Solving Multi Objective Linear Programming Problems Using Vague Optimization Method: A Comparative Study

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Abstract

This newspaper's goal is to current a computational procedure for resolving a multi-objective lined programming problematic by means of a unclear optimization technique. It also covers some significant possessions of a unclear set, as healthy as processes on it. The procedure's growth is based on the finest choice set code, which is got by journey dissimilar vague choice sets obtained for apiece objective drive. Also, because the indistinct optimization method employs degrees of fit in and non- fitting, we done a relative schoolwork of line and nonlinear hint functions for fitting and non-belonging to realize how they touch optimization and gain understanding into such a process. To demonstrate the advanced procedure, a numerical instance has stood provided.

I. Introduction

In numerous optimization malfunctions, it takes remained experiential that unimportant defilements of a assumed restraint or constraints can principal to additional well-organized solutions.This situation arises frequently in applied modeling, particularly in optimization glitches; it is often unreasonable to specify precise parameters, meanwhile abundant of them are found by guesstimate or around method of anthropological statement.For specimen, in a creation optimization badly-behaved, it is not compulsory that all harvests be of lofty class to be traded at a motionless price.It is possible that bumpily products are broken-down and cannot be sold at the fixed price.Also, due to overpowering conditions, raw substantial prices and over development marketplace amounts may vary due to shop spare/deficiency.Then, it is clear that expenses in addition/or manufacturing be present not indecently deterministic, but imprecise or non-deterministic, and nonclassical methods requirement be used to determination such optimization glitches.Of progression, most real-world difficulties linking optimization events are modeled as multi-objective program writing problems.In general, such multi-objective programming hitches may have conflicting objects [6].For example, in agricultural manufacture planning problems, the optimal model should aim at maximizing income while minimalizing input and planting costs [8].Due to the contradictory nature of these objectives, the solution to such problems is frequently a compromise that satisfies each objective role to some extent, and it is in this state that the ideas of connection and non-membership arise. Zimmermann [2], [3] was the first to use Zadeh fuzzy sets. [1] Multi-objective exact programming for solving fuzzy problems.Optimization in fuzzy environments has been studied and applied by several canvassers together with Tanaka [4], Luhandjula [5], Sakawa et al. The labor of Sahinidis [7] provides a brief impression of optimization under uncertainty by numerous researchers.Various extensions of fuzzy sets have emerged due to their increasing When the available information is ambiguous, ambiguous, or uncertain, use it in modeling glitches. An extension of fuzzy sets is used in such a case. In his research, Atanasoff emphasizes that attribution and non-attribution should be treated as distinct, rather than complementary, attributes when dealing with information fuzziness, ambiguity, or doubt. Angelov [10] judiciously well thought-out the concepts of relationship and non-membership in optimization glitches and presented a fuzzy method for resolving optimization hitches. Jana and Roy [11] inspected the multi-objective incoherent in lines software design problem and applied it to the challenging transportation badly behaved. Luo [12] solved multi-criteria decision-making problems by incorporating fuzzy sets. Several other researchers, Several researchers, including Mahapatra et al. [13], investigated linear software proposal hitches in fuzzy environments using fuzzy numbers and interlude qualm in fuzzy numbers. The stimulus for this reading is the faith that it will be responsible for a computational algorithm for disentangling multi-objective linear software design teething troubles using fuzzy optimization methods. In this optimization process, we as well needed to investigate the waves of countless types of membership and non-membership occupations, so we conducted a virtual scholarship of lined affiliation and non-membership title role with nonlinear involvement and non-membership gatherings. [7].

II. PRELIMINARIES

In over-all, the multi impartial optimization problematic of linear software design through p ideas, q restrictions, also n pronouncement variables is as pettiness:

max $⟦Z = \{z\_■(1@\ )\ ⟧\ z\_2....z\_■(p@\ )\}$

Such that $\boldsymbol{g\_i}$ (x) ≤0, j=1 . 2.q

x_i≥ 0 , i=1 , 2…n

where x =$\{x_1, x_2 \ldots.. x_n\}$

1)Complete solution

x^0 is said to be a wide-ranging best resolution for tricky (1)

if here exist $x^0 \in X$ uch that

$f\_■(k@\ )\ (x^0) \geq f\_■(k(X)@\ )$, k=1,2,...,p for all $x \in X$

Nonetheless, such unabridged finest solutions that concurrently capitalize arranged wholly of the multiple-objective senses do not be in over-all, especially when the impartial purposes are integrally conflicting. In multi-objective programming, in its place of a whole best key, a answer idea recognized as Pareto optimality remained presented.

