CHAPTER 9

CONCLUSION

The pixels are the basic elements of an image, proposing a methodology based on ear a contour image pixel that encourages researchers to work on the area of an Ear Biometrics system. The methodology “Pixel Based Feature Extraction Approach” for Ear biometrics” is based on ear contours constructed from human ear images and ten different; the unique features are identified using simple geometrical properties of pixels and its manipulations. The effective manipulations of the ear contour image improve the quantity and quality of features that are extracted from the ear biometrics system.

The “Structural (shape) Feature Extraction Approach for ear biometrics”, has used structural or shape properties of the ear image to extract features, which are used to identify the unauthorized persons. The features area, perimeter, major-axis-length, minor-axis-length, eccentricity, horizontal-height, vertical-height, rectangularity, circularity, compactness and elongation for a given database are verified to identify whether the unauthorized person is present in the database or not. The performance is measured using two principles False Match Rate and False Non Match Rate using graphs. The AMI ear database is used for experimentation.

The Ear Biometrics based on “Gray Level (Spatial) Statistical Feature Extraction” has developed an ear image based human identification system. It has extracted statistical features mean, median, mode, standard deviation, min, max, skewness and kurtosis of the gray levels from the human ear image to construct an effective ear biometrics system. These features are extracted taking IIT Delhi ear database and a new database is created to verify the authorization of the individual, This approach has used gray level distribution and its
properties of the ear image to extract statistical features to build a biometric system. The performance is verified using False Acceptance Rate (FAR) and False Rejection Rate (FRR).

In “Location Identification of an individual based on image Metadata”, a methodology is proposed to locate an individual depending on the image and video using background metadata and tracks the location of an individual depending on the four metadata parameters GPS Altitude, GPS Latitude, GPS Longitude and GPS position extracted from the user’s social media upload. The GPS mapper helps in identifying the location and track the individual by repetitive image metadata analysis. The data is also useful for forensic evidence for cyber crime investigation. This method helps in remote identification of an intruder relying on the image/video upload using a device which is enabled with location services like android mobile. The output also displayed where the image is captured with varying zoom percentage and also it is helpful to identify the nearest location of the criminal. The tool provides 30 odd different features of metadata registry regarding an image. Theses parameters can be used for different purposes such as location identification, secure data insertion, image compression, forensic investigation and image enhancement.

In “Left-Right Symmetry Based Feature Extraction Approach for ear biometrics system” it has used three methodologies namely – Pixel based symmetry, Bilateral Symmetry and Histogram based symmetry which are proposed to verify the percentage of symmetry that existed between the left and right ears of an individual. The symmetry parameter acts as a prime factor to reconstruct the occluded left or right ear during image acquisition in the ear biometric system through a surveillance camera. The result shows a better percentage (95% approx.) of symmetry. This is an optimal symmetry match to reconstruct the left ear from the right and vice versa.
In order to provide security for the ear database, a new approach is suggested for symmetric encryption using Cartesian plotting, circle generation and image translation/rotation, which is termed as “Chakra: a symmetric key encryption”.

The dissertation presents three approaches for ear recognition using three different benchmark databases. As said in the conclusion chapter L-R based symmetry approach is best suited for real time ear recognition, with two ways processing of left-right ear images. The future work can be extended by combining the best feature sets of the existing approaches as a hybrid approach. The performance of the proposed feature extraction is on average of 75% which is an average performance for any biometrics algorithm but the trends in ear biometrics are emerging and the performance can be improved by applying different feature extraction refinement.