

Multi Biometrics: Overview and User Perception Survey

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Abstract: *Multibiometrics are used in high security system. The primary use of this technology is identification however, most of people don't have enough knowledge and experience about multibiometrics technology .this paper introduces with a anatomy of multibiometrics and advantage of multibiometrics over unibiometrics. This paper aims to study user perception of multi biometrics in India; to determine the acceptability of this technology. It shows user experience with biometrics and perspective of multibiometrics. Finally, some finding and conclusion will be presented.*

Keywords: MultiBiometrics; Security; Evaluation; User Perception, User Acceptance

1. Introduction

In the real world applications, unimodal biometric modalities often face many problems due to sensitivity to noise, poor quality of acquisition data, interclass variability, non-universality, hacking problem, etc. Unimodal biometric is not very effective to handle all these problems with an individual matcher. No matter how good a matching algorithm is, it is not possible to get desirable results under highly unconstrained condition. With a view to change this scenario the researchers have moved toward the development of multimodal-biometric systems that can address these problems by providing multiple pieces of information of the same user. These systems help to achieve a better reliable and secured system which is not possible with a unimodal biometric system [1].

It may be noted that fusion of multiple biometric characteristic not only increases the recognition rates but also decreases the vulnerability to spoofing. In addition, the use of multiple biometric provides a better utilization of the unimodal biometric characteristics. The proposed multimodal biometric system named as the face based multimodal biometric system contains ear, IR face and iris as its components.[1][2] The choice of this combination of modalities is attributed to the complementary pieces of information that they possess. For example while conducting multiple security checks head position may not be apt for ear recognition but not so for the face recognition. In case face and ear are hidden by mask then iris may be used. In other scenario when only one side of a face is visible then only the ear can come to our rescue.[5]

Multibiometric recognition systems are from new biometric tools used for automatic person Authentication.. I present a survey to know the reaction, knowledge and user acceptance of Indian community towards multi biometrics.

2. Anatomy of Multibiometric System

Based on the nature of the sources of biometric information, a multibiometric system can be classified into five categories which are multi-sensor, multi-algorithm, multi-sample, multi-

instance and multi-modal systems. The scenario of multibiometric systems is depicted as in Fig.1.

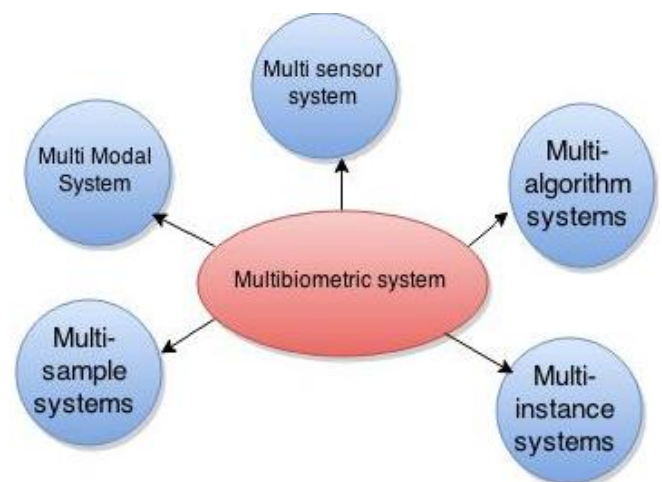


Figure 1: Anatomy of MultiBiometrics System

Multi-sensor systems: multi-sensor system employs multiple sensors to capture single biometric trait of an individual[4]. The example of this system is using two different cameras for taking image of subject and processing that image with same procedure.

Multi-algorithm systems: multi-algorithm system employs multiple feature extraction or classification algorithms, different algorithms process same data capture from sensor, In this system multiple algorithms help to improve the performance And this will cause a complex system[5].

Multi-sample system: multi-sample systems use multiple samples derived from same biometric acquired by a single sensor[6]. The same algorithm processes each of the sample and the individual results are fused to obtain an overall result. Advantage is to avoid poor performance due to the slack properties of sample in only one sample is used.