2)Pareto-optimality

Pareto efficiency is an economic state in which financial resources are distributed or allocated to exploit utility. As a result, any additional effort for reallocation will have no positive effect unless there is an equivalent negative effect.

x^0 $\in X$ is imaginary to be a Pareto idyllic answer for (1)

if here does not be added $x \in X$

such that f_k $(x\hat{}0) \leq f_{k(X)}$, for all p=1,2,..,p and $f_j(x^0) < f_{j(X)}$

for at minimum one $j \in \{1,2.., p\}$.

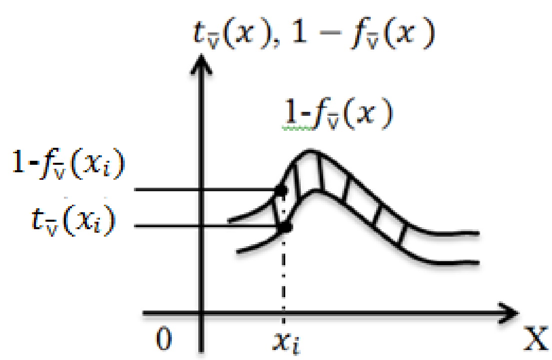
Definition [13]

Let U be the universal of dissertation. A vague set $\bar{\nabla}$ over U is characterized by a truth function $t_{\bar{\nabla}}$, $t_{\bar{\nabla}}$: U → [0,1] *and* a false $f_{\bar{\nabla}}$, $f_{\bar{\nabla}}$: U → [0,1]. If generic component of U is denoted by x_i then the lower bound on the membership grade of x_i

derived from evidence for x_i is denoted by $t_{\bar{\nabla}}(x_i)$and the lower bound on the negation of x_i is meant by $f_{\bar{\nabla}}(x_i)$. $t_{\bar{\nabla}}(x_i)$ and $f_{\bar{\nabla}}(x_i)$ both associate a real amount in [0,1] with each point x_i in X ,

where $t_{\bar{\nabla}}(x_i) + f_{\bar{\nabla}}(x_i) \leq 1$

Figure (1). A vague Set.



and so is a promotion of a undefined set. Here merger and fitting together of dual unclear sets are clear as

$\bar{A} \cap \bar{B}$**={[x , min(**$t\_A ̅ \ (x) \ 〖,t〗 \_B ̅ \ (x)$**),max(**$f\_A ̅ \ (x), f\_B ̅ \ (x)$**)]** $x \in X$ **}**

$\bar{A} \cup \bar{B}$**={[x,max (**$t\_A ̅ \ (x) \ 〖,t〗 \_B ̅ \ (x)$**),min (**$f\_A ̅ \ (x), f\_B ̅ \ (x)$**)]** $x \in X$ **}**

Fuzzy Optimization Technique The maximum-minimum method Zimmermann first rummage-sale Bellman and Zadeh's [18] max-min worker to solve Multi Objective Lined Software design (MOLP) glitches, and he defined the problematic (1) as: Find X

Z_k (x)≥ g_k, k=1.2…p

g_j (x) ≤0 , j=1.2…q $x \geq 0$

anywhere g k and x mean goal mouth, and all unprejudiced gatherings are expected to remain exploited. In this case, impartial goals are regarded as fuzzy restraints. We could first get a table of optimistic ideal answers in order to establish association functions of impartial purposes (PIS). The possible response set is clear by the message of the fuzzy objective set in the min-operator idea. This feasible solution set is then defined by its membershipt A (x), which is as follows:

$t_D(x)$**=min(**$t_1(x), \dots \dots, t_K(x)$)

A decision maker then brands a decision by the maximumt D worth in the likely choice set. The choice answer can be got by solving the tricky of maximizet D (x) below the given restraints, i.e.

