



SECURE BIOMETRIC USING MULTIMODAL BY DEEP HASHING AND DNN TECHNIQUES

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Abstract

The Security is an important factor required for every individual. Biometric is the best method for security. Almost many applications use biometric as the security devices. There are unimodal and multimodal biometrics. This research uses multi modal. DNN deep neural networks are used for features extraction which extracts multi modals. The integration of DNN is made with deep hashing and LDA technique for extracting the required multimodal features. The secure architecture is embedded with DNN which provides high security compared with general biometric systems. This research is for combination of fingerprint and iris. The secured features are classified and image retrieval is obtained. The research gives the promising accuracy of 99.27% which is best in compared to available biometric systems. The error rate is very low and applicable for all the biometrics.

Keywords – Biometric, DNN, LDA, Multimodal

I. INTRODUCTION

Security for all the applications can be given from various ways. Compared to password protection systems the biometrics plays a vital role in the technology era. Biometrics is defined as body measurements and statistical evaluations of its values. Bio-metrics is real time systems which work on security. They deal with binary representations. The biometrics is connected to image processing. Various parameters are considered for obtaining perfect biometric system. There are various types of Biometrics which are given below and shown in figure 1



Fig 1 Types of Biometrics



Different types of Biometrics are as follows

- deoxyribonucleic acid (DNA)
- Auricle (EAR)
- Iris
- Face
- Palm
- Hand Finger print
- Leg Finger print
- Retina
- Speech
- Audio
- Movement of Lips
- GAIT
- Digital key
- Signature
- Overall Body etc

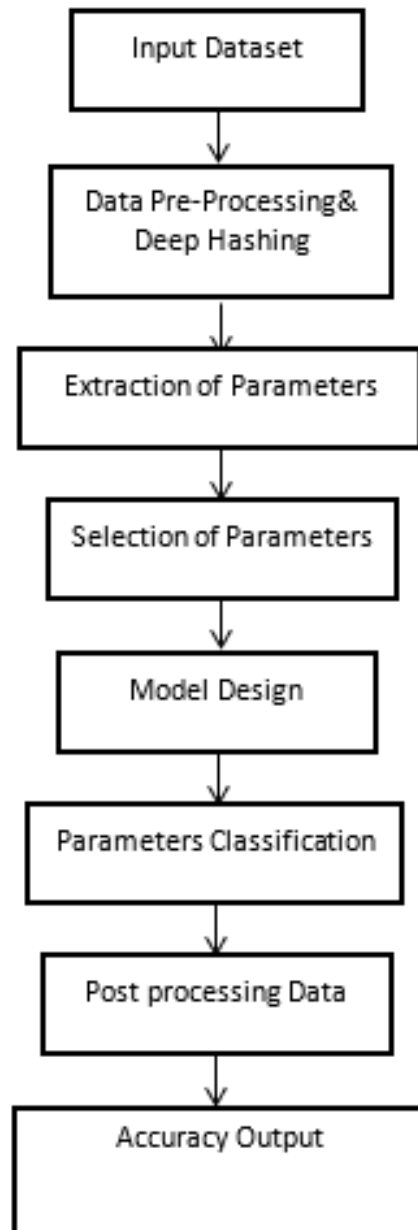
All the biometrics is processed with scanning. Once the data is scanned it forms an image and further image processing is applied to design better systems [15]. Biometrics are classified in to two types

- Physiological biometric
 - Face
 - Iris
 - Hand
 - Fingerprint
 - DNA etc
- Behavioral Biometric
 - Speech
 - Voice
 - Audio
 - Signature etc

II. BASIC ARCHITECTURE

The bio metric system is designed with various subsets as shown in figure 2. The input data is collected and data set is formed. Each data is pre-processed and conversion is done, using deep hash functions where there is no loss of information. Now some parameters are extracted by using DNN algorithms. All the parameters are not useful so only useful parameters are selected. Now the model is designed with the available parameters. The parameters are classified and lastly post processing is done.

Accuracy is calculated. This is the advanced architecture embedded in the biometric system. General biometrics works on unimodal but this architecture works on multimodal. General biometric systems have only hash functions but this research uses DNN which is faster. Now recent mobile phones and laptops uses the same technology with artificial intelligence [12].



a) Data Set:

Many databases are available in various websites like

- *CITER*
- *Data.world*
- *IEEE Biometrics*
- *Socofing*
- *CUBS*
- *WVU etc*

This research uses kaggle dataset for biometrics. This website is quite commonly used by many researchers for their testing.

b) Data Pre-processing & hashing:

Pre-processing deals with removal of noise, that is unused data. Image pre processing is done by DWT or DCT. This research uses Symlett wavelet for pre-processing and it deals with

- Cleaning
- reduction



- enrichment
- validation
- Transformation

c) Feature extraction:

Parameters extraction is the extraction of various parameters on image DNN techniques is used for the extraction of parameters

- Cross overs
- Core
- Bifurcations
- Ridge endings
- Islands
- Deltas
- Pores
- Short breaks
- Bridges
- Dots
- Lakes
- Hooks
- Petal Length
- Petal Width
- Sepal Length
- Sepal Width
- Boundary Points
- Texture
- Color

d) Feature selection:

As mentioned above various features are extracted for all the images in the data set. But all these are not useful. So LDA linear discriminate analysis technique is used for selecting some features.

e) Feature Classification:

The selected features are classified using DNN technique. The recognition accuracy is measured from the classification. This is the most crucial part where high end algorithms are used. DNN is deep neural networks/ this paper uses HMM based DNN technique for the classification which is shown in figure 3.

