RECOGNITION OF NEW BORN BABIES USING MULTI CLASS SVM

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***Abstract* — Biometric recognition can be used for the identification of new born babies. It avoids the swapping, abduction, incorrect identification and accurate census. In this paper, it uses an auto encoder based scheme for extracting the features. Then it is followed by a problem specific distance metric learning through one shot similarity with multi class SVM. The algorithm has been implemented successfully.**

Keywords— ***Biometric recognition, swapping, auto encoder, multi class SVM***

I INTRODUCTION

Automatic recognition of new borns is one of the challenging problems with various applications. Because of face of new born may change day by day. The unique nature and behaviour of newborn babies leads to interesting challenges towards a newborn biometric system. Considering the non-intrusive nature of face biometrics, this research explores the possibility of using face recognition for determining the identity of newborns. It had some constraints such as reliability, immense security measures, time consuming and cost effective. The current technologies such as RFID bracelets, palm and foot prints are used for the identification of new borns. Some of the hospitals reported that the babies are transferred too and away from the mother. The delivery of new born to wrong parents is another social issue. In developing countries swapping and abduction are the major problems. The medical science techniques such as DNA, HLA are costly but time consuming. The rapid availability of DNA technology has been enabled faster. So it can be effectively utilizing DNA for biometrics. In Some countries these techniques may not be available .So the institutions such as hospitals, neonatal cares can adopt a biometric system for new born babies. In this case face recognition can be used.

II RELATED WORKS

One of the most common techniques used for identification of new borns is the use of RFID bracelets [2].After the birth the bracelets are tag on baby's hands or legs. But this technique has not been able to provide enough level of security for new born. So foot prints can be used. Shepard *et al*. [1] proposed that the foot prints are collected from various new borns and stored along with their mothers finger print. That way it is expected that any identity doubt about baby or his or her mother can verify. Due to illegal problems the use of foot prints identification is not possible in the majority cases.

In this paper [4] proposed that the face and soft biometric can be used for the recognition system. In the proposed system, the biometric recognition system is divided into two subsystems face and soft biometric. The soft biometric identifiers such as height, weight, gender, and blood-group can be very useful in newborn recognition. The promising tools such as face and soft biometric data can be useful for the identification of new born. The two subsystems are the primary biometric system which consists of face. The

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secondary biometric system consists of soft biometric behaviours like height, weight, gender and blood-group. For the secondary biometric system the output is prior probability corresponding to the test user. The Bayesian integration can be calculated using matching probability of the user, the given primary biometric and biometric future vector. So the soft biometric characteristics are not as permanent and reliable. The traditional biometric identifiers provide some information about the identity of the newborn. So it leads to higher accuracy in establishing the user identity.

The Daniel Weingaertner *et al*. [10] proposed that using palm prints the new born biometric identification can done. They developed a sensor consisting of a 8 megapixels digital camera attached to a rectangular optical glass prism, capable to generate images of approximately 1400*d pi* with a capture area of 35*mm*×45*mm*. The working principle of the sensor is the same as other existing optical fingerprint sensors, based on the total reflection characteristic of a prism. When a palm or sole is placed on top of the prism's inclined surface, light is absorbed by the ridges touching the prism, yielding dark points on the image, while at the valleys light is reflected into the camera. This method provides high contrast images, and the main advantages of the developed sensor are its high resolution.

III EXISTING SYSTEM

The existing system consists of two methods. The stacked denoising autoencoder and learning based distance metrics.

1) Stacked Denoising Autoencoder

The large numbers of unlabelled samples are trained. A stacked denoising autoencoder is unsupervised feature learning. It is in the form of a neural network. The layers are trained independently using back propagation algorithm in a greedy manner. So it minimizes the error occurred in each layer.

2) Learning based Distance Metrics: One Shot Similarity using LDA

A metric function is defined as a positive definite distance measure between two elements in a set. One-shot similarity measures the dissimilarity between a given instance and a separate class of negative instances that are available during matching.