Max [min t_k (x)]

s.t g_j (x) ≤0, j=1.2…q

$x \geq 0$

Now, if pretentious α= $〖min〗 \_k \ t\_k \ (x)$, be the overall acceptable equal of collaboration, previously we obtain the next equivalent perfect Max α

Such that $t_k(x) \geq$ α , for all k

g_j (x) ≤0, j=1.2…q $x \geq 0$ (3)

C. unclear Optimization Method [6]

Consider the ambiguous optimization routine as promotion of the as the crow flies above problematic a below demanding by Angelov [3]

minf_i (x) ≤0, i =1.2…p

g_j (x) ≤0, j=1.2…q (4)

$x \geq 0$

where x signifies the choice variables, f i (x) signifies the impartial drives, g j (x) signifies the limit meanings, and p and q represent the number of impartial purposes and restraints.

This problem's best answer must encounter all restraints accurately. Accordingly, an analogous ambiguous optimization prototypical of the problem is used to feat the degree of reception of bits and pieces and restraints as follows:

$(min)\tilde{}$ f_i (x) ≤0, i =1.2…p

g_j (x) ≤0, j=1.2…q (5)

Where (min) means unclear minimization and typifies fuzzy discrimination. Bellman and Zadeh [4] rummage-sale vague set exploit for the step of association of the decisiveness and shrinking to solve this order (5).

max 〖t〗 $\_k$ (x), $x \in X$,
k=1.2……p+q 0 ≤t_k (x)≤1 (6)

$x \geq 0$

wherever t k (x) means the notch of gratification with the particular indefinite sets. It is critical to appreciate that the grade of non-membership in a ambiguous usual is the second of membership, so growth of the relationship drive determination automatically minimalize non-membership. However, in a vague set, the degree of rebuff is sure concurrently with the score of receiving, and because these grades are not complementary, VS may deliver a more wide-ranging tool for describing this uncertainty-based optimization model. As a size, the dim unsure optimization (VO) picture-perfect for awkward(3) is if as for every

$⟦^{max}_{x}\{\ t⟧_k$(x)} $\in X$, k=1.2…p+q

〖$(\_x\text{^}min)\{\ f$〗 $\_k$ (x}, $x \in X$,
k=1.2…p+q

Such that

$f_k(x) \geq 0$ k=1.2…p+q

$t_k(x) \geq f_k(x)$, k=1.2…p+q

$t_k(x)$+$f_k(x)$≤1, k=1.2…p+q
(7)

someplace t k (x) represents the degree to which x is predictable by the th kth VS and f k (x) denotes the degree to which x is rejected by the th k IFS. Intuitionistic fuzzy objects and fetters are among the IFS. The excellent set D is now clear as a mixture of vague objectives and restraints.

$$\bar{F} \cap \bar{C} \begin{cases} [x, \min\,(t_{\bar{F}}(x), t_{\bar{C}}(x))] \\ max(f_{\bar{F}}(x), f_{\bar{C}}(x))] \end{cases} \quad x \in X$$
(8)

where, $\bar{F}$ is combined intuitionistic uncertain impartial and C ~ means combined intuitionistic fuzzy fetters and is distinct as

$\bar{F}$={ $[x,\ (t_{\bar{F}}(x), f_{\bar{F}}(x), x \in X)] = \cap_{i=1}^{p} \bar{F}^{(i)}$

$$= \{x,\ \min_{i=1}^{p} t_i f(x), \max_{i=1}^{p} f_i\, f(x)], x \in X\}$$

$\bar{C}$= $\{x, t_{\bar{c}}(x), f_{\bar{c}}(x)], x \in X\} = \cap_{j=1}^{q} \bar{C}^{(j)}$

$$= \{x, \min_{j=1}^{q} t_i(x), \max_{j=i}^{q} f_i(x)], x \in X\}$$

Further, the vague choice set (VDS) denoted as D ~ :

$$\bar{D}=\bar{F}\cap \bar{C}=\{x, t_{\bar{D}}(x), f_{\bar{D}}(x)], x \in X\} \quad (9)$$

$$t_{\bar{D}}(x)= \min [t_{\bar{F}}(x), t_{\bar{C}}(x)] = \min_{k=1}^{p+q} t_k(x)$$

(10)

$$f_{\bar{D}}(x)= max[f_{\bar{F}}(x), f_{\bar{C}}(x)] = \max_{k=1}^{p+q} t_k(x)$$

(11)

anywhere t D (x) designates the degree of VDS getting and f D (x) means the grade of VDS snub. Now, for a possible answer, the equal of receipt of VDS is continuously fewer than or equal to the level of receipt of any separate and constraint.

