

Personalized Testimonial System Using Cardio Signals

¹S.L. Jany Shabu, ²Dr. S. Prayla Shyry, ³J. Refonaa, C.L. Stefi Sterlin

Faculty Of Computing, Sathyabama University, India,

janyshabu@gmail.com

Abstract—In general, the heart cardio sound is used to predispose the heart's physical conditions. The review says that the idiosyncrasy extracted from heart helps in finding out the disorder that has occurred, and this idiosyncrasy is attained using ECG (electro cardio gram). This signal can be used in a better way in their personalized testimonial system. In recent days, there is a lot of biometric testimonial system raised in order to hand over conservancy, however they still face a contemplative drawback, this is due to the development in malware practices. It strongly reveals the single person testimonial system with the help of PCG(phonocardiogram). Around 20 samples from a single person is extracted and the database created these wavelets which is then correlated with the real-time signal produced by the heart during the testimonial process.

Index Terms— PCG, ECG, Coiflet

I. INTRODUCTION

Biometric testimonial interpolate to the identification of humans by their characteristics or traits. It is used to find out singleton Biometric identifiers as they are the distinctive, measurable characteristics used to describe the respective person; the two-type's biometric testimonial is physical and behavioral.

A biometric that would be identified using by one's voice, hand print or behavior comes under the physical biometrics. Behavioral biometrics which consist of characteristic is that related to the behavior of a person, it is not limited to: typing rhythm, gait, and voice. Fewer researchers have described the term behaviometrics to stand for the latter class of biometrics.

The traditional access control consist of token-based identification systems, like driver's license or passport, and knowledge-based identification systems like password or PIN number (Personal identification number). As biometric identifiers are unique they are more effective in identifying than token and knowledge-based. The biometric identifiers give raise to privacy concerns on their ultimate use of their information.

A. Biometric Mode

The biometric modes operate in two modes they are as shown below:

1) Verification Mode

In verification mode, the system performs a one-to-one comparison of a captured biometric with a specific template stored in a biometric database in order to verify

the individual. Steps involved in person verification. Initially the sample signal is collected from some singleton and that reference model is stored in a database. Next step is to verify the real-time signal attained during the testimonial process with the already store sample signals.

2) Identification Mode

In Identification mode, the system performs a one-to-many comparison against a biometric database in attempt to establish the identity of an unknown individual. The system will succeed in identifying the individual if the comparison of the biometric sample to a template in the database falls within a previously collected samples then a positive recognition is given else a negative recognition is given.

II. PROPOSED SYSTEM

In the proposed system verification process a digital value for each wave signal is computed using a time division for a faster processing time in identification process coiflet wavelet algorithm is used. This algorithm which does not consider the time or frequency rather it uses structure or pattern of the Cardio sound signals. The PCG is used to extract the Cardio sound and with the help of condenser microphone this sound signal is converted into digital signals which in return generate a wave form in the system. The disadvantage of the previous system is overcome by having a larger database placing the stethoscope at different places near heart. Which increases the possibilities for finding the person by reducing the EER from 9% to 0.1%.

A. Disadvantage of Existing System

A fewer number of samples is collected between a group of people, there is a chance where the samples of person1 will get confused with the sample of person2 which will produce an inappropriate result to respected person during the testimonial process

The samples that has been collected is dependent on a person's emotion (i.e.) It is mandatory that the person has to stay in a particular emotion in which the initial samples were taken during the testimonial time, which there by produces the false result when a person is in tension, excitement, anger, it is quite complicated for the short temper person or blood pressure person

B. Advantage of Proposed System

The personalized system can be used in highly unassailable

places such as research laboratory, ISRO international Army governance, the traditional biometric system may fail in these restricted places where the cardio signal is remained securable among all. Even if person is under emotional conditions say like tensed or excitement the testimonial is accepted which is due to the profligacy of the system on people's emotion which thereby produces accuracy.

C. Coiflet Wavelet

Coiflet wavelet have scaling functions with vanishing moments the wavelet is near symmetric, their wavelet functions have upto 5 decomposition degree and vanishing moments. And it can be highly decomposed in order to produce noise free waveform.

The implementation of coiflet wavelet transform that considers the frequency alone is used to structure the pattern this pattern is in the absences of time and hence however emotion the person is, the system is not bothered which eventually decreases again the EER error.

III. PROPOSED SYSTEM METHODOLOGY

In the beginning when a person uses the system for the first time the respective person has to enroll them in order to create a database on their own. During the enrollment, biometric information from an individual is acquired and stored. Later this biometric information is compared with the real-time information stored at the time of enrollment.

