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Building Fuzzy Goal Programming with Fuzzy Random Linear Programming for Multi-level Multi-Objective Problem

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ABSTRACT

This paper proposes a fuzzy goal programming that is developed by fuzzy random regression approach, to solve a multi-level multi-objective problem. Fuzzy random regression enables us to deal with fuzzy random circumstances and approximate the coefficients for the developed model. A numerical example of the production planning problem illustrates the proposed solution approach. The proposed method is important where the fuzzy random data is dealt in the mathematical model to solve the multi-level multi-objective decision making problem which can attain a satisfactory solution.

KEYWORDS

Fuzzy goal program, fuzzy random linear programming, multi-level multi-objective problem.

1 INTRODUCTION

The mathematical model is important to translate real-world problem to find the solution. However, translating real-world problem into a mathematical model becomes more complicated when uncertainties are contained in the system. Decision maker faced with environments in which both fuzziness and randomness are included causes the developed mathematical model should carefully treat these uncertainties.

Since the model coefficients are usually decided by decision makers, it makes these decisions crucial and influential to the result of the model [1]. A regression analysis will be possibly used to estimate the coefficients of the model [1], [2], [3]. However, classical regression models consider crisp variables and values, and produces crisp kinds of model. That is, the obtained statistical model does not consider randomness and vagueness included in the data or in a system [3]. In view of the nature of the real world, the information available to a decision maker is often imprecise due to inaccurate attribute measurements and inconsistent priority judgments. It makes the treatment of such circumstances is necessary.

The real situations of making a decision in an organization involve a diversity of evaluation such as evaluating alternatives and attaining several goals at the same time. In many practical decision making activities, decision making structure has been changing from a single decision maker with a single criterion to multiple decision makers with multi-criteria and