$t\_D ̅ (x) 〖≤ t〗\_(k) (x)$,

$f\_D ̅ (x) 〖≥ f〗\_(k) (x)$

For all k=1,2,..., $p+q$

As a result the above group can be transmuted to the following union of disparities:

$\alpha \leq t_k(x)$ k=1,2,...., $p+q$

$\beta \geq f_k(x)$ k=1,2,....., $p+q$ (12)

$\alpha + \beta \leq 1$

$\alpha \geq \beta, \beta \geq 0, x \in X$

someplace represents the lowest acceptable notch of independent(s) and limits, and signifies the maximum notch of criticism of objective(s) and irons.

By means of the unclear optimization, problematic (1) is now biased to the lined programming problematic assumed as:

exploit$(\alpha - \beta)$
subjact to $\alpha \leq t_k(x)$ k=1,2,........, $p+q$

$\beta \geq f_k(x)$ k=1,2,...., $p+q$
(13)

$\alpha + \beta \leq 1$

$\alpha \geq \beta, \beta \geq 0, x \in X$

Now, this lined software design problem can be effortlessly solved using a simplex technique to deliver an optimization response to a multiobjective linear programming problematic (1). Figure 1 portrays the lined membership and nonmembership purposes.

III. COMPUTATIONAL ALGORITHM

I. Way (Linear Association Function) (Linear Association Function)

Step 1: Select the first detached role from the hitch's set of k determinations and solve it as a on its own unprejudiced surrounded by dint of the constraints as short as. Control the significance of middle-of-the-road functions and decision variables.

Step 2: Using the judgment variables' standards, compute the values of the remaining (k-1) objects.

Step 3: For the right-hand over (k-1) objective senses, reappearance Rankings 1 and 2.

Step 4: Create the PIS bench by tabulating the standards of the dispassionate purposes obtained in Classifications 1 and 2 and 3.

Step 5: Using the figures from Step 4, determine the higher and upper leaps for each disinterested common sense.

TABEL I: POSITEVE IDEAL SOLUTION (PIS)

$\max f_1$	$f_1^{/}(x_1)\ f_2^{/}(x_2)\ f_3^{/}(x_3)\ \dots\ f_k^{/}(x_1)$	x_1
$\max f_2$	$f_1^{/}(x_2)\ f_2^{/}(x_2)\ f_3^{/}(x_2)\ \dots\ f_k^{/}(x_2)$	x_2
$\max f_3$ . . .	$f_1^{/}(x_3)\ f_2^{/}(x_3)\ f_3^{/}(x_3)\ \dots\ f_k^{/}(x_3)$ . . .	x_3
$\max f_k$	$f_1^{/}(x_k)\ f_2^{/}(x_k)\ f_3^{/}(x_k)\ \dots\ f_k^{/}(x_k)$	x_k
	$f_1^{/} f_2^{/} f_3^{/}\ \dots\dots f_k^{/}$	

where f_k^* and $f_k^{/}$ are the highest, smallest values respectively.

Stage 6. Set U_k^{μ}= max $(Z_k(X_r))$and

$L_k^{\mu} = \min\big(Z_k(X_r)\big)\ 1 \le r \le p$ for connotation and for non-membership resolutions $U_k^{\mu} = U_k^{\mu} - \lambda\big(U_k^{\mu} - L_k^{\mu}\big)$

$L_k^{\mu} = L_k^{\mu}$, $0 < \lambda < 1$.

