

Recent Advances in Signature Verification and Facial Recognition Algorithms

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Abstract

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Article History Article Received: 18 May 2019 Revised: 14 July 2019 Accepted: 22 December 2019 Publication: 21 February 2020 iometric techniques are very reliable. Biometric verification is generating high interest recently. Biometric verification methods are used to verify the authenticity of the individuals. It is getting a reliable method of verification. Face recognition and signature verification are very common biometrics techniques. Many researchers are working on face recognition technology and signature verification. In this paper recent advancements in facial recognition and signature verification technology are presented. The detailed analysis indicates that low light identification is still a tedious task and there is intraperson variations in the signatures.

Keywords: Biometrics, FAR, FRR

I. INTRODUCTION

Biometric distinguishes the physiological or behavioural traits. These are then used as an automatic means of recognizing a person [1]. There are many features that can be measured like; face. fingerprints, iris, voice, signature. hand geometry and retina. Biometric method provides highly secure solution to identification and personal verification systems. Now a days the transaction frauds are increasing at a rapid rate due to which a highly secured personal verification and identification system is required. Biometric can solve this purpose. It provides highly secure environment for financial transactions.

The two of many biometric aspects of a person are as follows:

Signature verification:Signature analysis is a useful tool for analysing the signing pattern of a user. Along with the

static shape of the signature the dynamic features like pressure, speed and velocity are also important factors.Automatic signature identification is considered to be an important category of biometrics. Signature verification is widely accepted at social and legal front [2]. People are accustomed to offline signatures as the signatures are used in normal transactions related activities. This is the reason that the signature verification method can very simply be included as a biometric method.

Face recognition:In face recognition the face of a user is identified by analysing the face features. The face can be captured from the facial image, captured by a digital camera. These categorized features can then be used in authentication processes.



II. BRIEF REVIEW

[1] Mokhayeriet. al. implemented facial recognition in video surveillance. They tried to detect individuals from the recorded video. They stated that there is a deference in performance of face recognition, when recognized from video instead of image.

[2] Atallahet. al. provided a method of age estimation from the critical review of face recognition methods. There are several challenges in face recognition techniques. They presented a detailed comparison about the different approaches of verification methods. They concluded that the same algorithm provides the difference of performance when implemented on different datasets.

[3] Abuzneidet. al. explained that due to different light effects there is a change in the complexity of the human face. They usedBPNN. The features were extracted on the basis of the correlation between different training images. T-Dataset was generated with the help of original set of data, the training dataset. This T-Dataset is utilized in the training of BPNN. This new Dataset does not uses image density instead it makes the use of correlation between the training set. Due to this algorithm converges faster than usual and better accuracy isachieved. The YALE and AT&T data sets were used.

[4] Azzopardi et. al. developed a method to determine gender from images. They proposed a method that fuses trainable features and domainspecific features to recognize the gender of the face extracted from face images. The method was evaluated on a new data set. This data set was acquired in real scenarios.

[5]Karet. al. proposed a novel technique. This technique is named as Stroke Point Warping (S P W). They took two signatures of every user and incorporated the normalized correlation coefficient between these signatures. They used two functional features. These features areinstantaneous phase and shape of signature. They utilized the SVM (Support Vector Machine). They used SVC2004 database and achieved the EER of 1%.

[6] Tang et. al. explained that intrinsic noise of reference samples (intravariability) and individual features (intervariability) are main reason for degradation of performancein signature identification systems. To avoid this, they introduced. In information divergence, test samples are the shifted version of reference samples. They used SUSIG and MCYT-100 databases and achieved EER of 3.16% and 2.13%.

[7] Choi et. al. used two types of features local and holistic. These features were derived from the whole face. They constructed a composite feature vector from these extracted holistic and local features for face recognition. Two features were extracted then the amount of discriminative information in the composite features were measured. The result derived from the composite features was compared from that of holistic features and local features. The proposed system exhibited better performance as compared to existing systems.

[8] Huang et al. proposed a new on-line signature verification method. In this paper two methods were used for these verification techniques. These methods are Support Vector Machine(SVM) Description and Genetic Algorithm (GA). On-line signatures data was analysed and many (27-parameter) features were used to form a set of parameters. These parameters include shape and dynamic features. They used SVC2013 signature database. This database was used for verification purpose. The use of global parameters, which are used in this case, provides antiinterference between signatures but they do not provide the local details of different signatures.

[9] Ruben Tolosana et al. divided proposed approach to two stages. They first implemented pre-processing stage. In this stage, different



devices were used to acquire data and the acquired data is processed in such a way that all the signals are normalize in similar ranges. Features wereselected inthe second stage which were robust in these conditions. They used DS2 and DS3 data sets which have dynamic features of signatures. These data sets consider the signatures from more than one session and they also simulate real operation conditions of signature collection. It provides an average improvement of performance. The EER for random forgeries cases comes out to be 60.3% while for baseline systems it comes out to be 26.5%. Two different systems are considered.

