ABSTRACT

Biometric recognition techniques enable the validation of persons by analyzing and comparing a query offered by the applicant to its biometric reference. Based on the result of investigation, the claim is approved or else, the claim is rejected. A unimodal biometric system has the limited accuracy. Multimodal biometric systems are widely used to improve the accuracy. Each biometric trait processes its information independently and the processed information is combined using an appropriate fusion scheme. In the thesis multi modal face and ear images are considered. A biometric cryptosystem fuzzy vault scheme is designed for recognition by the fusion of face and ear modalities. The acquired face and ear are extracted and saved as images. The RGB face and ear image inputs are converted into gray scale images. The image filtering operations are applied to remove the blurred edges and to decrease the noise. The preprocessed images are used to extract the shape, texture and energy featured set of face and ear. The shape features are extracted using Modified Region Growing Algorithm, texture features are extracted using Local Gabor XOR Pattern technique and energy features of the ear image are extracted using Local Principal Independent Component method.

Fuzzy vault with multiple polynomials has utilized to effectively secure the template of the modalities. Chaff points are randomly chosen from the characteristic feature points using enhanced optimization technique based on fuzzy vault with multiple polynomials. X and Y co-ordinate chaff matrix can be created with the support of boundary matrix from the extracted features. A Hybrid ABC-PSO algorithm is used for calculating the optimal location to make novel chaff points. Artificial Bee Colony algorithm consists of three components namely, employed bees, onlooker bees and scout bees. In Hybrid ABC-PSO, the Particle Swarm Optimization algorithm is processed within the scout bee component, which leads to fast convergence and limited search space controlled based optimization of locations. The feature vector points obtained from the face and ear feature extraction processes are converted into its corresponding locations. From these locations, the best of locations are selected for the further process. Fuzzy vault using multiple polynomials improve the security of biometric template with the addition of secret key concept into the feature set.
Fuzzy vault template has been generated by using multiple polynomial encoding and error correction. In fuzzy vault decoding, the query multi modal biometric is applied to unlock the vault and recognize the person. Fuzzy vault encoding leads to very strict matching against a query image in fuzzy vault decode. The collective approach gives improved recognition, template security, much faster convergence, limited search space and it is proved to be a resourceful tool. The performance evaluation has been made which improves the recognition result.