Step 7. Use following lined association occupation($t_k(f_k)(\,x)$ and non-membership drive $(f_k(f_k)(\,x)$ for each objective functions:

$$t_k(f_k)(\,x) \begin{cases} 0 & if\ \ f_k(\,x) \le L_k^t \\ \frac{f_k(\,x)-L_k^t}{U_k^t-L_k^t} & if\ \ L_k^t \le\ \ f_k(\,x) \le U_k^t \\ 1 & if\ \ f_k(\,x) \ge U_k^t \end{cases}$$

$$f_k(f_k)(\,x) \begin{cases} 0 & if\ \ f_k(\,x) \le U_k^f \\ \frac{U_k^f-\ f_k(\,x)}{U_k^f-L_k^f} & if\ \ L_k^f \le\ \ f_k(\,x) \le U_k^f \\ 1 & if\ \ f_k(\,x) \ge L_k^f \end{cases}$$

Step 8. Today the vague optimization system for MOLP unruly (1) with lined association and non

relationship drives gives a equivalent linear software enterprise difficult as :

Maximize $(\alpha - \beta)$

subjact to $\alpha \le t_k(f_k(x))$

$\beta\ \ge\ (f_k(f_k(x))$

$\alpha + \beta \le 1$

$$\alpha \ge \beta, \beta \ge 0, \qquad (14)$$

$g_j(x) \le b_{j\ ,\ \ x\ge 0}$

k=1,2,....p; j=1,2,..,q

Step 9: Firmness the directly above crumpled software development problematic(14) by means of the simplex technique. B. Procedure II (Nonlinear Contribution Purpose) Stages 1–6 must be boring to make a bench of positive perfect answers.

Step 7: Undertake that the process computed keys review a hyperbolic purpose for relationship and an exponential job for non-membership.

$t_k(f_k)($

$$x)\begin{cases} 0 \quad if \quad f_k(x) < L_k^t \\ 1 - Exp\{-\psi\dfrac{f_k(x) - L_k^t}{U_k^t - L_k^t}\} \quad if \quad L_k^t \le \quad f_k(x) \le U_k^t \\ 1 \quad if \quad f_k(x) \ge U_k^{\mu} and\ \psi \longrightarrow \infty \end{cases}$$

$f_k(f_k)($

$$x)\begin{cases} 1 \quad if \quad f_k(x) \le L_k^{\mu} \\ \dfrac{1}{2} + \dfrac{1}{2}\tanh\{\delta_k \dfrac{U_k^f + L_k^f}{2} \quad if \quad L_k^f \le \quad f_k(x) \le U_k^f \\ 0, \quad if \quad f_k(x) \ge U_k^f \end{cases}$$

anywhere are non-zero boundaries fixed by the conclusion fabricator. Besides, the unknown optimization performance for MOLP unruly (1) by way of exponential envelopment and hyperbolic non production livings profits the direct software scheme badly-behaved: (-) Takings full disadvantage of

Subject to $\propto \le t_k(f_k)(x)$

$$1 - Exp\left\{-\psi\frac{f_k(x) - L_k^t}{U_k^t - L_k^t}\right\} \ge \alpha$$

$\beta \ge \quad f_k(f_k(x))$

$\frac{1}{2} + \frac{1}{2}\tanh\{\delta_k \frac{U_k^f - L_k^f}{2} \quad - \quad f_k(x)\} \le \beta$ (15)

$\alpha+\beta\le 1$, $\alpha\ge\beta$,
$\beta \ge 0$
$g_i(x) \le b_{i,\ x\ge 0}$ k=1,2,.......p; j=1,2,.......,q

For result suitability the above your head problem (15) is partial to

Maximize $\gamma - \eta$

Subject to $f_k(x)$-$\frac{\gamma(U_k^t - L_k^t)}{4} \ge L_k^t \ where\ \gamma -$ $\log(1-\alpha)$,

$$f_k(x) - \frac{\eta}{\delta_k} \ge \frac{U_k^f - L_k^f}{2}$$

$where\eta = \tanh^{-1}(2\beta - 1), and\ \psi = 4,$ (16)

$\delta_k = \frac{6}{U_k^f - L_k^f}$, $\gamma \ge \eta$, $\gamma + \eta \le 1$, $\eta \ge 0$

$g_j(x) \le b_{j,\ x\ge 0}$ k=1,2,.......p; j=1,2,.......,q

Which can be effortlessly solved by a simplex method.

IV. Application

A. Building Preparation Problem Deliberate a joint of six mechine systems whose measurements are to be whole-hearted to construction of three goods and chattels. A contemporary dimensions portfolio is available , measured in mechine hours each weedy for individually mechine amounts unit valued giving to apparatus type.

