

Dual Vision And Depth Sensor Face Recognition For Foreged Face Presence System

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Abstract- To prevent forged face picture on face presence system, we can use twin imaginative and prescient camera in face Recognition machine. Dual imaginative and prescient Camera is used to provide detectable face pics from two positions of the left lens and the proper lens. Image retrieval at the 2 corners of the left lens and the right lens can produce a merged face photo database of left lens face picture and proper lens face photograph. The use of sides of the face perspective taking is used to avoid falsification of facial records which includes the usage of a face picture of a man or woman or a photo similar to a person's face. This research can produce a presence system primarily based on accurate face recognition and can be used to count on falsification of face records with reputation accuracy up to 98%.

Keywords- Dual-vision, Stereo Vision Camera, Face Recognition.

I. INTRODUCTION

Face detection and face recognition device can be used as presence machine via the use of a human face as the object. One of the maximum reliable attendance systems is the presence gadget the usage of human face detection and popularity machine using a real-time video camera. A digital camera of face detection system has benefits in application flexibility, so it does now not require customers to make direct contact with attendance machine. To decrease the capacity for counterfeit facial statistics, this examine uses a twin-vision camera (stereo imaginative and prescient digital camera). Stereo vision digicam can produce detectable facial picture information from positions from the left lens and proper lens. The camera on the face reputation device is used to produce facial photograph with the intention to be processed either within the form of a 2D or 3-d photo. The 2D photo acquisition model on face reputation commonly makes use of single vision digital camera, for three-D image acquisition model is carried out the usage of two imaginative and prescient digicam (stereo imaginative and prescient digital camera) or different photograph acquisition equipment which includes a scanner.

In a few face recognition research, stereo imaginative and prescient cameras are widely used in facial popularity processing to produce three-D imagery. An extensively used approach is to reconstruct facial dots to provide a three-D face image that can be used for face reputation techniques. From a few preceding studies, the usage of stereo imaginative and prescient cameras has no longer been widely used to provide a 2D combo of pix from the right lens and left lens. The use of stereo imaginative and prescient digicam will be very beneficial to produce a face popularity method and can be used to expect falsification of facial records on the presence device primarily based on the sample of face reputation symmetry.

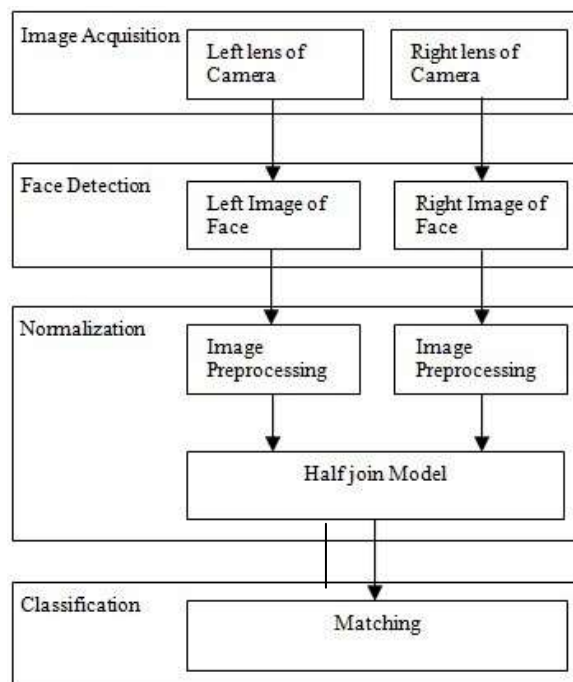
Face popularity based on the sample of facial symmetry uses face geometry including eyes, nose, mouth and cheeks on human face. This pattern of facial symmetry is fashioned from the association of organs on the face primarily based on the vertical axis of the face. Based on the use of face symmetry patterns, face detection and recognition studies are divided into half of-face, full-face and 1/2-face and complete-face studies.

Research to reconstruct half of-face images into complete face snap shots based on density characters from a few organ capabilities consisting of eyes, ears, nostril, mouth and cheeks on a facial photograph taken from a digital camera from a few attitudes of retrieval is developed with the aid of [2]. Face detection studies uses the traits of facial symmetry styles in detecting human faces in addition to understand the gender of the facial picture caught on camera has been accomplished by means of [3]. Face popularity studies based on facial symmetry with the half-face approach used to technique 2D imagery as training image is done via [4]. Face recognition research the usage of half-face approach executed with the aid of [4] is then persevered and evolved on face reputation the use of the equal technique but the use of 3-D imagery [5]. [6] behavior faces recognition research using facial symmetry strategies inside the training system. [7] maintain facial recognition studies primarily based on formerly done facial symmetry via [6]. This study also uses the unique photograph mirroring approach and integrates with

the original 2D photograph of a single imaginative and prescient retrieval technique for use in face recognition.