Multi-instance systems: In this system, the biometric information has been extracted from the multiple instances of the same body trait. The example of this system is using left

and right index finger and iris of an individual [7]. Multi-modal systems: multi-modal systems use the evidence of multiple biometric traits to extract the biometric information of an individual.[8] These different biometric traits can come from a variety of modalities such as finger and hand or face. The multi-model system is better due to presence of multiple independent biometrics

3. Acceptance and Perception Assessment

Biometric system is human centric [9]. Therefore, the human's perception is the most important factor that should be considered. The literature of hand biometrics, which have been referred to in the previous section, touches upon performance evaluation only (e.g. EER). Acceptability and user satisfaction are new evaluation measures that quantify a users' perception, feelings and opinions regarding the system [14]. Few studies [10][11][12][13][14][15][16][17][18] have been done to address this issue compared to the performance evaluation. These studies aim to extract information from community and helps address two important aspects:(i) a better understanding of users needs and (ii) improve the quality of biometric systems (algorithms and devices) [14]. Perception studies can be listed at two different levels. The first one is based on biometrics systems as a whole for a limited region or society [10][12][13][14][18]], while the other level focuses on a specific type of biometric such as fingerprint [20][25] and hand geometry [17]. Recently, there has been some work [14] to build an evaluation model for user perception that can be applied into any type of biometric system. This author has come across only one study that focuses on users perception of hand geometry based biometric systems [17]. There is a lack of similar studies as it relates to india. For this reason, this paper aims to measure user perception towards hand biometrics based on a survey study, as this will be illustrated in the next section [18].

4. Survey of User Perceptions

Motivation and goals:

India is one of the countries that have started using biometrics in certain places for many different purposes. Recently India had applied biometric technology in the Aadhar card for its citizens. This survey has been conducted to determine individuals' understanding about Multi biometrics and their acceptability to use this technology.

Objectives

- Users' knowledge and perception about Multi biometrics.
- Acceptability, Trust degree and other properties (e.g. easy to fraud).
- The important areas which Multi biometrics should be apply in.

Methodology

An electronic survey, which consists of 8 parts and 12 questions, has been done. This survey was distributed online via two ways:

- 1)Sending it to certain people: this survey has been sent directly to some faculty members from different universities
- 2)Distribute the survey in many different famous forums within community. The period for conducting this survey was two weeks.

5. Results and Discussion

1. General information about respondents:

The question, which has been answered by 216 respondents, was "tell us about your working field?" Figure 1 clearly shows that the largest portion of respondents represents students (63.9%). Teacher (5.6) and IT (17.6) and 22% are other from the total number of respondents.

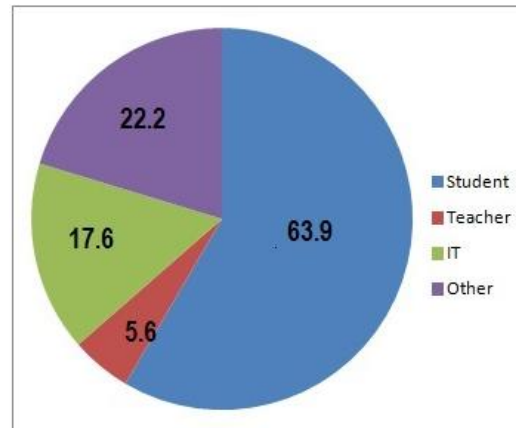


Figure 1: Position of respondents

One of the questions asked was whether they had heard before about hand biometrics or not. The result, as shown in Fig. 3.a, revealed that approximately half of the respondents (50.5%) had done so. This indicates that the respondents have good knowledge of Multi biometrics prior this survey.

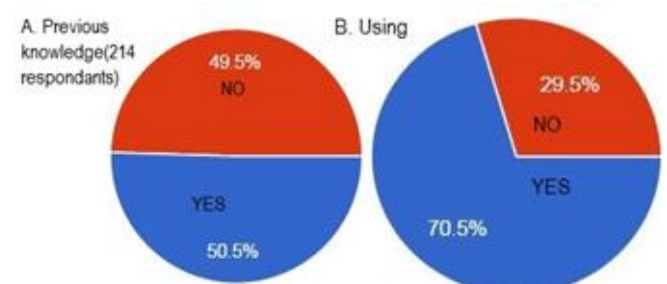


Figure 2: Knowledge of Biometrics

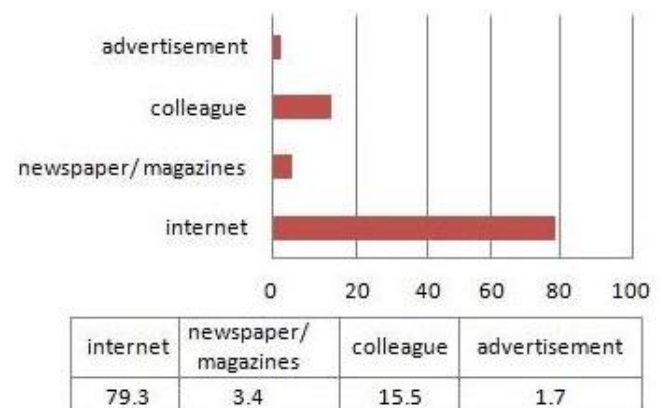


Figure 3: Knowledge sources (116 respondents)

Figure 3 indicates the sources from which the biometric aware. Internet represent the top two sources percentage (79.3). It is worth noting that the proportion of respondents indicating 'education' as a source is small compared to largest respondent from students; this indicates a weak level of knowledge of Multi biometrics at education curriculums. Companies had a Small percentage of respondents (1.7%), which may obtain the lowest development and usage of companies regarding new technology such as Multi biometrics.

