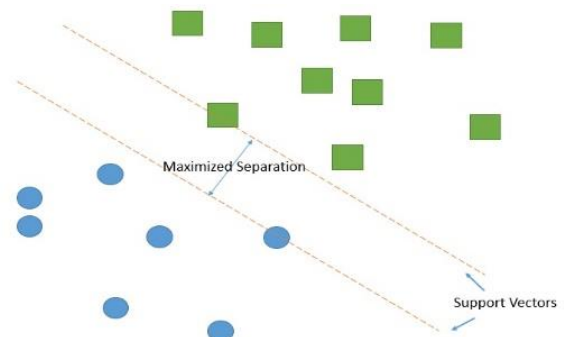


Figure 2. Support Vector Machine

• **RF**

Arbitrary backwoods (RF) is one of the most generally utilized and ground-breaking AI systems which has indicated a higher precision rate among late AI calculations. It is reasonable for preparing an enormous arrangement of information with an assurance of assessing the most proper highlights required for grouping. RF is an assortment of tree-organized classifiers where each tree relies upon the estimations of an arbitrary vector examined autonomously and the conveyance of all trees in the woods.

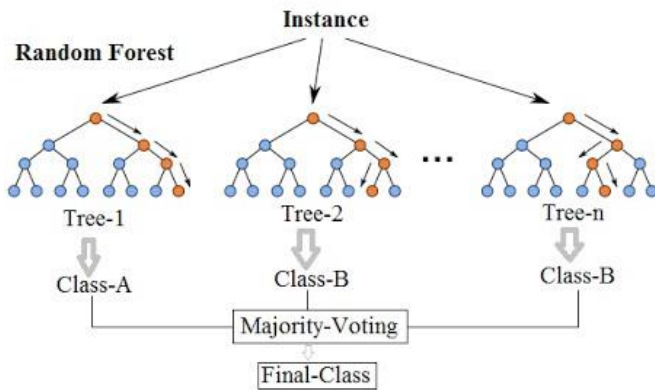


Figure 3. Random Forest

• Decision Trees

A Decision Tree Classifier works by separating a dataset into littler and littler subsets dependent on various rules. Distinctive arranging standards will be utilized to partition the dataset, with the quantity of models getting littler with each division.

When the system has partitioned the information down to one model, the model will be placed into a class that relates to a key. At the point when various irregular woods classifiers are connected together they are called Random Forest Classifiers.

• K-Nearest Neighbors

K-Nearest Neighbors works by checking the good ways from some test guide to the known estimations of some preparation model. The gathering of information focuses/class that would give the littlest separation between the preparation focuses and the testing point is the class that is chosen.

IV. PROPOSED SYSTEM

A continuous individual checking/remembers framework is structured fit for recognizing the gander orientation of potential people. A versatile boosting (Ad boost) AI calculation is utilized to identify human faces and use explicit sifting criteria to take out pointless information. For each recognized individual, face and middle data are recorded in a database for

distinguishing proof. The least as of late utilized distinguishing proof record will be erased if the database is full. Gender orientation grouping is performed by help vector machine utilizing hair proportions extricated from gender describing locales.

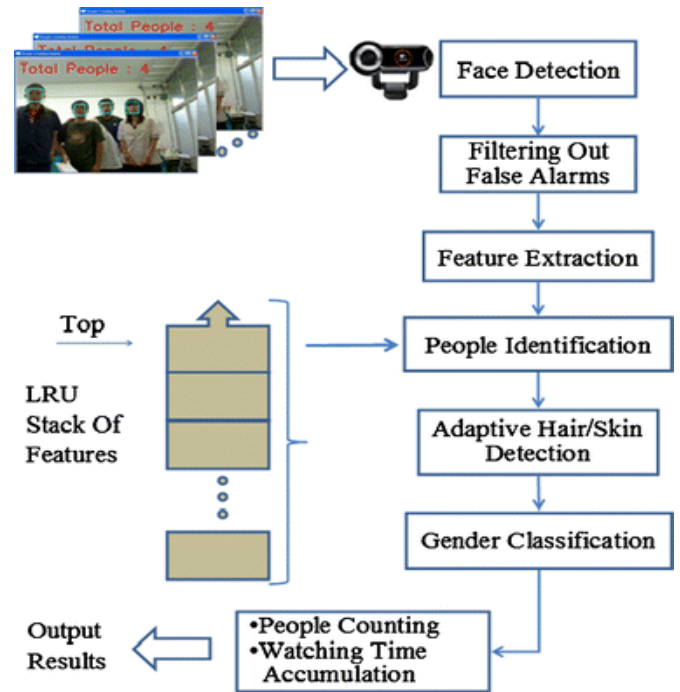


Figure 4. Proposed system

ALGORITHM

- Step 1: Upload or Browse video.
- Step 2: Convert inputted video into several frames.
- Step 3: Apply Pre-Processing using Histogram Equalization and Median Filtering.
- Step 4: Find the location of a human face in an image from input video stream.
- Step 5: Apply Deep Learning Approach SVM, RF and make database.
- Step 6: Detections such as face detection, head detection, upper body detection and people detection are performed.
- Step 7: Extracting shape features, texture features and classifying gender.

- Step 8: Demonstrate the total male and female count.

