Implementation of Feature Level Fusion of Face and Ear in Multi-Modal Biometric System

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Abstract – In this paper discusses a new multimodal biometric based on face and ear. Multi modal biometric system is one of the major areas of study identified with large applications in recognition system. Single modal-biometric systems have to challenge with a variety of problems such as noisy data, intra-class variations, non universality and unacceptable error rates. Some of these limitations can be solved with multi modal Biometric systems. Human Identification is the primary goal hence; Researchers have proposed various biometric human identification system are most widely used such as face, iris, fingerprint, hand and palm etc. In this paper we are going implement a multi modal biometric system. Our aim is to develop algorithms that will overcome the disadvantages of current biometric system.

Keywords- Multi-biometrics, Biometrics, Fusion level, Feature extraction.

1. INTRODUCTION

Automated recognition of individuals based on their behavioral and biological characteristics is called biometric Some examples of biometric characteristics are fingerprint, iris, face (2D and 3D), retina, palm print, hand veins, ear, DNA, voice, signature, gait, typing patterns, etc. These characteristics are denoted as biometric traits or modalities. Since the biometric traits are intrinsically bound to the person, they can be used to establish his identity with high degree of confidence. A classical biometric system, involves two distinct phases: enrollment and comparison. During enrollment, biometric information multiple biometric image is captured using specific sensors. This information is processed using specifically designed algorithms to obtain pertinent features. These features are used to create a reference biometric template for the user. The features may be represented as a fixed dimension feature vector or a feature set of variable dimension eyes and fingerprint minutiae. This reference biometric template is required at the time of verification for comparison purposes and hence, the biometric templates for all such registered users are stored in a central template database for further comparisons.

At the time of comparison, a fresh sample of the biometric measurement is captured and similar process, up to obtaining pertinent features, is followed. These features are compared with the stored templates. Typically, biometric systems can operate in two distinctive mode first is the identification mode and second is the verification mode. In other words, during identification, the information extracted from the fresh biometric data is compared with all the stored templates and the identity of the person to which the biometric data belongs is determined. In verification, the person who wants to get verified provides his identity along with his biometric data. A one-to-one comparison is carried out between the information extracted from the fresh biometric data and the stored template corresponding to the provided identity and the result of this comparison is either accept or reject.

Most of the new applications of technology employ some kind of biometrics for authentication purposes biometrics is the use of personal authentication for use. Biometrics deals with identification of a person based on biometric traits such as face, ear, fingerprint, iris etc. Are the use but combination is not used ear and face for implementation..As a result, recognition based on a single biometric trait may not be sufficiently robust and it has a limited ability to overcome spoofing. The biometric technologies can be combined to provide enhanced security over a single modal biometrics, which is called as multimodal biometric system. Biometric systems deployed in current real-world applications are primarily Unimodal, i.e., they depend on the evidence of a single biometric

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marker for personal identity authentication (e.g., single ear or face). Unimodal biometrics are limited, because no single biometric is generally considered both sufficiently accurate and robust to hindrances caused by external factors. Several of the limitations imposed by Unimodal biometric systems can be overcome by incorporating multiple biometric markers for performing authentication. Such systems, known as multimodal biometric systems, are expected to be more reliable due to the presence of multiple, independent pieces of evidence. However, the incorporation of multiple biometric markers can also lead to additional complexity in the design of a biometric system. For instance, a technique known as data fusion must be employed to integrate multiple pieces of evidence to infer identity

Biometrics:

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Multi-biometrics:

Multi-biometrics system is the important development in the field of biometrics is to combine information from multiple biometric sources . A system that consolidates the evidence presented by multiple biometric cues is known as a multi-biometric system. Multi-sensor – in which, more than one sensors are used to capture information from the presented biometric trait (e.g., capacitive and optical sensors for fingerprints). Multi-sample – when more than one recording of the biometric trait is used (e.g., multiple face images can be used for creating the template). Multi-algorithmic – where the same biometric data is processed through multiple algorithms (e.g., minutiae and texture based features for fingerprints). Multi-unit or multi-instance – in which, multiple instances of the same biometric trait are used (e.g., information from images of left and right irises is combined) Multi-modal – when more than one biometric traits are used (e.g., a combination of iris and face). The problem of consolidation of information presented by multiple biometric sources or cues from any of the types mentioned above is known as information fusion. The information fusion in a biometric system can be carried out at different levels Multimodal biometrics system involves various fusion levels. First is the **Sensor Level** – Information coming from different sensors is combined. Second is the **Feature Level** – The biometric information extracted in

form of features is combined. Third is the **Score Level** – Match scores of individual biometric comparisons are combined. Fourth is the **Decision Level** – The results of individual biometric comparisons are combined. and final is the **Rank Level** – When the output of each biometric system is a subset of possible matches (i.e., identities) sorted in decreasing order of confidence, the fusion can be done at the rank level. This is relevant in an identification system where a rank may be assigned to the top matching identities. Feature level fusion of face and ear in multimodal biometric system are the use feature level.

