Chapter 7
CONCLUSION AND FUTURE DIRECTIONS

In the present study a new adaptive technique and a new crossover operator are developed. It is seen that genetic algorithms could be used as a powerful tool for solving various types of optimization problems as well as other types of imputing problems by using adaptive techniques.

The following are the main original contributions in the works reported in this thesis.

An innovative search technique named as GA with adaptive search limits (GAASL) is introduced for finding solutions to optimization problems and proved to be very effective. The effectiveness is demonstrated by testing with various case studies obtained from the literature.

A new crossover operator based on conjugate gradient logic is proposed and implemented in GAASL. It is proved effective in getting the optimal solution fast and accurately.

A new algorithm integrating with adaptive genetic algorithm with an Expectation-Maximization structure for estimating the statistical characteristics of the incomplete data without losing any information available in the data is presented. The procedure is tested on simulated data and found to be superior to other methods. This procedure generates
the sufficient statistics for the parameters of the multivariate incomplete data.

An innovative search algorithm motivated by the Genetic Algorithm is proposed for the solution of Travelling Sales Man Problem. New crossover operators and mutation operators suitable for solving TSP by GA are developed and presented. It is seen that the present algorithm is able to generate best solutions for TSP within a short execution time. The efficacy of the algorithm is shown with 15 cities and 40 cities TSP.

The works reported in the thesis are presented in various technical conferences and published in journals/proceedings. These include


Scope for Future Research

The concept of Adaptive GA can be effectively applied in other types of real life problems such as reentry time and location prediction of space objects. Reentries of risk objects, mainly space debris objects, are of great concern due to its threats to Earth impact, casualty and property loss and damage. The threats caused by the debris objects can be mitigated or controlled, if we are able to predict the reentry time and location. This problem can be framed as a minimization problem and can be attempted using the adaptive GA proposed in this thesis. The adaptive techniques with real coded GA can be pursued and can be applied in various fields of real life. Further research on various types of adaptive GA will be of great interest for future works.