

Analysis of Face Detection Techniques

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Abstract

The image processing is the technology which can process the information which is stored in the form of pixels. The face recognition is the technique of neural networks for the bio metric system. The face spoof is the attack which is possible in the bio-metric systems. The face detection systems are broadly classified into classification systems and AI systems. In this review paper, the classification techniques for the face detection is reviewed and analyzed in terms of certain parameters

KEYWORDS-Classification, SVM, KNN

1. INTRODUCTION

The development of real-time vision modules has been facilitated due to the advancement in the computing technology with human interaction. Faces in the biometric systems are used as non-intrusive input modules, before applying any recognition algorithm, it is essential to locate faces in a scene. In order to attain the attention of the user, an intelligent vision based user interface has been utilized to respond accordingly. In the area of digital cosmetics, to detect facial features accurately it is required to locate and registered first to facilitate further processing [1]. The success of any face processing systems depends upon the face detection as it plays critical role in determining the desired person. The identification of the face is a major challenge as it has to determine all possible appearance variation caused by change in illumination, facial features, occlusions and many more. It also has face challenge when face appear at different scale, pose, with in plane rotations. Tremendous progress has been made in the last decade and real-time performance has shown by many systems instead of all these difficulties.

Face detection is the process in which an image or object is scanned and taking the resultant datasets, it is also known as creative process. With the help of algorithm, it takes a high level of coding by which moving images from a running video stream can be detected easily and also captured different poses from dataset. In image processing, it is the most popular areas of research, it also has wide range of real-world applications including surveillance, access control, identity authentication, and photo based image detection and recognition [2].

Face detection is mainly the first step in image recognition that perform two functions firstly, whether human faces appear in a given image and secondly, where their faces are located. After doing face detection on input image we get patches for every face in the input image. In order to justify orientations and scales of these patches face alignment are performed that help in making face recognition system more robust or easy to design. It is the pre-processing step for face recognition. Feature Extraction is the process after completion of first step where human patches are extracted from images that can't be used directly for face recognition. The face extraction has been performed on patches that do information packing, dimension reduction, salience extraction, noise cleaning and remove the drawbacks. Face Recognition is the last step in the process of face recognition that recognizes an identity of these faces [3]. There is need to build a face database in order to achieve automatic recognition in which several images are taken of each person and then their features are extracted and stored in the database. Face Identification is the step in which a face image is given and the system has to tell who he / she is or the most probable identification. Face Verification is the step in which a face image and guess of the identification is given, the system has to tell that guess is true or false.

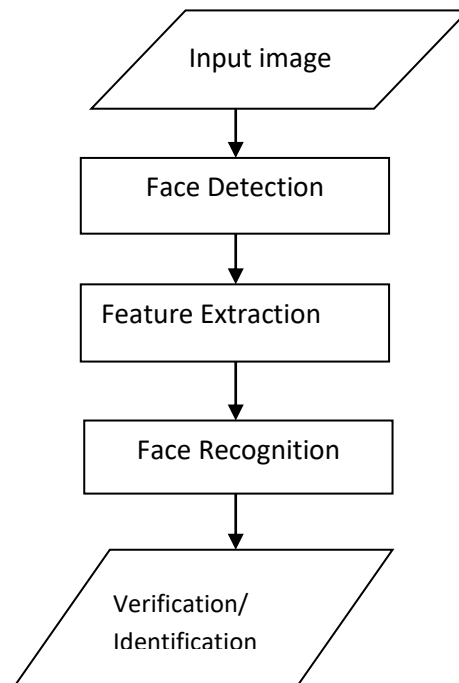


Fig. 1: Flow chart of general process of face recognition

1.2 Methods for Face Spoofing Detection

Motion based methods: This method is utilized mainly for the printed photo attacks and to overcome these attacks by planning properly to get a vital sign for vitality and the subliminal motion of organs and muscles in a live face, for instance, eye blink, mouth advancement and head pivot.

Texture based methods: The texture based methods were proposed to counter the printed photo and replayed video attacks and to separate the image antiquities from spoof face images [4]. On the Idiap and CASIA databases, texture based methods have made significant progress. Texture based methods require only a solitary image to identify a spoof instead of all like motion based methods.

