CHAPTER 7
CHAPTER 7

CONCLUSION AND FUTURE ENHANCEMENTS

The portfolio optimization problem has become a standard financial engineering problem since the pioneering work of Markowitz on Modern Portfolio Theory. It aims to find an optimal allocation of capital among a set of assets by simultaneously minimizing the risk and maximizing the return of the investment. In the theoretical case of linear constraints, this problem is basically solved by quadratic programming.

This research work aims at proposing a model for the naïve investors to construct and optimize their portfolio and manage it for minimal risk and maximal return. The original Markowitz portfolio optimization problem is solved using a convex quadratic programming procedure. However, real-life financial market imposes some nonlinear constraints such as cardinality constraints, which limit the number of assets held in the portfolio, minimum transaction lots constraints, which require holding discrete units in assets, multiples of minimum lots, or transaction costs, which tend to eliminate small holding.

This thesis discusses the concept and implementation of prediction of the Stock Market Behavior and Investment Decision Making using Benchmark Algorithms for Naive Investors. It explains Portfolio determination using PSO adopted Clustering technique. It also
concentrates on the theory and the enhancement of the portfolio determination using Multi objective Optimization. Finally a model which elucidates Semi-Supervised Clustering for the portfolio determination is built and the results are demonstrated.

The model proposed in the research could be used by the individual investors in the customized manner. The proposed work could be adopted with the existing tools to enhance the profit and minimize the risk.

**Future Enhancements**

Drawing attention to further applications to portfolio management (over time) with the consideration of hard constraints seems quite worthwhile and practical. Some of the aspects to be explored more in EAs concern the possible ways to handle the constraints within the algorithm.

Besides adopting penalty strategies and rejecting or repairing the infeasible individuals, finding a more appropriate representation scheme incorporating the problem-specific-knowledge is more appealing and useful.