Essential information is recorded as in less Table II.

TABLE II: PHYSICAL PARAMETER VALUES

Machine type	Machi hours	Unit price ($100 per hour)	Products		
			*x*1	*x*2	*x*3
Milling machine	**1400**	**0.75**	**12**	**17**	**0**
Lathe	**1000**	**0.60**	**3**	**9**	**8**
Grinder	**1750**	**0.35**	**10**	**13**	**15**
Jig saw	**1325**	**0.50**	**6**	**0**	**16**
Drill press	**900**	**1.15**	**0**	**12**	**7**
Band saw	**1075**	**0.65**	**9.5**	**9.5**	**4**
Total capacity cost $4658.75					

TABLE III: POSITIVE IDEAL SOLUTION

	f_1	f_2	f_3	X
max f_1	8041.14	10020.33	9319.25	X_1
max f_2	5452.63	10950.59	5903.00	X_2
max f_3	7983.60	10056.99	9355.90	X_3

Let X_1 , X_1 , X_1 indicate three crops, then the ample in your own time formulation of the above stated tricky as a Multi objective Undeviating Software plan (MOLP) problematic is known as:

Max $f_1(x) = 50x_{1+}100x_{2+}17.5x_3$ (profit)

Max $f_2(x) = 92x_{1+}75x_{2+}50x_3$(quality)

Max $f_3(x) = 25x_{1+}100x_{2+}75x_3$(employee satifaction)

Subject to the restraints

$12x_{1+}17x_2 \leq 1400$

$x_{1+}9x_{2+}8x_3 \leq 1000$ (17)

$10x_{1+}13x_{2+}15x_3 \leq 1750$

$6x_{1+}16x_3 \geq 1325$

$x_{1,}x_2, x_3 \geq 0$

Rejoinder of the overhead tricky is well thought-out by the means I and method II revealed in preceding components. For policy of the events almost of steps stand showing as

Step 1. Disentangle a wrinkly software proposal problem good-looking one and only objectiv

Exploit $f_{1=}50x_{1+}100x_{2+}17.5x_3$

Topic to the fetters

$12x_{1+}17x_2 \leq 1400$

$x_{1+}9x_{2+}8x_3 \leq 1000$

〖10x〗_(1+) 13x_(2+) 15x_3 ≤ 1750

6x_(1+) 16x_3 ≥1325 (18)

〖12x〗_(2+) 7x_3 ≤ 900

〖9.5x〗_(1+) 9.5x_(2+) 4x_3 ≤ 1075

x_(1,) x_2 〖,x〗_3 ≥ 0

TABLE IV: VALUES OF OPTIMAL DECISION VECTORS

vague optimization Technique when association and Non- memberships are lined.					
λ	x_1	x_2	x_3	α	β
.1	65.2571	26.9187	49.8324	.5899	.4101
.2	58.4833	34.5907	47.6992	.8525	.1475
.3	65.2600	26.9155	49.8333	.7583	.2417
.4	65.2585	26.9172	49.8328	.8847	.1153
.5	66.1947	25.8441	49.2978	1.000	.0000
.6	71.1362	22.6184	44.8504	1.000	.0000
.7	71.7199	25.7841	35.6084	1.000	.0000

.8	75.3355	14.2823	45.3258	1.000	.0000
.9	82.1131	9.12270	46.1075	1.000	.0000
vague **optimization Technique when membership and Non- memberships are Non-linear**					
.1	49.8906	47.1360	42.5550	.6321	.3345
.2	64.6968	36.6846	41.7421	.6321	.0073
.3	62.1896	38.0097	41.8452	.6321	.0009
.4	62.8180	38.0109	41.5300	.6321	.0001
.5	62.8157	38.0125	41.8454	.6321	.0000
.6	62.8163	38.0120	41.8454	.6321	.0000
.7	59.7690	40.1631	42.0127	.6321	.0000
.8	62.8265	38.0048	41.8448	.6321	.0000
.9	62.8207	38.0087	41.8451	.6321	.0000

Best solution to this crisp lined software scheme problem is

$x_{1=44.93}$, $x_{2=50.63}$, $x_{3=41.77}$

$(f_{1,})_{1=8041.14}$

Step 2. Withthese choice variables, equaled standards of further residual impartial purposes are:

$〖(f\_(2,))〗\_(1 = 10020.33)$

$〖(f\_(3,))〗\_(1 = 9319.25)$

Step 3. Step 1 and Step 2 are recurrent for other impartial functions f_{2} ,, $f_{3,}$.

