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Fuzzy goal programming with different importance and priorities. (English) Zbl 1053.90140
Eur. J. Oper. Res. 133, No. 3, 548-556 (2001).

Summary: This paper formulates fuzzy goal programming (FGP) incorporating different importance and preemptive priorities by using an additive model to maximize the sum of achievement degrees of all fuzzy goals. In contrast to previous works, the proposed approach allows the decision-maker to determine a desirable achievement degree for each fuzzy goal to reflect explicitly the relative importance of these goals. This approach can generate a set of achievement degrees consistent with the decision-maker's expectations, even though the relative importance of the goals may change. Furthermore, in this paper we incorporate the decision-maker's preemptive priority structure into a single formulation. The resulting solutions satisfy both the preemptive priority structure and have the maximum achievement degrees in sum. The proposed approaches' effectiveness and computational superiority over the existing approaches are demonstrated and compared with examples from the literature.

MSC:

90C70 Fuzzy and other nonstochastic uncertainty mathematical programming
90C29 Multi-objective and goal programming

Cited in **1** Review
Cited in **43** Documents

Keywords:

Goal programming; Fuzzy goal programming; Preemptive priority; Relative importance

Full Text: [DOI](#)

References:

- [1] B. Aouni, O. Kettani, J.-M. Martel, Estimation through imprecise goal programming model, in: R. Caballero, F. Ruiz, R.E. Steuer (Eds.), *Advances in Multiple Objective and Goal Programming*, Lecture Notes in Economics and Mathematical Systems, No. 455, Springer, Berlin, 1997, pp. 120-130
- [2] D. Bouyssou, Modelling inaccurate determination, uncertainty, imprecision using multiple criteria, in: A.G. Locket, G. Islei (Eds.), *Improving Decision Making in Organizations*, Lecture Notes in Economics and Mathematical Systems 335, Springer, Berlin, 1989, pp. 78-87
- [3] Can, E.K.; Houck, M.H., Real-time reservoir operations by goal programming, *Journal of water resources planning management*, 110, 297-309, (1984)
- [4] Chalam, G.A., Fuzzy programming (FGP) approach to a stochastic transportation problem under budgetary constraint, *Fuzzy sets and systems*, 66, 3, 293-299, (1994)
- [5] Charnes, A.; Cooper, W.W., *Management models and industrial applications of linear programming*, (1961), Wiley New York · [Zbl 0107.37004](#)
- [6] Chen, H.-K., A note on a fuzzy goal programming algorithm by tiwari dharmar and Rao, *Fuzzy sets and systems*, 62, 287-290, (1994)
- [7] Chen, S.-H., Ranking fuzzy numbers with maximizing set and minimizing set, *Fuzzy sets and systems*, 17, 113-129, (1985) · [Zbl 0618.90047](#)
- [8] Choobineh, F.; Li, H., An index for ordering fuzzy numbers, *Fuzzy sets and systems*, 54, 287-294, (1993)
- [9] Dhingra, A.K.; Rao, S.S.; Miura, H., Multiobjective decision making in a fuzzy environment with applications to helicopter design, *AIAA journal*, 28, 4, 703-710, (1990)
- [10] Dhingra, A.K.; Rao, S.S.; Kumar, V., Nonlinear membership functions in multiobjective fuzzy optimization of mechanical and structural systems, *AIAA journal*, 30, 1, 251-260, (1992) · [Zbl 0729.73959](#)
- [11] Fortemps, P.; Roubens, M., Ranking and defuzzification methods based on area compensation, *Fuzzy sets and systems*, 82, 319-330, (1996) · [Zbl 0886.94025](#)
- [12] Gen, M.; Ida, K.; Tsujimura, Y.; Kim, C.E., Large-scale 0-1 fuzzy goal programming and its applications to reliability optimization problem, *Computers and industrial engineering*, 24, 4, 539-549, (1993)
- [13] Hannan, E.L., Linear programming with multiple fuzzy goals, *Fuzzy set and systems*, 6, 235-248, (1981) · [Zbl 0465.90080](#)
- [14] Hannan, E.L., On fuzzy goal programming, *Decision sciences*, 12, 3, 522-531, (1981)
- [15] Hannan, E.L., Some further comments on fuzzy priorities, *Decision sciences*, 12, 539-546, (1981)
- [16] Hannan, E.L., Contrasting fuzzy goal programming and fuzzy multicriteria programming, *Decision science*, 13, 2, 337-339,

(1982)

