Original Research Article

The Use of Biometrics in Informative Institutions: Academic libraries as an Example

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ABSTRACT

This study aims to identify the possibility of applying/using biometrics in library and information profession, especially in academic libraries which aims to provide advanced services to meet all the needs of researchers, whether faculty members or students. Utilizing the descriptive analytical approach, the present study will review the concept of biometrics, biometrics applications, and their categories .and The study will then shed light on the use of biometrics in academic libraries, the advantages of using biometric applications in academic libraries, and the obstacles hindering their application. In addition, the study makes recommendations for the use of such measurements effectively in academic libraries.

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ABSTRACT

تهدف هذه الدراسة إلى التعرف على إمكانية استخدام القياسات الحيوية في المكتبات والمعلومات. خاصة في المكتبات الأكاديمية ، حيث تسعى المكتبات الجامعية إلى تقديم خدمات متقدمة لتلبية جميع احتياجات الباحثين من أعضاء هيئة التدريس والطلاب على جميع المستويات ، وقد تم استخدام المنهج الوصفي التحليلي واستعرضت الباحثة مفهوم القياسات الحيوية والفئات والمجالات التي تمثل استخدام تطبيقات القياسات الحيوية وتهدف هذه الدراسة إلى إلقاء الضوء على استخدام القياسات الحيوية في مجال المكتبات الأكاديمية والمزايا التي تعود على المكتبات لاستخدام تلك التطبيقات بالإضافة إلى العيوب والمشاكل التي يواجهونها ، وتم تقديم العديد من التوصيات بحيث يمكن استخدام تلك القياسات بفعالية في المكتبات الأكاديمية وخاصة في الوطن العربي .

Introduction:

Modern technologies have played an essential part in communication sciences. They led individuals to live in a visual society where the old coined term 'Hypothetic society' becomes a common and widespread term among all users of the internet. Since its introduction, biometrics has been used in information security, but these days they are being heavily utilized in libraries. Biometrics, as a science, can be defined as the measurement of both physiological and behavioral characteristics with the purpose of accurately identifying the identity of individuals. (2).

Biometric identification technology adopts graphical information which can be obtained by means of scanning, whether of face image, retina/iris, fingerprint shape, voice pattern, or by means of facial recognition and hand geometry identification (1). The present study aims to identify the types of biometrics, their applications, and the possibility of using biometrics in informative institutions like academic libraries, which are

considered as a source of sciences and knowledge for all researchers and students all over the world.

While scientific research is considered an essential part of any progressed society, the researcher is a major pillar of scientific research for his contribution in pushing the wheel of progress and development. University libraries can be viewed as the cornerstone in the educational process and scientific research. These libraries should strive towards providing advanced services to meet all the needs of researchers on a large scale.

Descriptive analytic approach is adopted in the present study as a means to achieve the study aims and explore biometrics' use in academic libraries.

Importance of the study:

Biometrics is considered one of the latest trends resulting from information and communication technologies in all areas of Life. In addition to its contribution to recent trends in academic libraries in the Arab world, the significance of this study also stems from the scarcity of similar studies in the Arab world. The present study attempts to measure the awareness, information literacy, and behavior of users in academic libraries in the Arab world towards biometrics through ease of use and attention.

Objectives of the Study:

Researchers and users in the academic environment, especially in the Arab countries, face problems relating to the insufficient use of biometrics in academic libraries. The exploratory study confirmed that there is a problem in informational awareness of biometrics in general and biometrics in academic libraries in particular, as in the role of biometrics in facilitating

the locations of academic libraries. In light of this, the study addresses the following questions:

1. What is the level of awareness of biometrics among faculty members and their assistants in Arab universities' libraries?

2. To what extent are faculty and their assistants in Arab universities' libraries aware of the importance of biometrics?

3. How much knowledge do faculty and their assistants in Arab universities' libraries have about biometrics?

4. What is the opinion of faculty members and their assistants in the libraries of Arab universities about the services and sites available through biometrics?

5. What are possible ways to raise awareness of biometrics information in university libraries?

Methodology of the Study and Data Collection Tools:

Due to the nature of this study, the researcher follows the field survey method, which aims at reporting the characteristics of a particular phenomenon depending on the collection of facts, analysis and interpretation, with the purpose of using their implications in achieving the objectives of the study.This methodology can be seen as the nearest appropriate methodology to identify the impact of some of the variables in relation to the extent of the use of biometric applications by university librarians.

