



A Study on the Role of Biometric Technology in Relation to University Teachers with Special Reference to Pune City

Saroj Hiremath*, S.B.Thorat**

ABSTRACT

Among all the biometric techniques, fingerprint-based identification is the oldest method which has been successfully used in numerous applications. Everyone is known to have unique, immutable fingerprints. A fingerprint is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint can be determined by the pattern of ridges and furrows as well as the Minutiae points are local ridge characteristics that occur at either a ridge bifurcation or a ridge ending. Fingerprint biometric is used in education institutes. As the level of security breaches and transaction fraud increases, the need for highly secure identification and personal verification technologies is becoming apparent. Biometrics has long been touched as a powerful tool for solving identification. It involves measuring one or more psychological characteristics. In addition to growing needs for fast, accurate and dependable security, biometrics technology has recently begun to enter into public consciousness. Government has made it mandatory to install biometrics machines for all State Government offices and colleges affiliated to University of Pune. In tune with the same, this study is conducted to identify role of biometrics technology in relation to university teachers that is, faculty members affiliated to University of Pune in Pune City.

INTRODUCTION

The word "biometrics" is derived from the Greek words 'bios' and 'metric'; which means life and measurement respectively. This directly translates into "life measurement". General science has included biometrics as a field of statistical development since the early twentieth century. Biometrics is the science and technology of measuring and analyzing biological data. It is an automated method of recognizing a person based on a physiological or behavioral characteristic. Among the features measured are face, fingerprints, hand geometry, handwriting, iris, retinal, vein, and voice. Biometric technologies are becoming the foundation of an extensive array of highly secure identification and personal verification solutions. As the level of security breaches and transaction fraud increases, the need for highly secure identification and personal verification technologies is becoming apparent. The history of biometrics dates back to a long time. Possibly the most primary known instance of

* *Suyog Pearl, 103, Ruby Building, Industrial Estate, Behind Crome furniture, Hadapsar, Pune-411 028, Maharashtra, India, Email Id: spchiremath@gmail.com*

** *Suyog Pearl, 103, Ruby Building, Industrial Estate, Behind Crome furniture, Hadapsar, Pune-411 028, Maharashtra, India, Email Id: spchiremath@gmail.com*

biometrics in practice was a form of finger printing being used in China in the 14th century, as reported by explorer *Joao de Barros*.

Barros wrote that the Chinese merchants were stamping children's palm prints and footprints on paper with ink so as to differentiate the young children from one another. This is one of the most primitive known cases of biometrics in use and is still being used today. Apart from its Chinese genesis, use of biometrics was also noted elsewhere in the world. Up until the late 1800s, identification largely relied upon "photographic memory". In the 1890s, an anthropologist and police desk clerk in Paris, *Alphonse Bertillon*, decided to fix the problem of identifying convicted criminals and turned biometrics into a distinct field of study. Bertillon developed a technique of multiple body measurements which later got named after him - **Bertillonage**. His method was then used by police authorities throughout the world, until it quickly faded when it was discovered that some people shared the same measurements and based on the measurements alone, two people could get treated as one. After the failure of Bertillonage, the police started using finger printing, which was developed by *Richard Edward Henry* of Scotland Yard, essentially reverting to the same methods used by the Chinese for years.

Biometric history in the recent past (three decades) has seen drastic advancements and the technology has moved from a single method (fingerprinting) to more than ten prudent methods. Companies involved with new methods have grown into the hundreds and continue to improve their methods as the technology available to them also advances. Prices for the hardware required continue to fall making systems more feasible for low and mid-level budgets and thus making this more adaptable in small businesses and even education institutes. In terms of security, specifically location security, the term access control refers to basically two aspects:

1. Practice of restricting entrance to a facility or property, this is done by providing access to authorized users while denying access to unauthorized users.
2. To keep a track of entry and exist.

Biometrics has long been touched as a powerful tool for solving identification and authentication issues for immigrations and customs, physical security and computer security. It involves measuring one or more psychological characteristics. In addition to growing needs for fast, accurate and dependable security, biometrics technology has recently begun to enter into public consciousness. Government has made it mandatory to install biometrics machines for all State Government offices and colleges affiliated to University of Pune. In tune with the same, this study is conducted to identify role of biometrics technology in relation to university teachers that is, faculty members affiliated to University of Pune in Pune City.