The detailed classification of HMM based DNN is shown clearly. There are many classification techniques where the data is classified by SVM, Naive byes, Pattern recognition classifiers but this research uses Deep neural networks. The optimization is good in HMM based DNN. The performance based systems are required for real time systems. So best option is HMM based DNN techniques. The detailed version of the techniques is determined by the class of data.

The classification and extraction uses DNN. The error rate can be low with the DNN. So many researchers used the DNN. The combination of HMM with DNN has given better results.

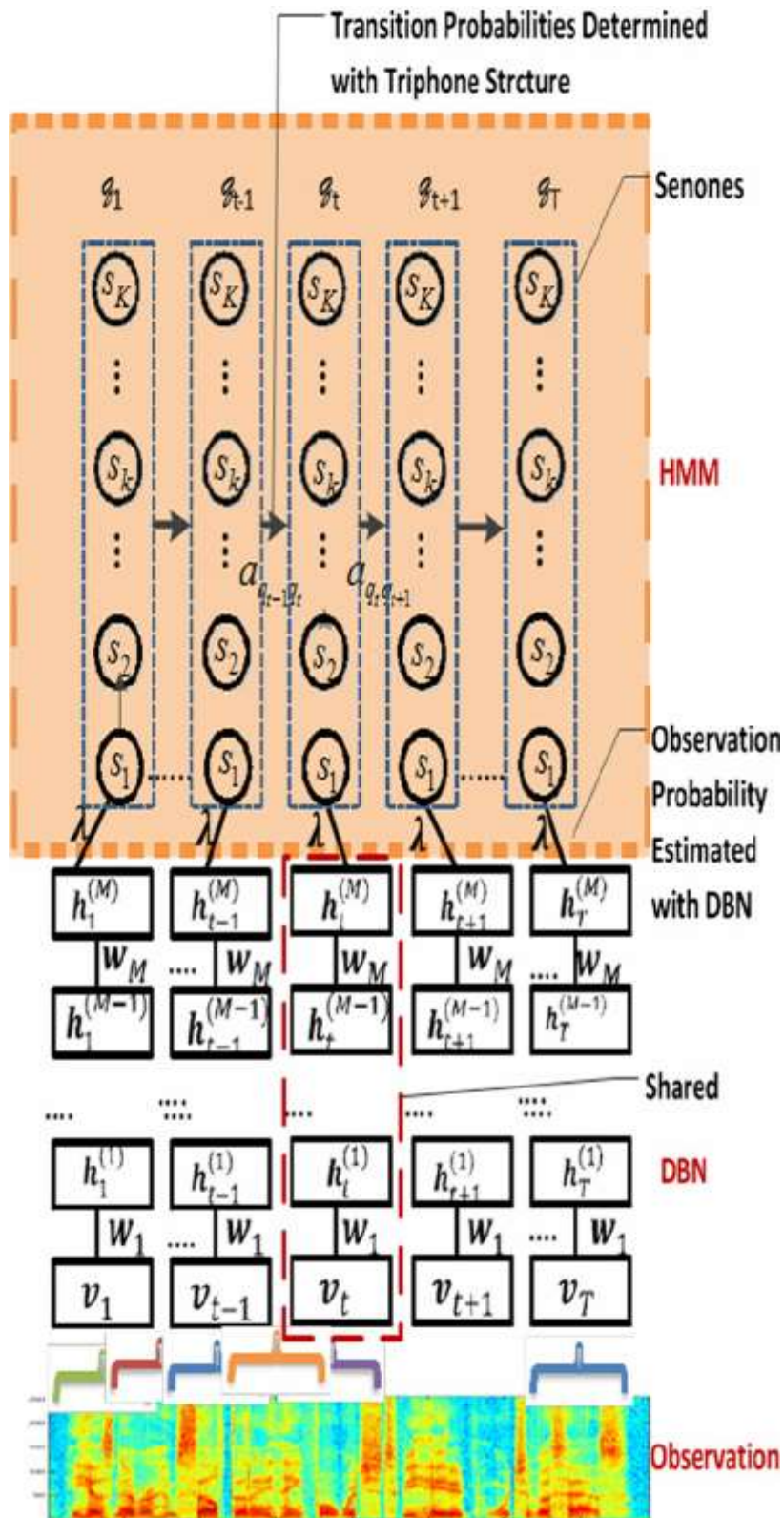


Fig 3: HMM and DNN

III. RESULTS AND DISCUSSIONS

The input is collected from the dataset. Pre processing given best results. The dataset has the collection of various humans with different age group and different gender. The original image and pre processed image is shown in the figure 4 and 5 below.