The researcher makes use of the questionnaire as a tool of data collection: the purpose is to reflect the views of the university librarians and their assistants on the applications of biometrics. The questionnaire employed in the present study has been judged by experts and professors of

library and information to endorse their validity. The time limit of this study is the academic year 2015/2016 AD.

The study sample:

Due to the difficulty of accurately counting the numbers of faculty members and the assisting staff in Arab universities, the researcher resorted to the simple random sample.The questionnaire was sent by e-mail once in March 2016, and again in October the same year. Twenty two questionnaires were excluded as they were not valid for the study. The analysis of these questionnaires shows that they cover the largest and most famous Arab universities, which led the researcher to complete the study where the sample of the study is representative of the study community to come up with valid indicators.

Review of Literature:

It is clear that a considerable number of scholars have tackled biometrics from different aspects, other than focusing on their use in libraries. Combining the social construction of technology (SCOT) approach, cultural analysis, and political economy, Gates, K. (2004) examines the social construction of facial recognition from its early development in the 1960s to its integration automated access system. The study findings show that the emergence of these new access control technologies is an integral dimension of the transition to what Dan Schiller calls "informationalized capitalism" ([1]).

Global Forkin, M (2011) proposes ocular recognition as a substitute for iris recognition, where the former outperform the latter, particularly with respect to challenging datasets.(2).

In another study, Nwatu, G. U. (2011) explored the utilization of biometrics technology in Nigeria as a means to control identity fraud

through reliable verification and identification of individuals. this research presents an example that developing countries could potentially use to facilitate the use of biometrics technology (3).

Ma, Y. (2007) explores the usability and efficiency of tree ensemble learning methodologies in the following research areas: multi-modal biometrics information fusion, software defect prediction and microarray data analysis. The data sets obtained from these three areas are structurally different in terms of their sample size, number of features, and the class labels distribution. For example, biometrics and software engineering studies produce data sets that are large-sized with hundreds to thousands of observations, majority of which are of the same class label.Microarray experiments, on the other hand, produce high-dimensional data with thousands of variables. This difference in the structure of the obtained data sets has varying requirements on the learning algorithms. However, regardless of the requirements posedon the learning techniques, the ultimate goal is to achieve thehighest possible prediction accuracy (4).

Guzman Tamayo, A. M. (2011) proposesan image processing framework for human face recognition that consolidates feature extraction, registration, matching through similarity measurements in the thermal mid-wave infrared portion of the electromagnetic spectrum, and validation through testing the designed algorithm on the C-X1 database (provided by the Computer Vision Research Laboratory at the University of Notre Dame). This research aims to design specialized algorithms as part of a biometrics system that would help identify individuals by means of facial vasculature information extraction and thermal facial signature formation. The highly accurate results clearly demonstrate the potential of the thermal infrared system to be applied to other thermal imaging based systems and related databases. The use of four images taken at various times to develop a thermal signature template guaranteed that the biometric matching process

is not affected by unforeseen changes in the vasculature, as it relied on consistent thermal features (5).

based on the above review of related literature, it becomes clear that such studies paid attention to the study of biometric in libraries in particular and academic Libraries in general,as inusing fingerprint and face detection as an access to these libraries. The previous studies have also traced and explored privacy and security systems of the developmental countries. The present study focuses on the use of biometrics in academic Libraries.

Definition of biometrics:

The origin of the word biometrics is traced back to the Greeks. It is made up of the merging of the two words 'bio' meaning life and 'metric' meaning to measure ([6]).For the purpose of the present study, biometrics refers to the technologies used for measuring and analyzing a person's unique physiological or behavioral characteristics([7]) which can be used to verify or identify a person([8]).

In addition to identification and verification based on physiological or behavioral characteristics, chemical attributes(DNA) have been recently introduced (9).There are several types of biometric authentication(10). The main features of the two categories of biometrics, physiological and behavioral, can be briefly illustrated as follows:

Physical Biometrics

Fingerprint Identification or Recognition

Speaker or Voice Authentication

Hand geometry recognition

Hand or Finger Geometry Recognition

Facial Recognition

Behavioral Biometrics

Keystroke or Typing Recognition

Speaker Identification or Recognition (11)

For a definition of biometrics of libraries and information centers ODLIS defines biometrics as a method of authenticating personal identity electronically through the use of digital data (usually encrypted) in which measurements of the person's unique physiological or behavioral characteristics are recorded.Some libraries use biometric scanners to identify patrons accessing the internet via public workstations, with the purpose of preventinglogging on with the library card number or PIN code of a friend or relative.Several European countries are considering mandatory biometric ID cards for their citizens (12). A good definition of biometrics is "the study of measurable biological characteristics". Within the field of computer security, biometrics refers to "authentication techniques that rely on measurable physical characteristics that can be automatically checked."(13).