IV PROPOSED SYSTEM

First the input face image is first divided into nine overlapping regions. Using a stacked denoising auto encoder the features such as mouth, chin, and forehead are extracted. The representations thus obtained are concatenated into a single feature vector. Then perform one shot similarity using multi class SVM. One shot similarity measures from a set of positive samples and a set of negative samples are available.

Algorithm

1. Train a set of images to produce the test samples. To train the images the input image is filtered and cropped using local binary pattern.
2. The input image is divided into nine overlapping regions.
2. The features are extracted using a stacked denoising auto encoder.
3. Each encoder provides the representation of component of face image such as mouth, chin and so on.
4. Thus the representations are concatenated into a single feature vector.
5. Then perform one shot similarity using multi class SVM. One shot Similarity measures the dissimilarity between a given class and a separate class of negative instances. Consider two trained samples say A and B. The similarity index between A and I is computed as S1. Similarly similarity index between B and I is computed as S2. One shot similarity is the combination of S1 and S2.Here the linear discriminatnt Analysis is used as the classifier. Refer the experimental outputs in section III figure2.(b)-figure2.(d).

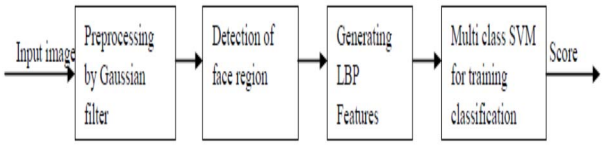

Figure 1: Proposed system

V EXPERIMENTAL RESULT

The images of 80 samples are selected for training and the remaining 20 samples are taken as the test data. Among the test samples select one image randomly, the LBP values are computed and stored for feature comparison and classification. Feature vectors are trained and classify through multi SVM.

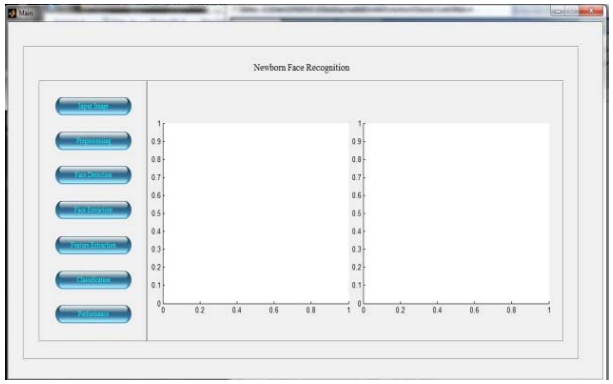

Figure2.(a)

Figure2.(b)

Figure2.(c)

Figure2.(d)

VI RESULT ANALYSIS

For analyzing face recognition technique three parameters are considered, which includes accuracy, sensitivity, precision. The observations for the given test sample shown in figure 3.

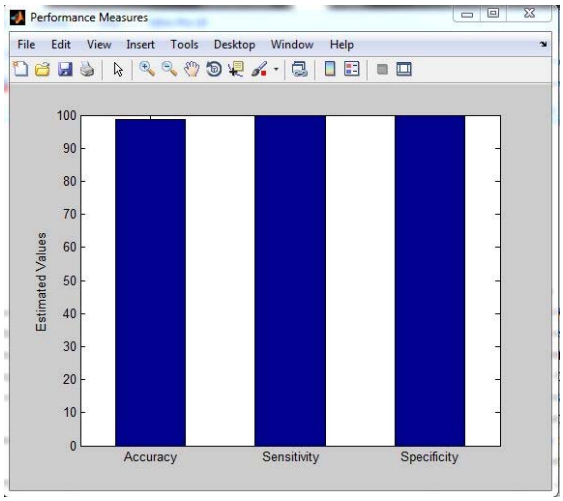

Figure 3

VII CONCLUSION

Domain specific feature extraction and unsupervised machine leaning by new born images is one of the finest methods for new born face recognition .The system combines both an auto encoder based feature representation followed by a distance metric using multi class SVM. The auto encoder learns domain specific using large number of unlabelled samples available. The distance metric learns problem specific using relatively small amount of information to improve the recognition performance. It gives the better classification accuracy

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