Methods based on image quality analysis: A biometric liveness detection procedure was proposed currently for the procedure of iris, unique mark and face images using 25 image quality measures, including 21 full-reference measures and 4 non-reference measures. The speculation capacity under cross-database situations is enhanced by the proposed approach as it has complexity, which rarely explored in the biometrics community.

Methods based on other cues: The signals derived from the sources aside utilizes, the signals for the Face spoof countermeasures from 2D intensity image, for instance, 3D depth, IR image, spoofing context, and voice has likewise been projected [5]. An additional need is imposed by this method on the user or the face recognition framework due to which its applications are less vary.

2. LITERATURE SURVEY

Bhavani K1, et.al 2017 presented all the captured images under controlled situations are handled by face detection systems. All the present images are in poor conditions such as varied orientations, mismatched expressions. A low level performance is shown by the traditional face detection and recognition algorithms on such images. In this paper, an efficient method for face detection and recognition was proposed which is capable to real-world conditions that can be trained using very few training examples and is technically efficient [6]. A frontal image alignment process is present in the proposed method followed by classification using sparse representation techniques. Therefore, for the extraction of the face detection and recognition, a simple and feasible algorithm has been utilized in order to obtain optimal performance.

Tanvi B. Patel, et.al (2017) presented the emerging technology which is efficient in verifying or identifying a face from query image or input image known as face recognition. In this paper, term occlusion is used which means irrelevant objects that hinder face recognition, for example, face covered with scarf, wearing glasses, beard, and cap [7]. This issue is considered as the major challenge in face recognition systems. Hence, an effective method has been proposed for the detection of occlusions by which missing information in the occluded face is specified. Viola-Jones algorithm has been utilized for face detection, fast weighted PCA has been utilized for occlusion detection and reconstruction of face such as Neural Network (NN). Principal Component

Analysis (PCA), Local Binary Pattern (LBP), Eigen faces are the other appropriate methods. Hence, occluded face are detected and recognized using proposed method with the help of given same faces from the database.

Afef SALHI, et.al (2017) Presented a novel method based on four algorithms such as block-matching (BMA), Meanshift, Camshift and Kalman filter for the face detection and tracking system [8]. This combinational method provides the better face detection and tracking. Proposed method increases the performance and other criteria values in the embedded system. In the computer vision most challenging application is tracking objects efficiently in video sequence. The best algorithms are far from reaching the speed and the performance of system, though progress has been accomplished. It is the key to solve a number of computer vision applications because Object or multi-object tracking (face, human, car, etc.) is a fundamental problem which is minimized using this method.

Kudzaishe Mhou, et.al (2017) presented a method that uses the light for reflection patterns and night vision infrared to detect spoof attacks as the different materials response differently to light. Author in this paper developed a system using Laplacian blur detection, Gabor filters, color moments and Local Binary Patterns [9]. This proposed method indicate the authenticity of the face whether it is real or fake, it also calculate the reflection of light on different material. As compared to other existing methods, proposed method worked well in a lighting controlled environment. Optimal results are obtained when a single light source when capturing a sample for preprocessing. They also created their own dataset using several cameras that add additional source to the existing CASIA-FASD and MSU MFSD public datasets.

Panteleimon Chriskos, et.al (2017) proposed a face detection hindering method in order to prevent the threats faced by peoples in their data, privacy and automatic video analysis may cause. The first step in human-centered video analysis is the face detection in images or videos such as automatic face recognition. Automatic face recognition is also becomes difficult or doubtful due to hindering face detection. Therefore, they examined two methods based on applications [10]. A naive approach is considered in the first step in additive or impulsive noise is added to the input image, until the point where the face cannot be automatically detected anymore. The application of the SVD-DID face de-identification method was examined in the second step. As per performed experiments, it is concluded that both methods provides the high face detection failure rates.

Yingxin Lou, et.al (2017) Proposed architecture based on a pre-trained VGG-16 network for both object and face detection tasks known as Pt-Net detection method [11]. This Pt-Net method uses further four methods and achieves a 76.8% mAP such as a linear combination of pre-trained model and CNN output, (2) multi-feature maps and concatenation from multiple layers, (3) generating proposals via particle filter method, (4) a novel overlap area loss function for localization. As per performed experiments, it is concluded that proposed method provides better performance as compared to other methods in terms of both in speed and accuracy.