From the above,it is observed that all definitions of biometrics in libraries focus on techniques and tools that could potentially be adopted, including:

-Physical characteristics

- Behavioral characteristics

- Identity identification

- More effective than passwords and ID numbers

- Use of secured digital data

History of biometrics:

The following is a short historical background of biometrics. Biometrics based on physical or behavior traits is traced back thousands of years (14).Although the use of parts of human body for the purpose of identification appeared all over the world first evidences of biometrics appeared in 29.000BC when the cavemen used their fingerprints to sign their drawings(15).Furthermore, the first known example of biometrics in practice was a form of fingerprinting being used by Chinese merchants in the 14th century, where they were stamping children's palm prints and footprints on paper with ink to distinguish the young children from one another; a practice which is being used up to present time (16).Similarly, fingerprints were used on clay tablets during Babylonian business transactions in 500 BC. In early Egyptian history, traders were differentiated by their physical characteristics(17).

In 1968, Biometrics was used in both commercial dealings and detecting terrorists and criminals. They have existed in commercially available products for a long time. The University of Georgia introduced the first known biometrics application in the year 1973 when a hand scanning system was installed with the purpose of restricting access to its dining halls. The device measured the lengths of members' fingers by scanning them with photoelectric cells. It is in the last decade that biometric applications have finally caught up with the technology that has been around for nearly 30 years. Beyond time and attendance, which is considered the largest growth area for biometrics, computer and electronic commerce security offer the greatest promise for widespread biometric use. During 1990's, fingerprint identification systems were the most popular and widely used form of biometric technology. However, today, a wide variety of

biometric devices such as hand scans, voice recognition system, hand geometry system, eye-scanning system, and face recognition system are available in the market. While these technological developments brought about a sharp decline in prices, and resulted in the escalating fraud and security breaches, they also brought biometric technology to market([18]).

Applications of Biometrics:

In the last few years, applications of biometrics have considerably increased and it is expected that biometrics will be used many times in our daily activities such as getting in the car, un/locking the door of our house, accessing bank accounts, and internet shopping (19). Biometrics is now being used in almost every area and various types of biometric systems are being used to achieve various functionalities(20).

Applications of Biometrics can be divided into three categories: (1)commercial applications, such as computer network logins, electronic data security, internet access, e-commerce, , credit cards, ATMs, physical access control, PDAs, cellular phones, medical records management, and distance learning; (2) government applications such as national ID cards, correctional facilities, border control, social security, driver's licenses, and passport control; and(3) forensic applications such as corpse identification, criminal investigation, missing children, parenthood determination, and terrorist identification(21).

Application scenarios for large-scale biometric authentication services

In the following, we propose the five major applications briefly:

Forensic

The use of biometric in law enforcement and forensics has been used since a long time. In particular, the AFIS (automatic fingerprint identification system) has been used for this purpose of identification of criminals. Lately the facial-scan technology (mug shots) is being also used for identification of suspects. Another possible application is the verification of persons of home arrest; a voice-scan is an attractive solution for this problem. The typical applications include identification of criminals, surveillance, corrections, probation and home arrest.

Government

There are many applications of biometrics in the government sector. An AFIS is the primary system used for locating duplicates enrolls in benefits systems, electronic voting for local or national elections, and driver's license emission, among other areas. Typical applications include national identification cards, voter ID and elections, driver's licenses, benefits, distribution (social service),employee authentication, and military programs.

