Automatic Fingerprint Recognition System is getting advanced as a major field in Biometrics and it plays an important role in forensics and law enforcement applications. Automated Fingerprint Recognition Systems have been effectively deployed around the earth for law enforcement, civilian applications and mobile biometrics in smart phones. Fingerprints will ever remain to be a leading biometric trait. Many identity applications and access control applications will continue to rely on fingerprint recognition because of its proven performance, existence of large databases and availability of the fingerprint devices at affordable costs. New research problems have emerged due to wider development of fingerprint technology. There are various issues that need to be addressed to develop make Automatic Fingerprint Recognition System a fool proof system. In this connection, there are designing challenges such as non linear distortion, low quality image, segmentation, sensor noise, skin conditions, overlapping, inter class similarity, intra class variations and template aging. In crime scenes, the latent images can be merged with some background images or more number of fingerprint images from same person or different person.

During investigations, there are several possibilities for acquiring damaged or overlapped fingerprint images. Individual persons cannot be identified and recognized by using these kinds of overlapped images. In forensics, the matching accuracy is extremely critical even if it involves some degree of manual intervention. An overlapped fingerprint image should be processed for fingerprint identification and recognition. Separation of overlapped images and identification of individual is a very complicated task for fingerprint examiners. The overlapped fingerprint images pose a very tedious challenge to existing fingerprint recognition algorithms. The objective
of this proposed system is to analyze, identify and separate overlapped fingerprint images automatically by using an Adaptive Neuro Fuzzy Inference System Classifier. In this research work, a novel algorithm called Orientation Field Separation algorithm is proposed to separate overlapping latent images and identify the region of overlapped images without human intervention. The proposed Automatic Fingerprint Recognition System analyzes and designs a fingerprint recognition system for overlapped latent images.

The planned work enables accurate and fast data retrieval by using one-to-N fingerprint identification for overlapped images. Extensive experiments are performed on Simultaneous Latent Fingerprint databases, National Institute of Standards and Technology-Special Database 27, Fingerprint Verification Competition 2006 Database1-A, Database2-A databases and evaluate rank-1 identification rate. The experimental results are highly promising and they outperform the previous systems in identifying overlapped images. The proposed Automatic Fingerprint Recognition System separates overlapped fingerprints more accurately and robustly and it consequently improves the fingerprint recognition accuracy. The achieved results confirm that the proposed automatic fingerprint recognition system has higher possibility in detecting overlapped fingerprints. In this research work, a methodology is proposed to separate overlapped fingerprints automatically and expand the set of testing and training samples. The performance of Adaptive Neuro Fuzzy Inference System Classifier is evaluated by applying the k-fold cross validation technique.

The outcome of the work shows that the overlapped fingerprint is separated in a successful manner. The work carried out in this research tries to improve the performance of separation of overlapped fingerprint images in an efficient manner and formulate the identification rate with accurate and fast data retrieval. The obtained results show that the proposed method achieves a
true acceptance rate for overlapped images and normal images at 92.6% with 8s, 95% with 3s, Rank-1 accuracies for various qualities good, bad, ugly are 92.6%, 58.5% and 55.6%, Adaptive Neuro Fuzzy Inference System Classifier classification rate of 90.66% with 5s, 86.66% with 12s and recognition rate for overlapped images with small, medium, large 85.7%, 88.9% and 85.5%.