Abstract

This paper introduces a priority based fuzzy goal programming (FGP) method for modelling and solving multilevel programming problem (MLPP) through genetic algorithm (GA). In model formulation, the individual best solution of objectives of each of the decision makers (DMs) is determined by using the GA method for fuzzy description of the objectives. Then, tolerance membership functions of the defined fuzzy goals are constructed for measuring the degree of satisfaction of goal achievement and thereby degree of optimality of the decision vectors controlled by the higher level DMs. In the executable FGP model, minimization of the under-deviational variables of the defined membership goals with highest membership value (unity) as the aspiration levels of them on the basis of pre-emptive priority is taken into consideration in the decision making context. In the solution process, sensitivity analysis with variations of priority structure of model goals is performed and then Euclidean distance function is used to identify the appropriate priority structure under which the most satisfactory decision can be reached in the decision making horizon. In the proposed GA scheme, roulette-wheel selection scheme, single point crossover and uniform mutation are adopted in the decision search process with regard to reach a satisfactory solution in the proposed hierarchical decision system. The effective use of the proposed approach is illustrated through a numerical example. Performance comparisons are also made to highlight the superiority of the proposed
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approach over the approaches studied previously.

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