Commercial

Banking and financial services represent enormous growth areas for biometric technology, with many deployments currently functioning and pilot project announced frequently. Some applications in this sector are account access, ATMs, Expanded Service Kiosks, online banking, telephony transaction, PC/Network access, physical access, e-commerce, and time and attendance monitoring.
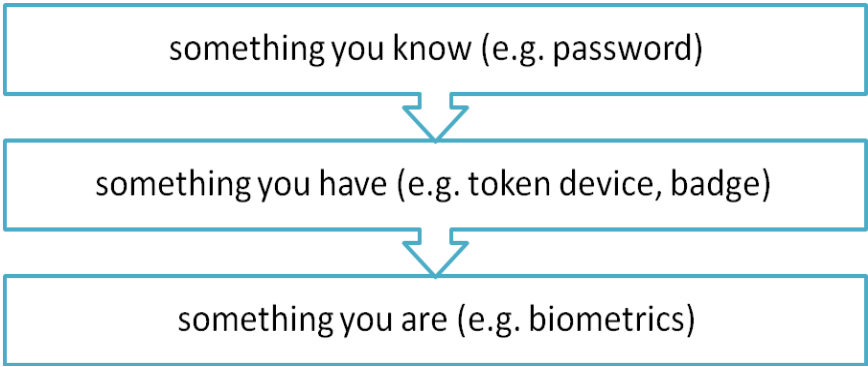
Health Care

The applications in this sector include the use of biometrics to identify or verify the identity of individuals interacting with a health-care entity or acting in the capacity of health-care employee or professional. The main aim of biometrics is to prevent fraud, protect patient information and control the selling of pharmaceutical products. Some typical applications are PC/Network Access, access to personal information, and patient identification.

Travel and Immigration

The application in this sector includes the use of biometrics to identify or verify the identity of individual interacting during the course of travel, with a travel or immigration entity or acting in the capacity of travel or immigration employee. Typical applications includeair travel, borders crossing, employee access, and passports (22).

Biometrics can be used for both steps, identification requiring a one-to-many search in the templates database and authentication requiring a one-to-one comparison of the measured biometric with the template that is associated to the claimed identity. There exist three types of authentication factors: something you know (e.g. password), something you have (e.g. token device, badge) and something you are. Biometrics falls in the third category, which is by definition the most secure because most companies still struggle to implement good password practices. Similarly, when token devices or badge readers are used, they get lost or are shared among colleagues([23]).

something you know (e.g. password)

something you have (e.g. token device, badge)
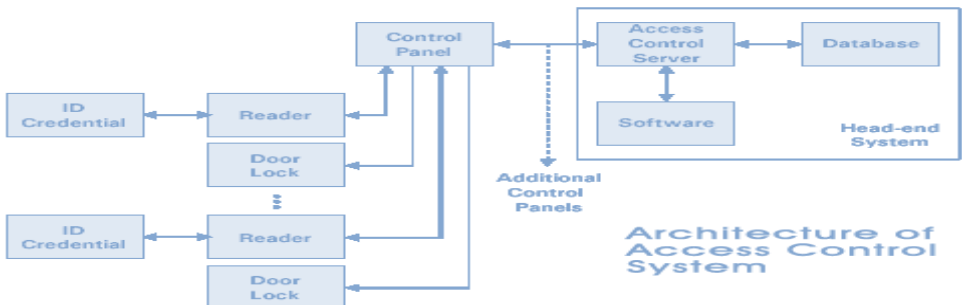
something you are (e.g. biometrics)

Biometric Time Clocks or Biometric time and attendance systems are being increasingly used in various organizations to control employee timekeeping.

Biometric safes and biometric locks provide security to homeowners.

Biometric Access Control - How it works?

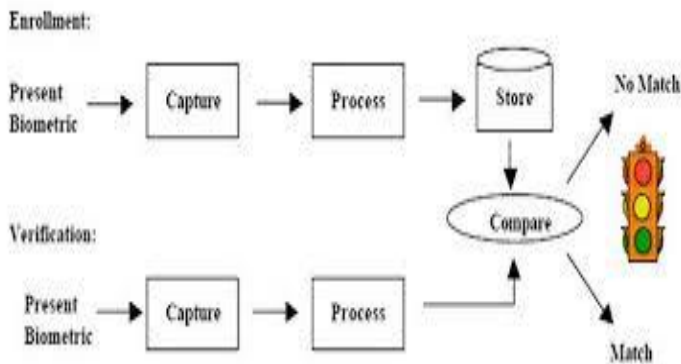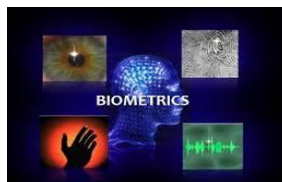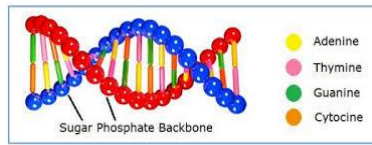Biometric access control systems provide strong security at entrances.

Biometric systems are also developed for securing access to pc's and for providing single logon facilities.