Step 4. The got Positive Unconquerable Solution (PIS) is renowned in Desk III. The answers of the above-mentioned MOLP are got using the comeback algorithms I and II. The difficult is solved using lined relationship also nonmembership purposes, as well as nonlinear relationship and nonmembership tenacities, and the keys got are to be found in Counter IV to deliver insight into the resolution practice. The Bench describes the feasibility of resolutions in terms of a number of levels of approval.

TABLE V: VALUES OF OPTIMAL OBJECTIVE FUNCTIONS

vague **optimization Technique when membership and Non- memberships are linear.**				
λ	max f_1	maxf_2	maxf_3	Total
0.1	6826.7920	10514.1757	8060.7275	25401.6952
0.2	7217.9710	10359.7261	8498.5925	26076.2896
0.3	6826.6328	10514.2475	8060.5475	25401.4278
0.4	6826.7190	10514.2120	8060.6425	25401.5735
0.5	6756.8565	10493.1099	7936.6125	25186.5789
0.6	6603.5320	10483.4304	7404.0250	24490.9874
0.7	6787.5520	10312.4583	7041.0375	24142.0478
0.8	5988.2065	10268.3285	6711.0525	22967.5875
0.9	5824.8063	10543.9827	6423.1600	22791.9490
vague optimization Technique when membership and Non- memberships are non-linear.				
λ	maxf_1	maxf_2	maxf_3	Total
0.1	7952.8425	10252.8852	9152.4900	27358.2177
0.2	7633.7868	10790.5556	8416.5375	26840.8793
0.3	7642.7410	10664.4307	8494.1000	26801.2717
0.4	7668.7650	10706.5735	8486.2900	26861.6285
0.5	7674.3295	10722.2519	8510.0475	26906.6289
0.6	7674.3095	10722.2696	8510.0125	26906.5916
0.7	7737.9823	10611.6155	8661.4875	27011.0853

0.8	7674.0890	10722.6380	8509.5025	26906.2295
0.9	7674.1942	10722.4119	8509.7700	26906.3761

TABLE VI: COMPARISON OF OPTIMAL SOLUTIONS OBTAINED BY VARIOUS METHODS

Decision variables & objective functions	Best Solution obtained by fuzzy optimization method with level of satisfaction α=0.5309	Best Solution obtained by proposed vague optimization alogirthm I	Best Solution obtained by proposed vague optimization alogirthm II
x1	65.2571	58.4833	49.8906
x2	26.9187	34.5907	47.1360
x3	49.8324	47.6992	42.5550
f1	6826.7920	7217.9710	7952.8425
f2	10514.1757	10359.7261	10252.8852
f3	8060.7275	8498.5925	9152.4900
Sum of objectives	25401.6952	26076.2896	27358.2177

V. CONCLUSIONS

In order to compare the vague optimization method with the fuzzy optimization method, we obtained the solution of the numerical problem by fuzzy optimization.

The optimization scheme according to Zimmermann [17] was superfluous and the superlative domino effect attained were leaf through and sold for appraisal with the present-day scholarship.We have cautiously considered the preeminent perseverance achieved by the two established algorithms in Board VI Mandate, and in each case additionally compared them with the results gained by the fuzzy optimization means.The aim of the recent exploration is to arrange for an active algorithm for unclear optimization methods to find prime way out to multi-objective linear programming teething troubles.The advantage of this line of attack is that it provides resolution makers with a solution that is of wavering degrees of interest.Decision makers can choose the appropriate worst solution according to the prerequisites of the current situation.In addition, a comparison of our underperforming effects clearly shows that fuzzy optimization underperforms fuzzy optimization.The achieved results also explain why the fuzzy optimization system II with nonlinear true value and nonlinear false value gives better results than fuzzy optimization algorithm I using line association function and line non-membership gathering.

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