APPLICATIONS

- ▶ Biometric Time Clocks or Biometric time and attendance systems, which are being increasingly used in various organizations and education institutes to control employee timekeeping.
- ▶ Biometric safes and biometric locks, provides security to homeowners.
- ▶ Biometric access control systems, providing strong security at entrances.

- ▶ Biometric systems are also developed for securing access to pc's and providing single logon facilities.
- ▶ Wireless biometrics for high end security and providing safe transactions from wireless devices like PDA's etc.
- ▶ Applications of biometrics technology in identifying DNA patterns for identifying criminals etc.
- ▶ Biometrics airport security devices are also deployed at some of the world's famous airports to enhance the security standards.

OBJECTIVES OF THE STUDY

1. To assess the role of biometric technology in relation to teaching fraternity from colleges affiliated to University of Pune.
2. To understand the Biometrics access control system.
3. To study the advantages and disadvantages of biometric.
4. To identify the need of biometric machines.
5. To study psychological aspect affecting on the use of biometric machines.

LITERATURE REVIEW

▶ Thomas A. Louis, Russell B. Millar, Geert Verbeke, Marie Davidian (Executive Editor): Published on behalf of the International Biometric Society, *Biometrics* emphasizes the role of statistics and mathematics in the biosciences. Its objectives are to promote and extend the use of statistical and mathematical methods in the principal disciplines of biosciences by reporting on the development and application of these methods. A centerpiece of most *Biometrics* articles is scientific application that sets scientific or policy objectives, motivates methods development, and demonstrates the operations of new methods.

▶ John D. Woodward Jr. article appeared in the *Washington Post* on February 4, 2001. The technological impartiality of facial recognition also offers significant benefits for society. While humans are adept at recognizing facial features, we are also susceptible to prejudices and preconceptions. The controversy surrounding racial profiling illustrates the problems that can result. Facial recognition systems, by contrast, do not focus on a person's skin color, hairstyle or manner of dress, and they do not recognize racial stereotypes. While there is a danger that the system may make an incorrect match, that danger is no more exaggerated than it is when traditional identification methods, such as comparing mug shots, are used.

RESEARCH METHODOLOGY

Primary data was collected with an In-person interview along with well administered questionnaire to obtain detailed and comprehensive analysis and to explore personal opinion. Two hundred faculty members from eight prominent colleges in Pune including Faculty members who were newly appointed faculty, selection grade and senior scale faculty members were questioned on issues concerning the use of Biometrics technology, acceptance or opposition of its use, general advantages and disadvantages of this technology. Twenty Five faculty members from each college were selected on random sampling. A questionnaire has been prepared and filled by 200 faculty members who included 5 newly appointed members

and ten each from selection and senior grade. Finally the data of all these respondents were summarized and analyzed statistically. Secondary Data is collected from journal and books.

HYPOTHESIS

1. Biometrics is the science and technology of measuring and analyzing biological data that plays very crucial role in management.
2. There is always concern about adapting new technology.

BIOMETRIC ACCESS CONTROL SYSTEM

Biometric access control devices of biometric access control systems are nothing but systems which use some aspect of biometrics to achieve the above mentioned two aspects of access control. We have various types of biometric access control systems, which make use of fingerprints, iris scan, and hand *recognition*. Any Biometric access control system will consist of biometric access control reader or scanner. This is a unit which captures the raw data in the form of fingerprint or information from iris scan, etc. This data is then analyzed and compared to the person's characteristics against the previously enrolled record. If the two records match, the person is authenticated. And if the time is within the authorized period of entry, the device will signal and release the electric door lock. The most common aspect of biometrics being used for access control is fingerprints. Although in more secure areas like defense, airports and important government etc. iris scanning systems, and other hi-tech approaches are being used. It is possible to understand if human characteristic can be used for biometrics in terms of the following parameters:

1. **Universality:** Each person should have the characteristic.
2. **Uniqueness:** Is how well the biometric separates individuals from another.
3. **Permanence:** Measures how well a biometric resists aging.
4. **Collect ability:** Ease of acquisition for measurement.
5. **Performance:** Accuracy, speed and robustness of technology used.
6. **Acceptability:** Degree of approval of technology.
7. **Circumvention:** Ease of use of a substitute.