Wireless biometrics is also used for high end security and providing safer transactions from wireless devices like PDAs.

Applications of biometrics technology in identifying DNA patterns for identifying criminals are also commonly used.

Biometrics airport security devices are also deployed at some of the world's famous airports to enhance the security standards(24).

To draw a comparison among all these types of Biometrics is a very important objective the present study seeks to achieve. Jain, Ross and Prabakar propose seven comparison criteria: Universality, distinctiveness, permanence, collectability, performance, acceptability, and circumvention, as indicated in the following table 'biometrics characteristics and systems':

Table 1 – Comparison of Various Biometric Technologies
(H = High, M = Medium and L = Low)

Biometric identifier	Universality	Distinctiveness	Permanence	Collectability	Performance	Acceptability	Circumvention
DNA	H	H	H	L	H	L	L
Ear	M	M	H	M	M	H	M
Face	H	L	M	H	L	H	H
Facial thermogram	H	H	L	H	M	H	L
Fingerprint	M	H	H	M	H	M	M
Gait	M	L	L	H	L	H	M
Hand geometry	M	M	M	H	M	M	M
Hand vein	M	M	M	M	M	M	L
Iris	H	H	H	M	H	L	L
Keystroke	L	L	L	M	L	M	M
Odor	H	H	H	L	L	M	L
Palmprint	M	H	H	M	H	M	M
Retina	H	H	M	L	H	L	L
Signature	L	L	L	H	L	H	H
Voice	M	L	L	M	L	H	H

Source: Anil K. Jain, Arun Ross, and Salil Prabhakar, "An Introduction to Biometric Recognition," *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 14, No. 1, January 2004.

Use of Biometrics in Libraries and Information Sciences:

Biometrics has been used in a considerable number of sectors like airports, commercial dealings, forensic medicine, and schools since 2012.The Information Commissioner's Office (ICO) stated that "such an enterprise should only be introduced when explicitly authorized by the
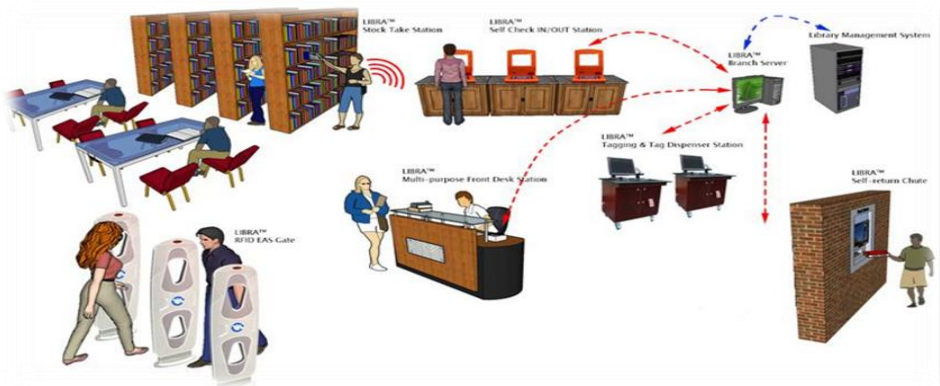
Government and should be subject to public debate and appropriate legislation."Legislation was introduced, with the Protection of Freedoms Act of 2012, creating an explicit legal framework for the use of biometric technologies in schools for the first time. Parents and pupils were given a legal guarantee that no finger prints would be taken without explicit consent being obtained first and that an alternative must be made available if they did not wish to use a biometric system ([25]).

From the researcher's point of view, using biometrics applications in schools have paved the way for biometrics to be used in libraries and information centers securely. As libraries one of the most vital places that need to be secured, they are attacked by hackers'art of their users however they must provide researchers and students with all information at the present.

Consequently, this study sheds light on using biometrics in Academic Libraries as an existing entity. While using biometrics in digital libraries that depend on networks and systems is very fruitful for users to log in their accounts instead of using their passwords and this is what the researcher seeks to achieve in her future study. The reason beyond using biometrics in libraries instead of library cards is organize the way of access for all users and to save time. Nevertheless, using biometrics can solve all librarians' problems in checking users' identity.

The library at an educational organization is a natural fit for adopting a biometric solution. In addition to providing high security level, keeping track of users and of library resources on a day-to-day basis helps the library operate quicker and more efficiently. It is a good gateway for testing biometric controlsin a closed environment before introducing them to other services and departments ([26]).