[8] has been carried out the development research of face reputation research that has been performed by way of [6]. The examine also utilizes facial symmetry patterns to be used in face popularity techniques. Facial popularity studies primarily based on geometry strategies by using making use of facial symmetry kinds such as eye, nostril and mouth factors has additionally has been performed by using [9].

This research will increase a face reputation version the use of dual vision digital camera to provide 2D images on each digicam lens [10]. Region of Interest (ROI) picture of face detection that has been resulted the usage of the technique of normalization is then processed using the technique of combining between left and proper lens image results. Two images are joined by way of combining a number of the left snap shots of the face detection of the left lens with some of the right image of the face detection of the proper lens. The result of this mixture can produce an aggregate image of face detection end result on each lens from stereo imaginative and prescient camera, so it can be used inside the system of feature extraction and class. The manner of this mixture is a new contribution in order to be useful within the development of presence machine model primarily based on face popularity particularly the presence machine that is capable of expect the falsification of face photo information.



II. METHODS

The proposed approach in this take a look at is a face popularity method using half of-be part of normalization with dual imaginative and prescient digicam as a face image acquisition device and its feature extraction.

- Image acquisition:

Image acquisition is used to capture the human face image that used as statistics at the face detection system. Face photo acquisition makes use of a stereo vision digicam that has lenses at the left and proper. The human face picture is taken in actual-time from the frontal view with a facial deviation to the camera approximately 15 o at the X, Y and Z-axes.

- Face detection:

Face detection the use of a stereo imaginative and prescient camera is performed based totally at the Viola-Jones face detection technique [12]. Face detection is accomplished on every of the left and proper lenses of the stereo imaginative and prescient digicam. Face image that taken from the left and right lenses is a raw picture that containing the history picture and face image. The method of detecting and searching facial features at the digital camera is further marked to be tracked photograph as output, at this level the device recognizes the pattern as a face or no longer. The detected face photo that generated through each digicam lens is marked with the aid of the location of the coordinate point of the area of hobby (RoI) of the ensuing face picture.

- Normalization:

Normalization is a technique performed on facial pics which have been detected in the face detection. Normalization has two ranges of facial photo processing: preprocessing stage and 1/2-join level.

- Reprocessing:

Reprocessing is the method of mixing several models of facial photograph processing. In the reprocessing, we use the approach of cropping, RGB-Gray, resizing, and assessment-brightness adjustment the use of histogram equalization to produce records that may be used to improve face popularity to be choicest. The reprocessing technique that carried out in this examine is used to improve the sharpness of the photo and can be used to count on the life of variations of luminance on the way to seem on the time of catching the face image.

• Half-Join Method:

The Half-join a part of technique is a human attitude model the usage of eyes to peer and recognize someone. Both eyes in people are then represented the usage of a twin vision digicam that has a left and proper lens. This method combines 1/2 of the left photograph and 1/2 of the proper photo into a picture that is ready to be extracted. Half-join part of that used in this research is a technique that divides comparable width between the face picture on the left and proper lenses on a digicam. We decide the width of the face image (w / width) in pixels after which decide the midpoint of the face picture (c / middle) by way of dividing the width of the face photo into 2 components. The point of intersection of the long way left ($x =$ zero) up to one pixel earlier than the midpoint of the photo ($x = c-1$) is particularly the photo of the face of the left lens. The factor of intersection of the midpoint of the photo ($x = c$) as much as the proper-most point of the picture ($x = w - 1$) is namely the photograph of the face of the proper lens. The photograph of the left half of the left lens of the camera that blended with the photograph of the right half of the proper lens camera will end result blended face photo.

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1. Start
2. Determine  $w$ ,  $w \leftarrow$  wide of image
3. Calculate the center of face  $c$ ,  $c \leftarrow w/2$ 
4. Det. left face area  $shj_{left}$ ,  $shj_{left} \leftarrow \sum_{x=0}^{c-1} C$ 
5. Det. right face area  $shj_{right}$ ,
 $shj_{right} \leftarrow \sum_{x=c}^{w-1} W$ 
6. Joining process  $shj$ ,  $shj \leftarrow shj_{left} + shj_{right}$ 
7. End
    
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Fig.2. Half-join algorithm

III. RESULTS AND DISCUSSION

TABLE 1. THE COMPARISON OF FACE RECOGNITION RATE

Images	Recognition Rate (%)			
	Euclidean		Mahalanobis	
	PCA	3Wavelet-PCA	PCA	3Wavelet-PCA
100	96.00	95.00	98.00	97.00
200	96.77	95.50	98.25	97.50
300	97.33	96.00	98.33	97.67
400	97.75	96.50	98.50	98.00

TABLE 2. THE COMPARISON OF FACE RECOGNITION TIME

Images	Recognition Time (ms)			
	Euclidean		Mahalanobis	
	PCA	3Wavelet-PCA	PCA	3Wavelet-PCA
100	16.31	6.84	15.24	2.45
200	18.87	7.57	16.76	2.66
300	20.45	8.42	18.69	3.48
400	22.41	8.76	20.65	4.76



(a)



(b)

IV. CLASSIFICATION

The approach of class that used on this study is Mahalanobis distance technique. Mahalanobis distance approach is used to determine the extent of similarity among functions so that it could produce a more ultimate face popularity. The dedication of facial function similarity is decided by evaluating the facial functions of the training that have been stored in the database in comparison to the facial features at the time of the check. The result is the identification of facts which is then stored because the presence records.

