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A approach to solve Multi Objective Fuzzy linear Programming

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Abstract:

This paper presents a comparative study between simplex method and dynamic programming through fuzzy ranking technique .

Keywords

Pentagon fuzzy numbers, dynamic programming ,simplex method .

Introduction:

Linear programming is a tool which is used in operation researches, it is important for solving the real life problems through its efficiency and simplicity. The managers and the decision makers have some lacking in their formation to decide the exact values of the parameters used in optimization models. So the flexible approach of (FLP) Fuzzy linear programming method is useful for these situations, fuzzy linear programs were developed to tackle problems encountered in real world application Multi Objective Fuzzy linear Programming Problem in constraint conditions with fuzzy co efficient. More over the objective considered in this paper are mixed maximization types.

Ranking of fuzzy numbers is an important component of the delusion process in many applications .Dubious and Prade in 1978 used maximizing sets to order fuzzy numbers

In section 2 have some basic definitions.In section 3 formulations of multi objective fuzzy linear programming prblam and raking formula are discussed.

In section 4 the simplex method to solving multi objective fuzzy linear programming problem with numerical example. In section 5 conclusions are discussed

2. Preliminaries

2.1 A convex and normalized fuzzy set differed on are whose membership function is piece wire continuums is called a fuzzy number

2.2.The Union of two fuzzy set A and B is the fuzzy set A U B and it defined by $\mu(A \cup B(X)) = \max[\mu A(x), \mu B(x)]$ Forall x€X

3. Definition of linear programming

In this work presents a multi objective fuzzy linear programming problem in constraints with fuzzy co efficient.

In this further discussion the objectives believed in this work with maximization type . we write about from this topic in detail model whose a measure or standard form is maximize $Z=d_{ij}y$ subject to the constraints

Where$\bar{A}_p y \leq \bar{n}$

$\bar{E}_p\, y \leq \bar{b}$;$y \geq 0$

Where $B_P=b_{ij}$ is an mxn fuzzy matrix and $a_{ij} =(a_1 ,a_2.......an)$ is an n-dimensional we now discuss a multi objective fuzzy linear programming problem with constraints having fuzzy co efficient is given by

Max $z = d_{11}\, y_{1+}d_{12}y_2+d_{13}y_3+.....+d_ny_n$

Subject to the constraints

$\bar{a}i_1y_1+\bar{a}iy_2+...............+\bar{a}iy_n \leq n$ and

$\bar{e}i_1y_1+\bar{e}i_2y_2+................+\bar{e}i_ny_n \geq b$

For all y_1y_2.........................$yn \geq 0$; $i=1,2,3,.....n$ where fuzzy numbers are pentagon fuzzy numbers,

Where

$\tilde{b}i_l = \tilde{b}i_{ll}, \tilde{b}i_{12}, \tilde{b}\, i_{13}, \tilde{b}i_{14}, \tilde{b}i_5$

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$\tilde{b}i_n = \tilde{b}in_1, \tilde{b}in_2, \tilde{b}in_3, \tilde{b}in_5$

and $\bar{n}_i=(n_1, n_2, n_3, n_4, n_5)$ and

$\bar{b}i=(b_1, b_2, b_3, b_4, b_5)$

By the ranking formula using to solve (MOFLPP) Multi objective fully linear programming problem in simple method and dynamic programming model.

Ranking of pentagon fuzzy numbers:

Consider the fuzzy numbers $\bar{A}_p = (a_1, a_2, a_3, a_4, a_5)$

And $\bar{E}_p = (e_1, e_2, e_3, e_4, e_5)$ be the two pentagon

Fuzzy numbers, then

$\bar{A}_p \geq \bar{E}_p \Leftrightarrow R(\bar{A}_p) \geq R(\bar{E}_p)$

$\bar{A}_p \leq \bar{E}_p \Leftrightarrow R(\bar{A}_p) \leq R(\bar{E}_p)$

$\bar{A}_p = \bar{E}_p \Leftrightarrow R(\bar{A}_p) = R(\bar{E}_p)$

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Let $\bar{A}_p = (a_1, a_2, a_3, a_4, a_5)$ a ranking method is devised based on the following formula

$$R(\bar{A}_p) = \frac{(3a_1 + 2a_2 + a_3 + 2a_4 + 3a_5)}{11} \left(\frac{4}{11}\right) \longrightarrow \boxed{1}$$

4. Simplex method

Maximize $Z = (0.8, 0.7, 0.3, 0.3, 0.2)\, x_1 + (0.2, 0.3, 0.4, 0.1, 0.2)\, x_2$

$(0.2,0.4,0.5,0.6,0.7)\, x_1 + (0.3,0.2,0.6,0.5,0.1)\, x_2 \leq (0.1,0.2,0.5,0.4,0.3)$

$(0.7,0.8,0.6,0.9,0.1)\, x_1 + (0.2,0.3,0.5,0.7,0.1)\, x_2 \leq (0.2,0.3,0.5,0.7,0.9)$

and $x_1, x_2 \leq 0$

Solution:

Maximize $z = 0.17x_1 + 0.07x_2 + 0x_3 + 0x_4$

Subject to the constraints

$0.17x_1+0.10x_2+x_3=0.09$

$0.22x_1+0.11x_2+x_4=0.19$

And $x_1, x_2 \geq 0$

Iteration:1

C_B	Y_B	X_B	Y_1	Y_2	Y_3	Y_4	Ratio
0	Y_3	0.09	0.17	0.1	1	0	52.94
0	Y_4	0.19	0.22^*	0.11	0	1	0.86
Zj		0	0	0	0	0	

Cj			0.17	0.07	0	0	
Zj-Cj		0	-0.17	-0.07	0	0	

Iteration:2

Enter y_1 and skip y_4

CB	**YB**	**XB**	**Y_1**	**Y_2**	**Y_3**	**Y_4**
0	Y_3	-0.05	0	0.02	1	-0.77
0.17	Y_1	0.86	1*	0.5	0	4.5
Zj		0.14	0.17	0.08	0	0.76
Cj			0.17	0.07	0	0
Zj – Cj		0.14	0	0.01	0	0.76

Maximize Z=0.14 at X_1=0.17 and X_2=0

It can be seen that the value of the objective function obtained by simplex method is same as the optimal value obtained by dynamic programming problem.

Thus the value realized by simplex is also optimal.

Conclusion

In this paper, the simplex method portrayed by pentagon fuzzy numbers, numerical example shows that by this method. We can have the optimal solution as well s crisp and Fuzzy Optimal total cost. Thus it can be concluded that simplex method provide an optimal solution directly in easily

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and simple iteration. As this method consumes is very easy to apprehend and apply. So it will be very pragmatic for crucial makers.

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