TYPES OF BIOMETRICS

There are basically two types of biometrics:

1. Behavioral biometrics
2. Physical biometrics

1. Behavioral Biometric: Behavioral biometrics basically measures the characteristics which are acquired naturally over a time. It is generally used for verification.

Examples of behavioral biometrics include:

- **Speaker Recognition:** Analyzing vocal behavior.
- **Signature:** Analyzing signature dynamics.
- **Keystroke:** Measuring the time spacing of typed words.

2. Physical biometric: Physical biometrics measures the inherent physical characteristics on an individual. It can be used for either identification or verification.

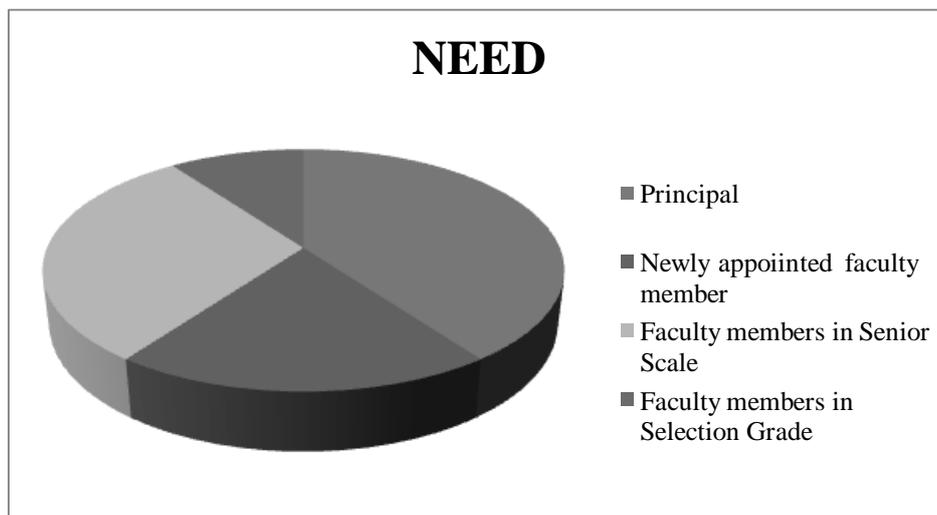
Examples of physical biometrics include:

- ▶ **Bertillon age:** Measuring body lengths (no longer used)
- ▶ **Fingerprint:** Analyzing fingertip patterns
- ▶ **Facial Recognition:** Measuring facial characteristics
- ▶ **Hand Geometry:** Measuring the shape of the hand
- ▶ **Iris Scan:** Analyzing features of collared ring of the eye.
- ▶ **Retinal Scan:** Analyzing blood vessels in the eye.
- ▶ **Vascular Pattern:** Analyzing vein patterns.
- ▶ **DNA:** Analyzing genetic makeup.

FINDINGS/DISCUSSION

To study the role of Biometrics technology in relation to teaching fraternity, views were taken from 200 faculty members from eight prominent colleges at different levels. A questionnaire has been prepared and filled by 200 faculty members who included 5 newly appointed members and ten each from selection and senior grade. They were questioned regarding enhancing security, accuracy, convenient and control and reduced paper work, its maintenance and the impact on relations among Principal and Faculty members. Faculty members were asked about their opinions regarding the installation of machines, its advantages and disadvantages, whether it is burdensome to them.

▶ NEED OF BIOMETRIC TECHNOLOGY



It is observed from data collected that the need for Biometrics at various levels amongst faculty is as follows:

Principal	40%
Newly appointed faculty members	10%

Faculty members in Senior Scale 30%

Faculty members in Selection Grade/Seniors 20%

Faculty members who did not feel the need stated that it is an hindrance for research and academic development and it can be noted that newly appointed faculty do not find the need of Biometric technology. The future professionals in education do not feel the need. Faculty members in Senior Scale feel that if it is acceptable as Government intends to do so and there is no harm in implementing it for some discipline. Faculty members in Selection Grade/Seniors are of an opinion that rules are to be maintained may be with some way outs. They further state that faculty should be imbued with the thought of having affiliation towards the workplace, which will automatically make them stay at the premises rather than compel them to stay at the premises. Those who do not have affiliation keep themselves clean on records, but imprint once in the morning and then go out for personal work and again come back after the stipulated time and again imprint the thumb.

