CHAPTER - 7

SUMMARY AND CONCLUSION

7.1 INTRODUCTION

The main motivation for this work stems from the fact that the existing models for fingerprint identification require large memory space for storing fingerprint data, large matching time and produce poor fingerprint identification results for given partial sizes of prints. Arriving at a suitable model for fingerprint identification is really a challenging task to the researchers working in pattern recognition area. In this work, the fault tolerant capability of neural networks and fast learning capability of GA have been utilised for solving fingerprint identification problem. This attempt of this work produced significantly good results compared to existing fingerprint identification methods. This chapter is aimed at reviewing the significant contribution and salient features of this work. Finally further directions of research work is also addressed.

7.2 ACHIEVEMENTS

The significant contributions of this work are :-

* Various existing techniques for modeling fingerprint identification are studied. The imminent need for developing a new model for fingerprint identification is realized.
* The different models for extracting features from image are discussed. The textural and directional features of the fingerprint are used for identification.

* The conventional neural network models have been implemented and tested for fingerprint identification. The performance these models are analyzed and are compared with each other. The comparison results lead to a conclusion that BPN performs better than other models in the recognition of deformed fingerprint through it consumes more training time.

* Some of the existing fingerprint identification models have been implemented and experimented. The performance of these models have been compared with the BPN model.

* The SGA has been improved by tuning selection methods, incorporating adaptive probability for operators and a method was developed for population overlapping.

* The genetic operators are directed based on current solutions in the population.

* The GA performance has been tested with different genetic parameters including population size and operators probability.

* A heuristic model has been developed using GA to define topology of network for training BP algorithm. The network topology is defined based on number of training patterns and size of input and output patterns.

* To solve slow learning nature and other problems related with learning algorithm in conventional models GA-based learning
is introduced. The comparison results leads to a conclusion that IGA based BPN is highly suitable for solving fingerprint identification problem.

7.3 THE SALIENT FEATURES OF THIS WORK

The salient features of this work are summarized as follows:

* The fingerprint matching time is significantly reduced to a negligible value.
* The model require less memory space for storing of fingerprint data.
* The original fingerprint is not necessary for matching.
* The model is able to produce 89% correct results even for recognition of 1/4 size of partial prints.
* The model is invariant to rotation and translation of fingerprints.
* The size of inputs required for training/identification is very small.

7.4 FUTURE DIRECTIONS OF RESEARCH WORK

Opportunities exist for pursuing the work in various directions such as

* Developing mathematical proofs for the convergence of developed models
* Improving the developed models as a general tool for solving any pattern classification problems.
* Parallel algorithms could be developed for the improved models to exploit the state-of-the-art technology on software and hardware.
* The developed system could be applied for palm pattern and footprint recognition problems.
* The network training based on GA could be extended to distributed computing environment for fast training.

7.5 CONCLUSIONS

This work enunciates a new approach for organizing network topology and learning of neural network models and applies the models to the fingerprint identification problem. Based on comparison of the significant results among neural network models, OSBPN system is appropriate model for solving fingerprint identification problem. The strengths of this model are that the time for recognition is negligible, utilization of memory space is very low and the accuracy partial prints recognition is high.