V. EXPERIMENTAL RESULT AND ANALYSIS

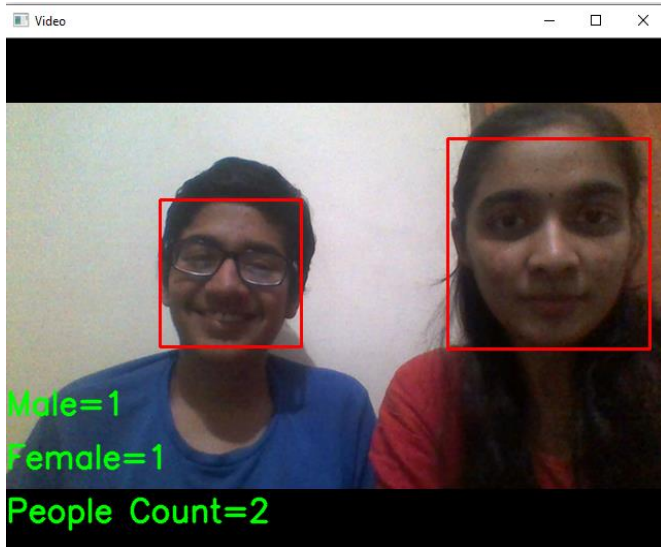


Figure 5. SVM

Table V. Accuracy Comparison Between Existing And Proposed Algorithm

Classifier	Accuracy
Support Vector Machine	81%
KNeighbors Classifier	78%
Random Forest Classifier	58%

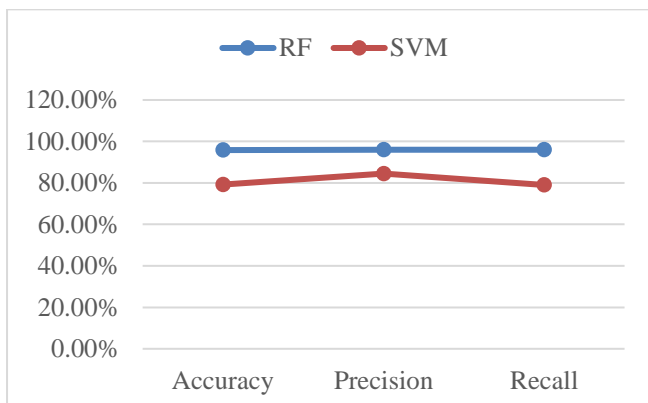


Figure 6. Analysis Graph

VI. CONCLUSION

In this research, we have AI examination for the execution of face acknowledgment and Gender orientation characterization framework. The framework is effectively perceiving the human countenances and furthermore arranging the Gender orientation of the info face picture in the diverse light and variety in the posture. Straightforwardness and high likelihood of getting the right outcome for acknowledgment and order is the principle preferred position of utilizing this strategy. The acknowledgment rate is shifting as indicated by the quantity of highlights removed from the preparation faces. The acknowledgment rate additionally relies upon lighting conditions and the clearness of the preparation set picture and the test picture. The limit ought to be taken cautiously in light of the fact that edge separation esteem relies upon the acknowledgment of the information picture or for the characterization of the information picture too. At the point when we are taking the face picture which is as of now in the database for the testing as an information picture the precision is high when contrasted with an obscure picture for the Gender orientation grouping.

VII. REFERENCES

- [1]. M. Tong, L. Fan, H. Nan, and Y. Zhao, "Brilliant Camera Aware Crowd Counting through Multiple Task Fractional Stride Deep Learning †," 2019.
- [2]. S. Saxena, "Plan of individuals checking framework utilizing MATLAB," no. August, pp. 10–12, 2017.
- [3]. V. Chauhan, S. Kumar, and S. K. Singh, "Human Count Estimation in High Density Crowd Images and Videos."
- [4]. S. D. Pore and B. F. Momin, "Bidirectional People Counting System in Video Surveillance," vol. 416415, pp. 724–727, 2016.

- [5]. M. Sajid, A. Hassan, and S. A. Khan, "Group Counting Using Adaptive Segmentation in a Congregation," no. 5, 2016.
- [6]. Y. Zhang and Y. Mama, "Single-Image Crowd Counting by means of Multi-Column Convolutional Neural Network," 2016.
- [7]. M. A. Hassan, I. Pardiansyah, A. S. Malik, and I. Faye, "Improved People Counting System based Head-Shoulder Detection in Dense Crowd Scenario," 2010.
- [8]. T. Xu, X. Chen, G. Wei, and W. Wang, "Group Counting Using Accumulated HOG," pp. 1877–1881, 2016.
- [9]. J. Nalepa, J. Szymanek, and M. Kawulok, "Continuous People Counting from Depth Images," vol. 2, pp. 387–397, 2015.
- [10]. A. Co, A. Kara, and M. Parlaktuna, "Individuals Counting System by Using Kinect Sensor," 2015.
- [11]. Z. Yu, C. Shen, and L. Chen, "Gender orientation Classification of Full Body Images Based on the Convolutional Neural Network," pp. 707–711, 2017.
- [12]. "Gender orientation Classification in live recordings Jiale Chen , Sen Liu , Zhibo Chen CAS Key Laboratory of Technology in Geospatial Information Processing and Application System University of Science and Technology of China , Hefei 230027 , China."
- [13]. S. Lopuschkin and A. Folio, "Comprehension and Comparing Deep Neural Networks for Age and Gender Classification," 2017.
- [14]. S. Jia, T. Lansdall-government assistance, and N. Cristianini, "Gender orientation Classification by Deep Learning on Millions of Weakly Labeled Images," 2016.
- [15]. X. Wang, A. Mohd Ali and P. Angelov, "Gender orientation and Age Classification of Human Faces for Automatic Detection of Anomalous Human Behavior," 2017 third IEEE International Conference on Cybernetics (CYBCONF), Exeter, 2017, pp. 1-6.

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