Hong, L., Jain, A. K., and Pankanti propose that the biometric system may easily be applicable to Library Management System in three ways: a) it maintains library patron records very quickly, accurately, orderly; b) it acts as a helpful management tool for the librarian and other managerial staff; and c) it may continue for years without any further costs following its installation(27).The following figure shows that biometrics as abased patron authentication system can be easily introduced in a library management system (28).

Using of Biometrics in Academic Libraries:

- **Controlled Access to Library Premises**

With this biometric application, authorized users' fingerprints will be scanned and stored for verification, thus preventing unauthorized access. Compared to passwords, badges, swipe cards and PINs, fingerprint identification is a more secure, convenient, and cost-effective alternative..Instead of the manual gate checking system which requires two persons at least to perform the job, the biometric reader mounts on a wall near the library main door[29]. The authorized library members and library staff members would be able to open the gate by themselves; where as non-members should ask for assistance to enter the library[30].

Biometric fingerprint scanners offer various levels of authorization such as allowing access based on the time of day and the choice to apply for the whole library or at least for the computer rooms and server/ network stations to avoid unauthorized access [31].

- **Closed Circuit Television**

Closed Circuit Television cameras and biometric methods are also used for surveillance in libraries to safe guard its possession of books and information[32].

The factors that must be considered a when using Biometric Technologies:

Implementation of biometrics should be the result of cost/benefit analysis that stems from a risk assessment. However, regulatory constraints sometimes make our decision easy[33]. Before deciding to use Biometric Technologies in libraries, officials must take into consideration the following before the application of biometrics:

1.Conducting an infrastructure auditing

The decision of implementing a specific biometric system should be preceded by conducting an audit of the existing

security infrastructure, and assessing its potential to compete with current security policies.

2. Selecting the most appropriate biometric modality for the business

When implementing biometrics in any business, there is a number of related factors that should be taken into account including physical location, task (identification or verification), security risks, user circumstances, expected number of end users, and existing data. Evaluation of the advantages and disadvantages of the possible modalities is an essential procedure that must precede implementation. Along the same lines, Arvind Muthukrishn an proposes that the factors that should be taken into consideration before choosing a biometrics solution include the level of security required, accuracy, cost and implementation time, and user acceptance(34).

3. Multimodal Biometric vs. Unimodal Biometric Systems

One important rule of a good security policy is to rely upon multiple layers of security. A unimodal biometric system captures and matches only one biometric trait resulting in an absence of sustainable ways to solve identification problems. Multimodal biometric systems are expected to be more reliable due to the presence of multiple, independent biometric traits. A good example of a multimodal biometric solution would be Hybrid Biometric Platform™ which supports any form of biometrics.

4. Biometric Hardware

With rapid innovations in biometric technology, various types of hardware are now available to choose from. The choice of one hardware depends on a number of factors such as liveness

detection capability, spoof detection capability, and mobility. For example, smart fingerprint readers are capable of capturing a high-quality fingerprint image as well as finger vein pattern for liveness detection and elimination of spoof attacks.

5. Consider the ROI

To develop an understanding of the rate of Return on Investment (ROI), a pilot project is conducted as an initial step. For example, instead of the deployment of five fingerprint scanners at five different points at your place of business, it is better to first consider deploying only one fingerprint scanner at one primary point for a short period of time. This procedure allows for quantifying ROI before doing a system wide deployment. in addition, a biometric system wide deployment does not take into consideration employee's perception and acceptance of the new technology(35).

Advantages of using biometrics in Libraries:

The advantages of using biometrics in academic libraries are varied and extend to include the following. While passwords can be lost or forgotten, Biometric traits can not. It is quite difficult to copy, share and distribute biometric traits. Biometrics requires the physical presence of the person being authenticated at the time and point of authentication. Users are no longer responsible for passwords, swipe or proximity cards, PINs or keys ([36]). Advantages also include eliminating recurring cost for library card, easy and foolproof verification of end user, rack management for book

retrieval, dynamic and easy searching of books, online budget and account maintenance, instant reports, and full inventory control ([37]).

Defects of Using Biometrics:

Though biometrics technology provides a number of advantages, the system has a number of defects. Biometric technology makes privacy violations easier and more damaging. Biometric systems' accuracy is impossible to assess prior to deployment. In addition, biometric systems are useless without a well-considered threat model. Moreover, biometrics is no substitute for quality data about potential risks. Furthermore, some biometric technologies are discriminatory. Finally, the cost of failure is high(38).