► **PSYCHOLOGICAL ASPECT AFFECTING ON THE USE OF BIOMETRIC MACHINES**

Psychological the faculty members are not prepared for the new technological implementation of biometric machine. 60% of faculty members are not psychologically prepared for the implementing of biometric machine. They find it to be stressful and think it is not the reward what they expect for the sincere effort they put in for the development of the college. They further are of an opinion that it is de-motivating for sincere and hard working faculty members. When benefits of biometrics were asked 40% of respondents stated that it is beneficial for enhancing control and discipline and reducing paper work. 60% are of an opinion that it is convenient to use. Faculty members get burden of biometric machine as it record exact time, but at the same time they accept using the machine.

ADVANTAGES

- Increased control and it provides a convenient and low-cost additional tier of security.
- **Fraud is Reduced** by employing hard-to-forge technologies. For example, minimize the opportunity for ID fraud, buddy punching is not prevalent.
- Eliminate problems caused by lost IDs or forgotten passwords by using physiological attributes. For Example, prevent unauthorized use of lost, stolen or "borrowed" ID Cards.
- Reduce password administration costs.
- Replace hard-to-remember passwords which may be shared or observed. Integrate the wide range of biometric solutions and technologies, customer applications and databases into a robust and scalable control solution for facility and network access.
- Make it possible, automatically, to know WHO did WHAT, WHERE and WHEN.
- Offer significant cost saving or increasing ROI in areas such as Time and Attendance.

DISADVANTAGES

- ▶ The fingerprint of those people working in academic is full of chalk is often affected. Therefore sometimes it is difficult to use the fingerprint mode of authentication.
- ▶ It is found that with age, the voice of a person differs. Also when the person has flu or throat infection the voice changes or if there are too much noise in the environment, this method may not authenticate correctly. Therefore this method of verification is not workable all the time.
- ▶ For people affected with diabetes, the eyes get affected resulting differences.
- ▶ Biometrics is an expensive security solution.

LIMITATIONS OF STUDY

1. This study is undertaken in a very narrow perspective by taking smaller sample size. The study can be undertaken with larger sample size.
2. The study has been conducted in only one city and only related to faculty members from prominent colleges. The attitude and outlook from smaller colleges may be different; hence further research can be undertaken by covering colleges at all levels and colleges from other cities.
3. Time constraint is a major limitation for this study. The time period available for data collection and interpretation is limited.

SUGGESTIONS

1. Faculty members are different to other professions, for example officers in Government offices etc., hence it is not very feasible to this profession.
2. Biometric should not be forced on the faculty members.
3. Faculty members should have affiliation towards their workplace, which will not make such machines compulsory.
4. Faculty members should not avoid using the technology just because it is new.
5. Sometimes the biometric machine is troublesome as it does not recognize the fingerprints, due to improper use of it; hence faculty members should be trained.
6. In case of academic/research or any other official work it is necessary to liberalize the system of Biometrics. The system should be official such as maintaining of register or record in some form.
7. Biometric should not be introduces to bring in fear in the mind of faculty member, but in consultation with them it should be amicably introduced which will create a congenial atmosphere.

CONCLUSION

Among all the biometric techniques, fingerprint-based identification is the oldest method which has been successfully used in numerous applications. Everyone is known to have unique, immutable fingerprints. A fingerprint is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint can be determined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteristics that occur at either a ridge bifurcation or a ridge ending. Fingerprint biometric

is used in education institutes. But there is always concern about adapting new technology. This study shows that some people are reluctant to accept biometrics because it affects them psychologically and they become stressed. Some of them even feel that it deteriorates their performance. But the futures of biometrics seem to be inevitable. Educational institutions, private companies, government department all have important roles in improving the technology and promoting its use through better education, increased usability, standards and proven reliability.

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