2. Second Part

This part explores the usage of biometrics by respondents to know the extent of multi biometrics and their purposes in India when asked about the purposes of multi biometrics usage, 47% of respondents have experience with this technology in the field of time and attendance at their organizations as shown on figure 5. Access control is the second important usage in (9%). In addition to the two usages, there are other usages as given by 24 respondents as follows: using both of them (i.e. access control and time & attendance, ID verification, airports, PC login, university registration, car traffic and to solve problems related to personal health. Fig. 4

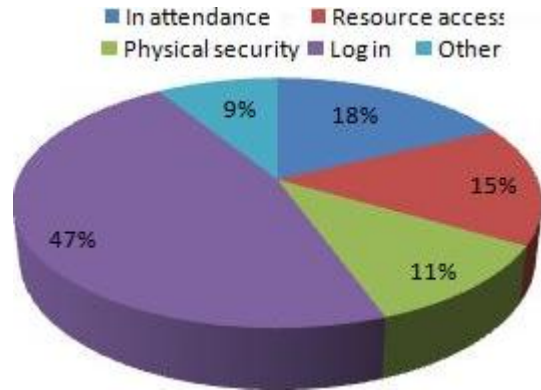


Figure 4: usage of biometric system(90 respondents)

3. Third Part:

This part includes the important questions regarding acceptability to use, feeling around some biometrics, properties and important areas to use. Figure obtains that most of respondents (84.7%) acceptable to use multi biometrics in their organization. And most of respondents(89.7%) thing multibiometrics is better then unibiometrics. The next question sought opinions about which two different biometrics trait is they want to use most of respondents thing hand geometry and finger print are better trait show in Fig.5

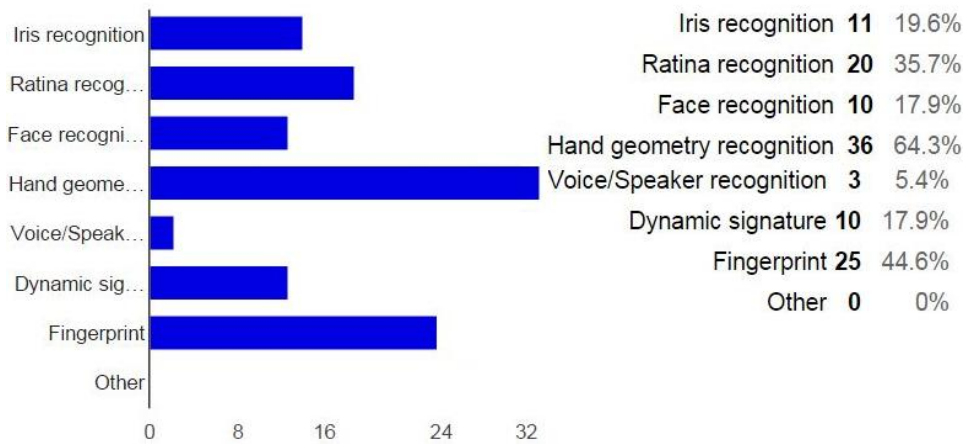


Figure 5: opinion about different biometric system

Next question in about to give rating 1-5 scale on basis of Easy to use, comfort, affect on personal health and reliability which is shown in Fig. 6





Figure 5: User acceptance

6. Conclusion

Although multi biometrics is considered to be one of the newest tools of biometrics, however the percentage of researches has grown up at all types of multi biometrics is low and not using in present. unibiometrics more easily faked or compromised used for verification task only. So it is important to be combined two or more biometrics trait in on system. Perception survey results showed many important finding. Firstly, background of multi biometric in public people is good in general. Overall, survey showed that high degree of acceptance for multi biometrics over exiting unibiometrics. By analysis the use of multibiometrics is very small, for access control, attendance, and id cards. Accordingly, there us a need to increase people understanding about biometrics and increase the use of it.

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