Data Analysis:

First: General Data of the Community of the Study:

The researcher attempts to review the general raw data of the community of the study in an abstract mode to give personal background, and a clear image of the whole community of the study (members of the teaching staff and assistants). Table (1) demonstrates the primary data:

Table (1)

Personality Traits of the Study Sample.

%	Number	Personality Traits of the Study Sample	
54.1	104	Male	gender
45.9	88	Female	
100	192	Total	
22.4	43	Less than 30	Age
36.00	69	From 30 - 39	
29.2	56	From 40 - 49	
9.8	19	From 50 - 59	
2.6	5	From 60 -	
100	192	Total	
2.1	4	Professor	Degree
20.3	39	Assistant Professor	
33.3	64	Lecturer	
19.8	38	Assistant lecturer	
24.5	47	Demonstrator	
100	192	Total	

Table (1) shows the general personality features of the community of the study, where the results showed that 54.1% of the participants were male, while the percentage of female participants amounts to 45.9%. As for the ages of the participants, they run as follows: from 30 - 39 is higher than 36.0 %;followed by the percentage of ages ranging from 40 - 49, with a percentage of 29.2%;then those whose ages are less than 30 years with a percentage of 22.4 %, with a clear difference from the percentage of those whose ages are 50 with a percentage of 59 %, and the last class are those over 60 years with a percentage of 2.6 %.

The table also shows the proportion of the study sample according to the academic degree. It shows that the degree of lecturer came first with a percentage of 33.3%; then demonstrator with 24.5 %; followed by the assistant professor with a percentage of 20.3%; then an assistant lecturer

with a percentage of 19.8%; and in the last rank of them is the professor with a percentage of 2.1%.

Table (2)

The Extent of the Awareness of the Members of the Study Sample of the Information about biometrics.

%	H	The Extent of the Awareness of the Members of the Study Sample of the Information about biometrics	
4.6	8	High	1
14.3	25	Average	2
81.1	142	Weak	
100	175	Total	

Table (2) indicates the percentage and size of the awareness of the community of the study sample about the biometrics, where it turns out that142 members, the highest percentage of the study sample, have weak information about the biometrics with a percentage of 81.1% of the participants. This is in sharp contrast with the number of participants with high level of information about the biometrics, only 8 participants with a percentage of 4.6 %.

Table (3)

Knowledge and Acquaintance with the Applications of Biometrics.

Don't know	Accepted	Good	Very Good	Excellent	Biometrics	
154	6	15	——	——	Fingerprint Identification or Recognition	1
158	——	17	——	——	Speaker or Voice Authentication	2
151	——	5	——	——	Hand geometry recognition	3
117	——	36	11	——	Hand or Finger Geometry Recognition	4
59	——	14	97	——	Facial Recognition	5

——	13	21	43	9	Keystroke or Typing Recognition	6
46	63	35	21	——	Speaker Identification or Recognition	7

The previous table illustrates the extent of the knowledge and acquaintance of the community of the study with the techniques of Biometrics. Each technique is reviewed separately in order to identify the extent of knowledge and familiarity of the subject of the study; the Faculty members and assistants in Arabic Universities, in order to draw a clear picture. For the **Fingerprint Identification or Recognition,** the percentage of those well acquainted with this technique is 8.6%, with an acceptable degree of 3.4%, whereas the percentage of those who do not have this familiarity with this technique reached 88.0%. As for **Speaker or Voice Authentication**, the proportion of those well familiar reached 9.7%, while the percentage of those who were not well acquainted with this technique reached 90.3%. As for the **Hand geometry recognition**, the percentage of those who were well acquainted with this application reached 5.9%, while the percentage of those who do not have knowledge or familiarity with this application reached 86.3%. The degree of knowledge of the remaining percentage has not been specified. **Regarding Hand or Finger Geometry Recognition**, the percentage of those very well familiar with this application reached 6.3%; the percentage of those familiar with it in a good level reached 20.6%; the percentage of those well familiar with this technique reached 20.6%, while the percentage of those who do not have familiarity with this application reached 66.9%.The extent of familiarity with this application by the remaining ratio has not been specified. As for the technique of **Facial Recognition**, The percentage of those who are very well familiar with this application reached 55.4%; and that of those with good familiarity with the technique 8.0%; while that of those who do not

have knowledge of this application is 78.7%. The extent of the knowledge of the remaining percentage has not been specified yet. As for **Keystroke or Typing Recognition**,the percentage of those with 'excellent' knowledge of this application reached 52.0%;that of those with 'very good' knowledge of it reached 24.6%; that of those with 'accepted' knowledge of the application reached 7.4%; while the extent of the knowledge of the remaining percentage has not been specified yet. Regarding **Speaker Identification or Recognition,** the percentage of those with 'very good' knowledge of this application reached 12.0%;that of those with 'good' knowledge of this application reached 20.0%; that of those with 'accepted' knowledge of the application reached 36.0%; while that of those who do not have knowledge of it reached 26.3%.The extent of the knowledge of the remaining percentage has not been specified yet.

