Chapter 9

General Conclusion
and
Future Scope of Research

9.1 General Conclusion

In this thesis, we have proposed two algorithms for solving deterministic (crisp) bound constrained and constrained optimization problems in the context of global perspective. These algorithms are based on interval ranking, interval mathematics and multisplitting/multisection criteria. We have also investigated the bound constrained and constrained optimization problems with interval valued objectives and crisp/interval valued constraints. For solving those problems for the first time we have also formulated the constrained optimization problems with interval valued objective into multiobjective optimization problems by optimizing the centre value and minimizing the width of the interval valued objectives. These methods have some limitations,

(i) By the proposed method only the optimization problems with continuous variables can be solved. However, any type of integer and mixed integer problems cannot be solved.
(ii) In these methods, the search spaces of the problem are to be prescribed; otherwise, considering a large search space one can solve the problem, but it takes larger computational time.

(iii) From the numerical experiments, it is clear that these methods give the better results if the size of the search space is small.

(iv) The speed of convergence of these algorithms is very high which has not been shown by any algorithms developed earlier. However, we have claimed this statement about the speed of convergence based on the numerical experiments. No theoretical proofs have been provided.

9.2 Recommendations for Future Research

In this thesis, we have mainly proposed a new interval computing $B \& B$ algorithm with multisection division criterion (Method 2) for various optimization problems with or without interval coefficients. The solutions of those problems are obtained with higher accuracy and lower computational cost which is never seen before. One can apply this technique to solve the classical decision making problems in different branches of OR which are not yet tackled satisfactorily till date. Moreover, the proposed technique can be applied to solve any type of continuous optimization problems with interval objectives, specially, inventory problems, transportation problems and different types of engineering problems with interval valued parameters.

In Chapter 7, an alternative approach for solving interval objective constrained optimization problem has been proposed and in Chapter 6, a new kind of constrained satisfaction rule has been defined for interval valued equality and inequality constraints. Hence, using this new constrained handling technique the aforesaid alternative approach can be extended for more general interval valued programming problems where the objective functions as well as the constraints are intervals. Additionally, this new general interval constraint handling technique may be used to solve different optimization problems and as a result, it will be helpful to tackle the uncertainty/impreciseness in different branches of OR very efficiently and effectively.

In Chapter 8, we have extended the Global Criterion Method for interval objective MOP problems. Theoretical developments are also given. In the same way, one can extend the other methods (like different Posteriori methods, Priori methods, Interactive methods etc.) to solve the MOP problems for interval environments. Furthermore, the
extended methods may also be useful to solve MOP problems with interval valued constraints also.

The aim of the interval based multisection algorithm proposed in this thesis is to obtain the optimal solutions with higher accuracy and lower computational cost for different crisp or interval valued optimization problems. Already stated that the speed of convergence of this algorithm is very high which has not been shown by any algorithms developed earlier. However, we have claimed this statement about the speed of convergence based on the numerical experiments. No theoretical proofs have been provided. It is obvious that the mathematical proof of convergence of this algorithm will make the approach authentic and more valuable.