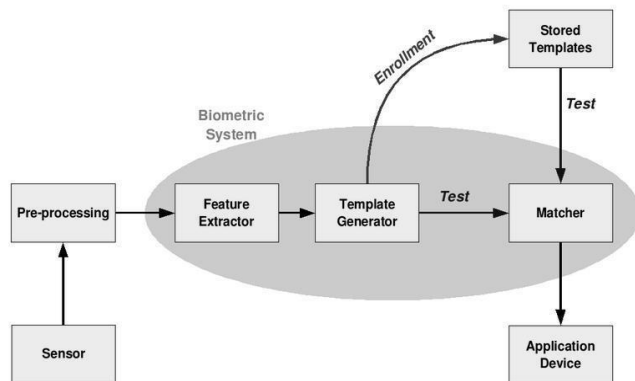


Fig. 1. proposed system methodology

The first block is a sensor block which acts as the interface between the real word application and the biometric system which contains all the necessary information. Mostly it is an image form, but it can change according to the desired and the characteristic of t. The second block performs all e person, in pre-processing the artifacts are removed or filtered from the sensor, to improve the input (e.g. removing background noise, and murmurs), with some kind of normalization the third block template generator where the necessary idiosyncrasys are being extracted. In This step, the correct idiosyncrasys need to be extracted in the optimal way

using efficient optimization techniques. An image with particular properties is used to create. A template is the relevant characteristics extracted from the source. Elements of the biometric measurement that are not used in the comparison algorithm used to identify the enrollee.

The matcher phase is the phase where the comparison being performed with the template in the database and the real time produced template these are passed through the matcher that compares it with other existing templates, this coordinating is done using auto correlation function. The result of the autocorrelation has to be 'One' to accept else the pattern is rejected.

The program will analyze the template with the input template. This will then be output for any specified purpose

IV. IMPLEMENTATION

Use either SI (MKS) or CGS as primary units. (SI units are strongly encouraged.) English units may be used as secondary units (in parentheses). This applies to papers in data storage. For example, write "15 Gb/cm² (100 Gb/in²)." An exception is when English units are used as identifiers in trade, such as "3½-in disk drive." Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity in an equation.

The SI unit for magnetic field strength H is A/m. However, if you wish to use units of T, either refer to magnetic flux density B or magnetic field strength symbolized as $\mu_0 H$. Use the center dot to separate compound units, e.g., "A·m²."

The biometric testimonial system using heart cardio signal is implemented under four modules

- 1) Signal source
- 2) Signal Accuquisition
- 3) Signal Processing
- 4) Testimonial

1) Source of Signal

Heart is the source of signal extraction, usually the heart signals are obtained in two different ways namely ECG (electro cardio gram) and PCG (phono cardio gram).

Comparison Of ECG And PCG

The main difference about ECG and PCG is that the signals and the pattern from the ECG is uniform for each and every individual but the PCG signal is not uniform it is occasioned by signal that is concerned with the sound signals taken from the different regions near the heart. The PCG signal is unique in characteristics for each and every individual.

PCG (Phono Cardio Gram)

PCG is an instrument used to plot high fidelity recording of the sounds and murmurs made by the heart with the help of phonocardiograph, or this can also be explained as "Recording of the sounds or murmurs made by the heart during a cardiac

cycle, or heart pump " The heart's pumping action originates in the sino-atrial node Then the atria contract and the electrical impulse pass on along the bundle Hiss now the ventricle contract. The contraction (systole) and the relaxation (diastole) are occurred during the cardiac cycle this sound may be heard due to the passive closing of valves the first sound is due to the closing of the artio ventricle valves and the contraction of ventricles. The second sound is due to the aortic pulmonary valves the first sound is long and dull so called LUBB the second sound is short and sharp so called DUBB.

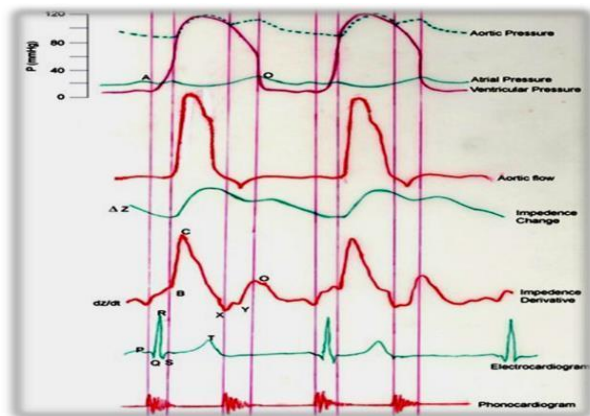


Fig.2. Waveforms of different signals from the heart

2) Signal Acquisition

The signal acquisition is done using stethoscope and condenser microphone.