2. RELATED WORK

Kirti V. Awalkar, Sanjay G. Kanade, Dattatray V. Jadhav we developed amulti-modal and multialgorithmic biometric system by combining iris and face. The iris features are extracted using the Daugman's algorithm which results in binary features. For face, we used two types of features: Gabor filters based and Local Binary Patterns (LBP) based. We performed extensive experiments to evaluate the system on publicly available databases using standard welldefined protocols[1].

R. Brunelli and D. Falavigna Multimodal systems combine the evidence presented by different body traits for establishing identity. They proposed a multimodal biometric systems utilized face and voice features to establish the identity of an individual (Brunelli and Falavigna. Physically uncorrected traits (e.g., fingerprint and iris) are expected to result in better improvement in performance than correlated traits (e.g. voice and lip movement). **[2]** M. Eskandari and O. ToygarThey presents an efficient technique for the fusion of face profile and ear biometrics. They proposed to use Block-based Local Binary Pattern (LBP) to generate the features for recognition from face profile images and ear images. These feature distributions are then fused at the score level using simple mean rule. Experimental results show that the proposed multimodal system can achieve about (97:98%) recognition performance, compared to unimodal biometrics of face profile 96.76%, and unimodal biometrics of ear 96.95%. Detailed comparisons with other multimodal systems used in the literature, like Principal Component Analysis (PCA), Full-space Linear Discriminate Analysis (FSLDA) and Kernel Fisher discriminate analysis (KFDA), are presented results of the individual face and iris classifiers.[11] Z. Zhang, R. Wang, K. Pan, S. Li, and P. ZhangFusion of NIR face and irises can improve the accuracy. In case of fusion of face and two irises, the genuine accept rate (GAR) increases from 97.35% (face biometric) to 99.75% on a close set and from 83.31% (face biometric) to 98.12% on an open set when false accept rate (FAR) is at 0.001. Fusion of multiple biometrics has a higher accuracy than fusion of multiple

units of the same biometric[3] Y. Wang, T. Tan, and A. K. Jain Face and iris identification have been employed in various biometric applications. Besides improving verification performance, the fusion of these two biometrics has several other advantages. We use two different strategies for fusing iris and face classifiers. The strategy is to compute either an un weighted or matching and to compare the result to a threshold[4]

3. SYSTEM MODAL

1. The input images it first given to Viola Jones detection where the face extraction if face are not found when a new images taken at the input else the face is the process wired created object detection to find out the eyes of the input face.
2. Once the eyes are extracted then we will use facial geometry to find out the electronic of eyes, face, fingerprint, etc.
3. Once face, eyes and ear are extracted then to find out of feature of the face, eyes and ear.
4. The find out mainly the structure property of all the components.
5. For any new images SVM classified apply in order to get the classification images.
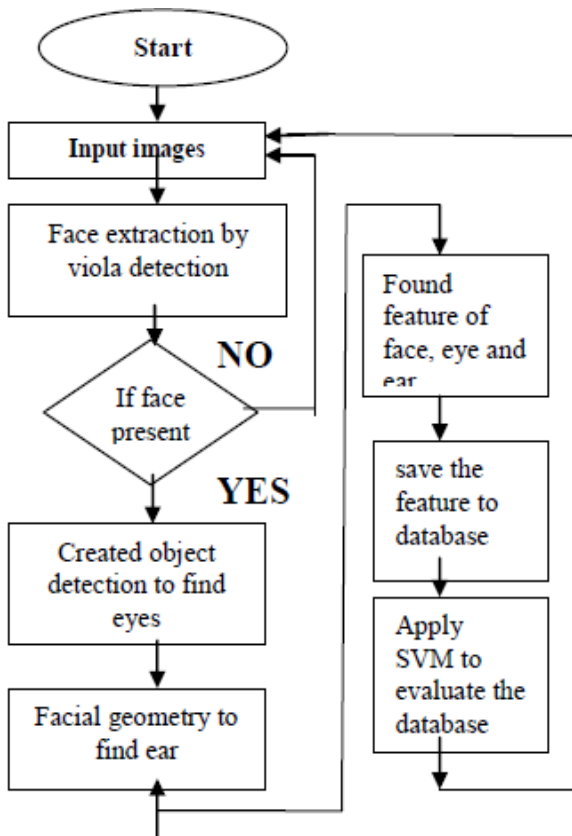
Fig; Flow diagram of system modal

MULTIMODAL BIOMETRICS BASED ON FACE, EYES AND EAR

First the find out of face is presented or not .supposed face is the presented input the images and detected the face no presented not detected. Build detection face, eyes detection for Viola Jones detection algrothium are used to detected face .all images to read detected boundary show the face images else otherwise face is not detected. Input the face images to detected the face and eyes.

A. MULTIMODAL BIOMERTICS SYSTEM USING PCA FEATURE EXTRACT

PCA is one of the most popular face recognition algrothium is used the database for the purpose the work contain train subject and test subject test biometric used face and ear .first the input images to face presented than pre-pressing detected face path for control point to images to encoding face for histogram algrothium to detected face using the PCA feature.

CONCLUSION

Overall accuracy of Ear and Face facial biometric authentication system. Will be evaluated and tested under various facial images. Developed an various algorithm which combines features from human Iris, Ear and Face for person verification. .We achieved significant improvement in the verification performance.
Compare the result tested result and implementation result are multi-biometric is their decreased complexity.

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