The goal of this study is to assess Arab universities' faculty members and officials' opinions and knowledge about techniques of biometrics, and to identify their familiarity with the available services which is based on biometrics techniques.

Table (4)

The Rate of the knowledge of techniques of biometrics.

Not used	Rarely	Sometimes	Often	Constantly		
				168	**DNA Matching**	1.
		95			**Ear**	2.
154					**Eyes - Iris Recognition**	3.
		79			**Eyes - Retinal Recognition**	4.
				169	**Face Recognition**	5.
146					**Fingerprint Recognition**	6.
				137	**Finger Geometry Recognition**	7.
	123				**Gait**	8.
	123				**Hand Geometry Recognition**	9.
146					**Odor**	10.
		97			**Signature Recognition**	11.
123					**Typing Recognition**	12.
146					**Vein Recognition**	13.
146					**Voice / Speaker Recognition**	14.
				163	**Voice - Speaker Verification / Authentication**	15.
146					**Voice - Speaker Identification**	16.

We find that the DNA Matching occupies the first place in the permanent knowledge rate, reaching 96.6% by 169 members. Comes second isFace Recognition available by the participants with a percentage of 96%, followed by the Voice - Speaker Verification / Authentication with a percentage of 93.1%, with 163 members, in the third place. Finally, Finger Geometry Recognition comes last with a percentage of 78.3%. As for the knowledge rate, Signature Recognition occupies the first rank, where 97 members are registered with a percentage of 55.4%; followed by the

percentage of Ear which reaches 54.3%. Eyes Retinal Recognition hits 45.3%.

As for the Faculty members and teaching assistants in Arabic Universities who reported the scarcity of their knowledge of the available services and sites based on the techniques of biometrics, it is found that the percentage of their use of these techniques reached 70.3% of both Gait and Hand Geometry Recognition.

Moving to the services and sites available on biometrics, which the community of the study reported no knowledge of, Eyes-Iris Recognition comes in the forefront with a percentage of 88%; followed by a percentage of 83.4% who reported having no knowledge of the following services: fingerprint recognition, odor, vein recognition, voice/speaker recognition, and voice-speaker identification. Typing Recognition site, on the other hand, recorded a percentage of 70.3%, by 123 members.

From the above it is noticed that the high rate of available services on the techniques of biometrics, which members of the Faculty and teaching assistants in Arabic Universities, the subject of the study, are not acquainted with, reached 43.7% by 7sites out of 16, the total number of services, as illustrated in the following table:

Table (5)

Rate of knowledge of Available Services Based on the Techniques of the biometrics.

%	Number	Utilization rate	
25	4	Always	1.
——	——	Often	2.
18.7	3	Sometimes	3.
12.5	2	Scarcely	4.
43.7	7	Non-use	5.
100	16	Total	

The above table shows the obvious lack of knowledge and awareness of biometricsby the Faculty members and the teaching assistants in Arabic Universities, which is evident from their non-use and non-benefit from the available approved applications of biometrics.

Results and Recommendations

Results:

1- There is a sharp decrease in both the techniques of Speaker or Voice Authentication, Fingerprint Identification or Recognition, Hand geometry recognition, and Hand or Finger Geometry Recognition. However, there is little increase in the rates of knowledge and acquaintance with Hand or Finger Geometry Recognition, and the less fortunate techniques: Facial Recognition, Keystroke or Typing Recognition. The reason for this may be the proliferation of these technologies broadly in commercial, travel and immigration areas.

2- Face Recognition occupies the first rank in the rate of knowledge on permanent basis, reaching a percentage of 96.6%, then the DNA Matching by 96%, followed by Face Recognition Authentication with a percentage of 93.1%, finally Finger Geometry Recognition by 78.3%.

3- There is a scarcity of knowledge of available services on the techniques of biometrics, with a percentage of 45.3% in Eyes - Retinal Recognition.

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