Stethoscope

Stethoscope is used to read the sound from heart directly, the diaphragm in the stethoscope converts the vibration produced by the heart into the sound signal, this diaphragm also avoids the larger murmur produced by the heart and attains the proper sound.



Fig. 3. Stethoscope



Fig.4. Condenser Microphone

The other end of the stethoscope is completed with condenser microphone. Condenser microphone is also called a capacitor microphone. Here, the diaphragm acts as one plate of a capacitor, and the vibrations produce changes in the distance between the plates. There are two types, depending

on the method of extracting the audio signal from the transducer: DC-biased and radio frequency (RF) or high frequency (HF) condenser microphones. For the extraction of heart signals Dc-based HF (high frequency) condenser microphone is used in order to obtain an accurate sound signals, and with the help of transformer this sound signal is converted into digital signal with high frequency rate

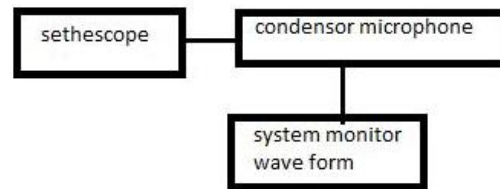


Fig.5. General block diagram

Around 20 samples from a person is acquitted using stethoscope and condenser microphone in this model each signal generates a waveform in the system using the signal processing libraries in the MATLAB.

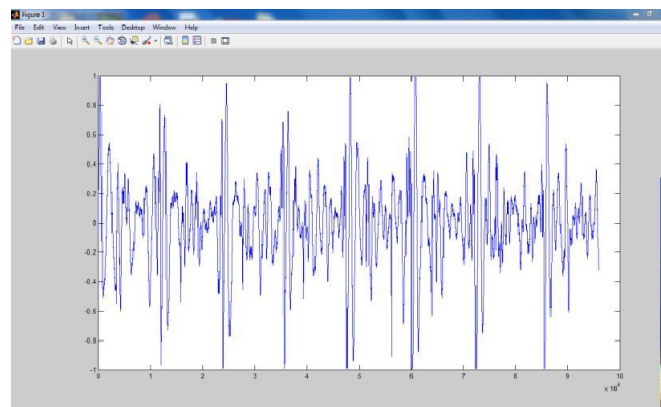


Fig.6. Real time signal waveform

3) Signal Processing

To processes the signal obtained coiflet wavelet transform is used. A unique value is calculated for each waveform with the higher decomposition degree 4 in order to obtain the accurate sound, using coif4 function from the MATLAB. Each wave form produces a value likewise, every other 20 sample is being decomposed and a unique value is obtained, later in order to create a database an average value of all the unique value, this is to decrease the EER error, so during the correlation time.



Fig.7. Value of a single wave

4) Testimonial System

This model uses the auto correlation method to correlate the real-time signal acquired with the signal that is already stored in the database, the autocorrelation function that is available in the MATLAB is called and used. The person is subjected before the system and with the help of stethoscope the signal is acquired, the noise present in the signal is filtered. And this real-time signal is matched with the already present waveforms in the database using auto correlation, if the match is found then the system accepts the person else it rejects.

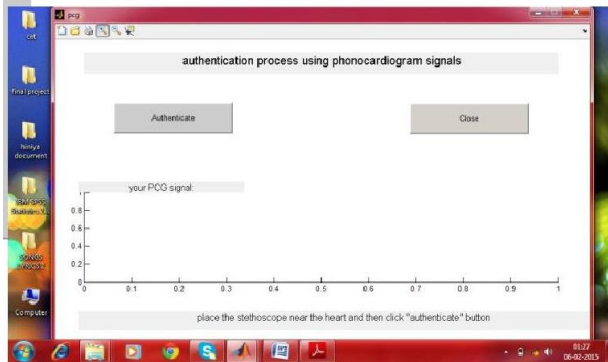


Fig. 8. Testimonial process

V. RESULT

The existing systems used a group of people in order to create an testimonial system with the minimum number of samples which there by produces mismatch during the testimonial creating the EER error rate (9.48%), whereas here a single person personalized system is designed with the maximum number of samples depending on the database, which there by reduces the EER error rate to (0.45%). The time frequency wavelet used is dependable on a time between the S1 and S2 which rejects the person on their emotions, where as the coiflet wavelet transform is in dependable on people's emotion which increases the effective usage of the testimonial system.

VI. CONCLUSION AND FUTURE ENHANCEMENT

The EER error from the previous paper has effectively overcome. The necessary steps are taken to prove the effectiveness of this methodology, In future, this can be extended in such a way that this testimonial system will be used by the people having pacemakers.

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