Dwi Ana Ratna Wati, (2017) presented face detection and recognition systems which is specifically designed for the security of smart home applications. MyRIO 1900 was utilized to implement the design and LabVIEW for programming. MyRIO and computer were connected through a wifi network. A webcam is connected to MyRIO using USB cable in order to take the image of the person [12]. The performance of the face detection is examined by testing the various attributes such as change in distance, light intensity, light position angles, person's accessories and shirt colour. When it is tested using real time image, the face recognition system achieved the 80% of accuracy. In order to increase the security level, it is required to have password with combination when it is applied to real smart home security system.

Neha D. Patil, et.al (2016) presented two methods, Image Distortion Analysis (IDA) and Principle Component Analysis (PCA) both the methods are effective and efficient for face spoof detection. Various features were analyzed in case of IDA such as Specular Reflection, Blurriness, Chromatic Moment and Color Diversity and all these features are concatenated to each other [13]. In PCA, PCA feature vector is found by calculating the eigen vectors and eigen values of the data covariance matrix. In multiple SVM classifiers all the extracted vector features of the IDA and PCA are embedded. All the proposed methods are used on different samples in order to check whether it is a spoof face or genuine face and performance of both the methods were compared.

Author's Name	Year	Description	Outcomes
Bhavani K, Dhanaraj V, Siddesh N V, Ragav Vijayadev, Uma Rani	2017	In this paper, an efficient method for face detection and recognition was proposed which is capable to real-world conditions that can be trained using very few training examples and is technically efficient.	A simple and feasible algorithm has been utilized in order to obtain optimal performance.
Tanvi B. Patel, Prof. Jalpa T. Patel	2017	Presented the emerging technology which is efficient in verifying or identifying a face from query image or input image known as face recognition. In this paper, term occlusion is used which means irrelevant objects that hinder face recognition, for example, face covered with scarf, wearing glasses, beard, and cap.	occluded face are detected and recognized using proposed method with the help of given same faces from the database
Afef SALHI, Yacine MORESLY, Fahmi GHOZZI and Ahmed FAKHFAKH,	2017	Presented a novel method based on four algorithms such as block-matching (BMA), Meanshift, Camshift and Kalman filter for the face detection and tracking system.	It is the key to solve a number of computer vision applications because Object or multi-object tracking (face, human, car, etc.) is a fundamental problem which is minimized using this method.
Kudzaish Mhou	2017	In this paper a system is developed using Laplacian blur detection, Gabor filters, color moments and Local Binary Patterns. This proposed method indicate the authenticity of the face whether it is real or fake, it also calculate the reflection of light on different material.	Optimal results are obtained when a single light source when capturing a sample for preprocessing. As compared to other existing methods, proposed method worked well in a lighting controlled environment.
Panteleimon Chriskos, Jonathan Munroy, Vasileios Mygdalisy, Ioannis Pitasy	2017	Proposed a face detection hindering method in order to prevent the threats faced by peoples in their data, privacy and automatic video analysis may cause.	As per performed experiments, it is concluded that both methods provides the high face detection failure rates.
Yingxin Lou, Guangtao Fu, Zhuqing Jiang1, Aidong Men, and Yun Zhou	2017	Proposed architecture based on a pre-trained VGG-16 network for both object and face detection tasks known as Pt-Net detection method. This Pt-Net method uses further four methods and achieves a 76.8% mAP	Concluded that proposed method provides better performance as compared to other methods in terms of both in speed and accuracy.
Dwi Ana Ratna Wati, Dika Abadianto	2017	Presented face detection and recognition systems which is specifically designed for the security of smart home applications.	In order to increase the security level, it is required to have password with combination when it is applied to real smart home security system.
Neha D. Patil, Sujata V. Kadam	2016	In this paper a system is developed using Laplacian blur detection, Gabor filters, color moments and Local Binary Patterns. This proposed method indicate the authenticity of the face whether it is real or fake, it also calculate the reflection of light on different material.	Optimal results are obtained when a single light source when capturing a sample for preprocessing. As compared to other existing methods, proposed method worked well in a lighting controlled environment.

CONCLUSION

In this paper, it is concluded face detection is the efficient approach for the bio-metric systems. The face detection systems are broadly classified into deep learning and classification techniques. In this review paper, various techniques of classification are reviewed in terms of certain parameters

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