Fig 4: Input Image



Figure 5 Pre Processed Image

The comparisons of various biometric systems with the designed new system is given in the Table 1. The extracted features are shown in the Table 1. DNN technique is used for extracting these features.

Table1: extracted features in various types of soils

| Soil/Feature | IRIS | Facial | Finger print | This Modal |
|--------------------|--------|--------|--------------|------------|
| Flexibility | Low | High | Low | Medium |
| Accuracy | High | Medium | Low | High |
| Fast | Medium | Low | High | High |
| Touch | No | No | Yes | Yes |
| Usage | Low | Low | Low | High |
| Error | Medium | High | High | Low |
| Money | Medium | Medium | Medium | Low |
| Stability | High | Medium | High | High |
| Uniqueness | Ok | Ok | Ok | Ok |



| | | | | |
|-----------------------|------|------|--------|-------|
| Performance | Low | Low | Medium | High |
| Collectability | High | Low | Low | High |
| porosity | Ok | Ok | Ok | Ok |
| consistence | Good | Good | Good | Great |

The accuracy is plotted in the graph below shown in figure 6

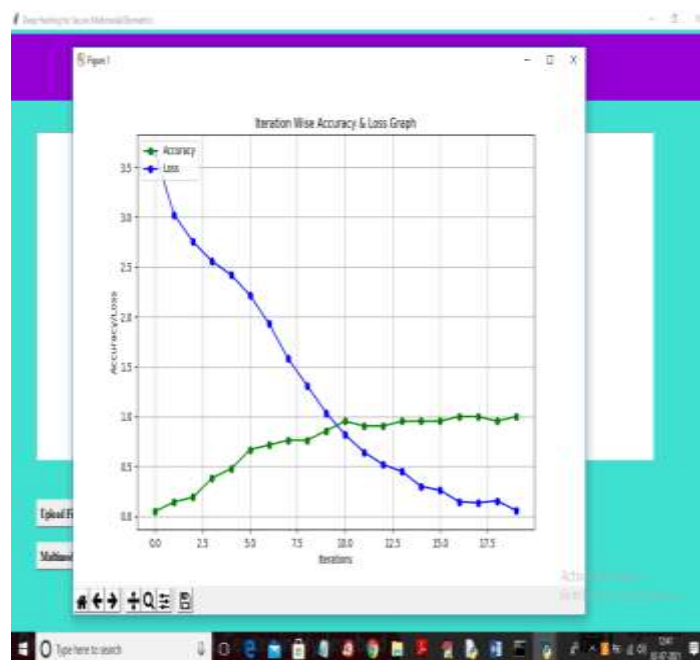
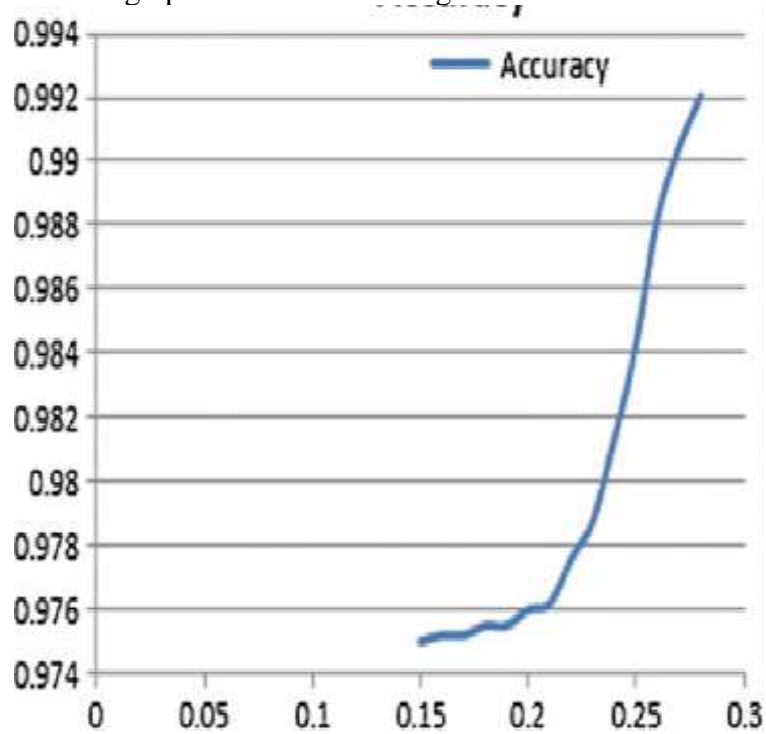


Fig 6 Accuracy



VI. CONCLUSION

This research deals with design of biometric using deep hash functions and HMM based DNN techniques. This research has given better results as compared with other designs. This paper used advanced algorithms where the performance is improved and error occurrence has become low. The various parameters are extracted and the operations are done on the extracted parameters. In future the authors can use advanced techniques. LDA technique, also given promising results. The overall accuracy was 99.27%.

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