V. RESULT

The assessment of the ensuing photo of the halfjoin method with the image of the outcomes of the preceding studies can be seen in Fig. Three. The output photograph of the half-of-join method is then processed the use of 3 stage of the wavelet. The wavelet decomposition picture is then processed the use of PCA and produces a dimensional discount of face picture resolution up to 20x20 pixels.

VI. CONCLUSION

To reduce the ability for forgery of facial data on facial presences device, this research makes use of lens digital camera (stereo imaginative and prescient digicam). Stereo imaginative and prescient cameras can produce detectable

facial photo statistics from two capture positions i.e. from the left lens and the right lens. The half-be a part of method is used to generate a merging photo of half of the left lens picture and half of the proper lens photo. The half-be part of approach that used in reprocessing can produce a face popularity with excessive accuracy and shorter face recognition times. This approach can be used in a face presence gadget so that it will decrease forgery of facial records along with using facial snap shots of a person or a photo similar to someone's face. In the assessment take a look at outcomes of face recognition accuracy, this technique can produce face recognition accuracy up to ninety eight% and better than the face popularity approach based totally on other half of face picture pattern.

REFERENCES

- [1] E. Winarno, A. Harjoko, A. M. Arymurthy and E. Winarko, "Development Of Face Recognition System And Face Distance Estimation Using Stereo Vision Camera", *Journal Of Theoretical And Applied Information Technology*, 67, 3, 652-657, 2014.
- [2] W. Chen, T. Sun, X. Yang & L. Wang, "Face detection based on half face-template", In *Electronic Measurement & Instruments*, 2009. ICEMI'09. 9th International Conference on (pp. 4-54). IEEE, 2009.
- [3] J. E. Tapia, & C. A. Perez, "Gender Classification Using One Half Face and Feature Selection Based on Mutual Information", *Systems, Man, and Cybernetics (SMC)*, 2013 IEEE International Conference on (pp. 3282-3287), IEEE, 2013.
- [4] J. Harguess& J. K. Aggarwal, "A case for the average-half-face in 2D and 3D for face recognition", *Computer Vision and Pattern Recognition Workshops, CVPR Workshops 2009*, IEEE Computer Society Conference on (pp. 7-12), IEEE, 2009.
- [5] J. Harguess& J. K. Aggarwal, "Is there a connection between face symmetry and face recognition?.", *Computer Vision and Pattern Recognition Workshops (CVPRW)*, 2011 IEEE Computer Society Conference on (pp. 66-73), IEEE, 2011.
- [6] Y. Xu, X. Zhu, Z. Li, G. Liu, Y. Lu & H. Liu, "Using the original and 'symmetrical face' training samples to perform representation based two-step face recognition", *Pattern Recognition*, 46(4), 1151-1158, 2013.
- [7] Y. Xu, X. Li, J. Yang, & D. Zhang, "Integrate the original face image and its mirror image for face recognition", *Neurocomputing*, 131, 191- 199, 2014.
- [8] M. Qiu, W. Liu & J. Cao, "Integrating the original face images and "symmetrical faces" to perform face recognition", *Optik-International Journal for Light and Electron Optics*, 125(11), 2665-2670, 2014.
- [9] J. Choi, Y. Dumortier, S. I. Choi, M. B. Ahmad & G. Medioni, "Realtime 3-D face tracking and modeling from a webcam", *Applications of Computer Vision (WACV)*, 2012 IEEE Workshop on (pp. 33-40), IEEE, 2012.
- [10] E. Winarno, A. Harjoko, A. M. Arymurthy and E. Winarko, "Face Recognition Based on Symmetrical Half-Join Method using Stereo Vision Camera." *International Journal of Electrical and Computer Engineering (IJECE)* 6.6 (2016): 2818-2827.
- [11] E. Winarno, A. Harjoko, A. M. Arymurthy and E. Winarko, "Improved Real-Time Face Recognition Based On Three Level Wavelet Decomposition-Principal Component Analysis And Mahalanobis Distance", *Journal of Computer Science*, 10, 5, 844-851, doi:10.3844/jcssp.2014.844.851, 2014.
- [12] P. Viola & M. Jones, "Rapid object detection using a boosted cascade of simple features", *Proceeding IEEE Conference on computer vision and pattern recognition 2001* (1-9), 2001.