- [17] Ignizio, J.P., Notes and communications on the (re)discovery of fuzzy goal programming, *Decision sciences*, 13, 2, 331-336, (1982)
- [18] J.P. Ignizio, *Goal Programming and Extension*, Heath Lexington Books, London, 1976
- [19] Inuiguchi, M.; Kume, Y., Goal programming problems with interval coefficients and target intervals, *European journal of operational research*, 52, 3, 345-360, (1991) · [Zbl 0734.90056](#)
- [20] Kvanli, A.H., Financial planning using goal programming, *Omega*, 8, 207-218, (1980)
- [21] Lee, S.M., *Goal programming for decision analysis*, (1972), Auerbach Philadelphia, PA
- [22] Liou, T.-S.; Wang, M.-J., Ranking fuzzy numbers with integral value, *Fuzzy sets and systems*, 50, 247-255, (1992) · [Zbl 1229.03043](#)
- [23] Martel, J.-M.; Aouni, B., Incorporating the decision-Maker's preferences in the goal programming model, *Journal of operational research society*, 41, 12, 1121-1132, (1990) · [Zbl 0721.90050](#)
- [24] Martel, J.-M.; Aouni, B., Diverse formulations of the imprecise goal programming model, *Journal of global optimization*, 12, 127-138, (1998) · [Zbl 0908.90267](#)
- [25] J.-M. Martel, B. Aouni, Incorporating the decision-maker's preferences in the goal programming model with fuzzy goal values: A new formulation, in: M. Tamiz (Eds.), *Multi-objective Programming and Goal Programming*, Lecture Notes in Economics and Mathematical Systems, Springer, Berlin, 1996, pp. 257-269 · [Zbl 0857.90139](#)
- [26] Min, H., The dynamic expansion and relocation of capacitated public facilities: A multi-objective approach, *Computers and operations research*, 15, 3, 243-252, (1988)
- [27] Min, H., A model-based decision support system for locating banks, *Information and management*, 17, 4, 207-215, (1989)
- [28] Narasimhan, R., Goal programming in a fuzzy environment, *Decision sciences*, 11, 325-336, (1980)
- [29] Pickens, J.B.; Hof, J.G., Fuzzy goal programming in forestry: an application with special solution problems, *Fuzzy sets and systems*, 39, 3, 239-246, (1991)
- [30] Rao, J.R.; Tiwari, R.N.; Mohanty, B.K., A preference structure on aspiration levels in a goal programming problem – a fuzzy approach, *Fuzzy sets and systems*, 25, 175-182, (1988) · [Zbl 0646.90049](#)
- [31] Rao, S.S., Description and optimum design of fuzzy mechanical systems, *ASME journal of mechanisms, transmissions and automation in design*, 109, 1, 126-132, (1987)
- [32] Rao, S.S., Multi-objective optimization of fuzzy structural systems, *International journal for numerical methods in engineering*, 24, 6, 1157-1171, (1987) · [Zbl 0612.73096](#)
- [33] Rao, S.S.; Sundararaju, K.; Prakash, B.G.; Balakrishna, C., Fuzzy goal programming approach for structural optimization, *AIAA journal*, 30, 5, 1425-1432, (1992) · [Zbl 0768.90090](#)
- [34] Romero, C., A note: effects of five-side penalty functions in goal programming, *Omega*, 12, 333, (1984)
- [35] Rubin, P.A.; Narasimhan, R., Fuzzy goal programming with nested priorities, *Fuzzy sets and systems*, 14, 115-129, (1984) · [Zbl 0546.90092](#)
- [36] Sinha, S.B.; Rao, K.A.; Mangaraj, B.K., Fuzzy goal programming in multi-criteria decision systems: A case study in agricultural planning, *Socio-economic planning science*, 22, 2, 93-101, (1988)
- [37] Suzuki, S.; Yoshizawa, T., Multiobjective trajectory optimization by goal programming with fuzzy decisions, *Journal of guidance, control, and dynamics*, 17, 2, 297-303, (1994) · [Zbl 0800.93561](#)
- [38] Tiwari, R.N.; Dharmar, S.; Rao, J.R., Priority structure in fuzzy goal programming, *Fuzzy sets and systems*, 19, 251-259, (1986) · [Zbl 0602.90078](#)
- [39] Tiwari, R.N.; Dharmar, S.; Rao, J.R., Fuzzy goal programming – an additive model, *Fuzzy sets and systems*, 24, 27-34, (1987) · [Zbl 0627.90073](#)
- [40] Yang, T.; Ignizio, J.P.; Kim, H.-J., Fuzzy programming with nonlinear membership functions: piecewise linear approximation, *Fuzzy sets and systems*, 11, 39-53, (1991) · [Zbl 0743.90115](#)
- [41] Zeleny, M., The pros and cons of goal programming, *Computers and operations research*, 8, 357-359, (1981)
- [42] Zeleny, M., *Multiple criteria decision making*, (1982), McGraw-Hill New York · [Zbl 0588.90019](#)
- [43] Zimmermann, H.J., Fuzzy programming and linear programming with several objective functions, *Fuzzy sets and systems*, 1, 45-55, (1978) · [Zbl 0364.90065](#)
- [44] Zimmermann, H.J., Fuzzy mathematical programming, *Fuzzy sets and systems*, 10, 4, 291-298, (1983)

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