[10] Napa Sae-Bae et al. used mobile deviceshaving touch interface. They used two datasets for training SUSIG and MCYT-bimodal biometric data sets. There are two benefits of this algorithm. The first benefit is that the feature set that uses a histogram requires a small space. This memory space can be pre specified. It stores the signature template. This memory can be protected and the privacy of the reference biometric data can be maintained. The second advantage is that only the template of the desired user is required for sample signature and one need not to train the network by a large dataset, that contain signature data from all other users. They observed that as the training sample becomes older as compared to the test sample, it lowers the performance of the system. So some technique is needed such that the templates are updated regularly, in this way the performance of the system will be stabilized.

[11] Marta Gomez-Barrero et al. stated that skilled-forgery is one of the biggest challenges that may come across the researcher in case of on-line signature identification. They proposed a new scheme. In this scheme they used the theory of Kinematic for rapid movements of human and the Sigma-Log-Normal model associated with it. They used DTW-based systems that provide high performance in verification tasks. They used Biosecure-ID multimodal database which comprises a large number (400) of subjects. They showed that DTW-based system provides the improved performance for random and skilled forgeries.

SN	Reference	Authors	Strength,	Weakness or	Opportunities	Remark
	No.		Tools &	Research		
			Technology	Gap		
1.	[2]	R.R.Atallah,	-Facial	-	-	-
		et. Al.	features can			
			be used in			
			face			
			recognition as			
			well as in age			
			estimation			
			-The			
			collection of			
			database (face			
			images) is			
			very difficult			
			over a long			
			period of time			



			for the same person -The age of person is very important factor for face identification			
2.	[3]	M.A. Abuzneidet. Al.	-Correlation between the training images is determined and features are extracted -Training by BPNN - AT&T and YALE data sets	-There is some change in the human face complexity of -Challenges due to variability of illumination -Not applied modern NN	- Convolutional NN can be applied to increase accuracy	- Convolutional NN algorithm provides better results than conventional ones
3.	[4]	G.AzzopardiA Greco, et. Al.	-Gender recognition from face images -Face alignment is very important it leads to high accuracy rates -GENDER- FERET dataset	-Simple alignment method is implemented in face is rotated to an upright position	- Sophisticated algorithms like skewness might be robust than variance	-Face alignment is important
4.	[5]	B. Kar, et. Al.	-A technique SPW (Stroke Point Warping) is proposed -The normalized correlation	-The random forgery scenario is not considered -Blind testing stages are not	-Algorithm should be tested on both random and skilled forgery	-Signature's features should be normalized



			coefficient is improved - Peaks and valleys of the signatures are given due	considered		
			importance - SVC 2004 database			
5.	[6]	L. Tang, et. Al.	-Distance normalizations techniques areanalyzed in-depth -MCYT-100 and SUSIG signature databases	-Distance normalization strategy does not provide an absolute solution -Intra- variability affects the performance	-Intra- variability noise should be reduced	-Proper aligning of signature is required
6.	[7]	S. I. Choi, et. Al.	-Extracted holistic features and local features -Constructed a composite feature vector	-Increases complexity and hence execution time	-Use of composite features provide efficient algorithms	-Execution time is also an important parameter

III. IDENTIFICATION OF RESEARCH GAP AND PROBLEM

The research problem can be identified as follows:

1. The features of a signatures are classified in 2 categories. These areLocal features and Global features.The use of global features parameters of signature provide strong anti-interference capability and calculation become simpler but the local details distinguish ability is reduced. 2. The pressure applied during signingis not a reliable feature to be considered alone in distinguishing forgeries from genuine signatures.

3. The performance of different Face verification techniques is different for different data sets.

4. Variant poses, personal appearances, number of light sources, the variability of facial expressions, variability in lighting intensity, orientation of the camera and



illumination are the major issues in face recognition systems.

5. The forgeries can be divided in two different classes: Skilled forgery and Random forgery. Algorithms are verified for database which contain data from skilled forgersandrandom forgers. To improve the performance of the system more parameters might be include afterwards.

6. Out of many selected features small number of features are suitable for training of Neural Network. Features can be either global features like number of strokes or they can be local features like gradient and projection of signatures. These can be used to improve the performance of the system.

7. Researchers are working on online signature verification or face recognition. Combining these two techniques may provide a better solution to secure financial transactions.

IV. EXPECTED IMPACT ON ACADEMICS/ INDUSTRY

In present scenario the signatures are used as an extensive tools to secure the financial transactions. The verification method involves humans and humans are mostly prone to error. This makes the possibility of a fraud very high. The proposed research may provide a solution to above problem. The verification for a financial transaction will be very secure.

V. CONCLUSION

Biometric verification is generating high interest recently. Using biometrics one can verify the identity of an individual. It is getting a reliable method of verification. Face recognition is one of the biometrics techniques. Many researchers are working on face recognition technology and signature recognition methods. In this paper the recent advancements of facial recognition technology and signature verification method are presented. The detailed review of literature indicates that low light identification is still a tedious task.

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