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DECAGONAL FUZZY NUMBERS IN SOLVING ASSIGNMENT PROBLEM BY HUNGARIAN METHOD

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ABSTRACT:

In this paper a new method is proposed for finding an optimal solution of assignment problem by using Hungarian method directly for Decagonal fuzzy numbers (DFN). We include basic fuzzy arithmetic operations like addition, subtraction of decagon fuzzy number. Fuzzy set theory mainly developed uses in various streams like operation research, control theory differential equations, fuzzy system reliability, optimization and management sciences etc.

Keywords: Fuzzy set, Decagonal fuzzy numbers, Hungarian method, Assignment algorithm.

INTRODUCTION:

Fuzzy set theory was introduced in their modern form by Zadeh, L.A. in 1965. A fuzzy number is a quantity whose value is imprecise, rather than exact as is the case with “ordinary” (single-valued) numbers.

In practical field we are sometimes faced with a type of problems which consists in assigning men to offices, jobs to machines, classes in a school to rooms, drivers to trucks, delivery trucks to different routes etc., The Assignment problem represents a special case of linear programming problem used for allocating resources in an optimal way.

In this paper, we have presented the definition and some operations of Decagonal fuzzy number (DFN) and then try to utilize those properties to solve an optimization problem.

PRELIMINARY:

Definition.

A Decagonal fuzzy number D can be defined as (a1lu, a2lu,a3lu, a4lu, a5lu, a6lu, a7lu, a8lu, a9lu,a10lu), and the membership function is defined as

$$\mu_{\tilde{D}}(x) = \begin{cases} \frac{1}{4}\frac{(x-a_{lu}^1)}{(a_{lu}^2-a_{lu}^1)}, & a_{lu}^1 \le x \le a_{lu}^2 \\ \frac{1}{4}+\frac{1}{4}\frac{(x-a_{lu}^2)}{(a_{lu}^3-a_{lu}^2)}, & a_{lu}^2 \le x \le a_{lu}^3 \\ \frac{1}{2}+\frac{1}{4}\frac{(x-a_{lu}^3)}{(a_{lu}^4-a_{lu}^3)}, & a_{lu}^3 \le x \le a_{lu}^4 \\ \frac{3}{4}+\frac{1}{4}\frac{(x-a_{lu}^4)}{(a_{lu}^5-a_{lu}^4)}, & a_{lu}^4 \le x \le a_{lu}^5 \\ 1, & a_{lu}^5 \le x \le a_{lu}^6 \\ 1-\frac{1}{4}\frac{(x-a_{lu}^6)}{(a_{lu}^7-a_{lu}^6)}, & a_{lu}^6 \le x \le a_{lu}^7 \\ \frac{3}{4}-\frac{1}{4}\frac{(x-a_{lu}^7)}{(a_{lu}^8-a_{lu}^7)}, & a_{lu}^7 \le x \le a_{lu}^8 \\ \frac{1}{2}-\frac{1}{4}\frac{(x-a_{lu}^8)}{(a_{lu}^9-a_{lu}^8)}, & a_{lu}^8 \le x \le a_{lu}^9 \\ \frac{1}{4}\frac{(a_{lu}^{10}-x)}{(a_{lu}^{10}-a_{lu}^9)}, & a_{lu}^9 \le x \le a_{lu}^{10} \\ 0, & otherwise. \end{cases}$$

Where l,u Є$\{0,1,2, \ldots \ldots .\}$

SOME ARITHMETIC OPERATIONS OF DECAGONAL FUZZY NUMBER:

- PROPERTIES

• [sl, su]+[sα, sβ]=(a1lu +a1βγ, a2lu +a2βγ, a3lu +a3βγ, a4lu +a4βγ, a5lu +a5βγ, a6lu +a6βγ, a7lu +a7βγ, a8lu +a8βγ,a9lu + a9βγ, a10lu + a10βγ). Here, notation _ denotes addition operation of uncertain linguistic terms.

• [sl, su]-[sβ, sγ] = (a1lu-a10βγ, a2lu-a9βγ, a3lu-a8βγ, a4lu-a7βγ, a5lu-a6βγ, a6lu-a5βγ, a7lu-a4βγ, a8lu-a3βγ,a9lu - a2βγ, a10lu - a1βγ). Here, notation denotes addition operation of uncertain linguistic terms.

• [sl, su]*[sβ, sγ] = (a1lu * a1βγ, a2lu *a2βγ, a3lu * a3βγ, a4lu *a4βγ, a5lu * a5βγ, a6lu * a6βγ, a7lu *a7βγ, a8lu * a8βγ, a9lu *a9βγ, a10lu *a10βγ).

MATHEMATICAL FORMULATION OF AN ASSIGNMENT PROBLEM:

Consider a situation of assignment 'm' jobs (or workers) to 'n' machines. Also let Cij be the cost of assigning ith job (i = 1,2,……..m) to jth machine (j = 1,2,……n). The objective is to assign the jobs to the machines (one job per machine) at the least total cost or the maximum total profit.

In the assignment problem, job represents 'source' and machines represent'destinations'. The supply at each source is one, i.e. ai = 1, for all I and demand at each destination is one, i.e. bj = 1, for all j.

The assignment problem can be represented in the form of n × n cost matrix or effectiveness matrix (Cij)

Let xij denote the assignment of the ith job the jth machine, since the assignment must be made on a one-to-one basis, we have

$$xij = \begin{cases} 1, & if\ i\ th\ job\ is\ assigned\ to\ the\ j\ th\ machine \\ 0, & otherwise \end{cases}$$

Then the mathematical model of the assignment problem can be posed as follows:

$$optimize\ z = \sum_{i=1}^{n} \sum_{j=1}^{n} cij\ xij$$

Subject to the constraints

$\sum_{j=1}^{n} xij = 1$,j=1,2,3,…….n [‘.’ Only one job will be assigned to one machine]

$\sum_{i=1}^{n} xij = 1$, j=1,2,3,…….n [‘,’ Only one machine should be assigned to one job] and x_{ij}=0 or 1 for all i,j.

Computational processor of Hungarian method (For Minimization Problem):

To obtain an optimal solution following steps,

Step 1. At first a cost matrix has to prepare, sometimes it may not be a square matrix, then add a dummy row or dummy column with zero cost elements.

Step 2. Now first reduced cost matrix must find out by subtract the minimum element in each row from all the elements of the respective rows. By subtracting from the new matrix, there will be at least one zero in each row.

Step 3. In first reduced cost matrix all column and row does not get the zero then again smallest cost element in each column from all elements of the respective columns has to subtracted. As a result, there would be at least one zero in each row and column of second reduced cost matrix.

Step 4. (i) Starting with first row of second reduced matrix, examine all the rows of this matrix which contains only one zero in it. Mark this zero within the circle and cross out the columns containing these assigned zeros. Continuechecking all the rows in this manner.

(ii) Start from the first column and examine all the uncovered columns to find the columns containing exactly one remaining zero. Mark this zero within the circle as an assignment will be made there. Cross out the rows containing these assigned zeros.

Continue steps 1 and 2 to cross out all zeros.

Step 5. If the order of the cost matrix is equal to number of covering lines, then the assignment made in step 4 is the optimal solution, otherwise go to the next step.

Step 6. Find the smallest element among the uncrossed elements and select it. After that subtract the smallest element from all the uncrossed elements and add the same at the point of intersection of two crossed out lines whereas the other elements crossed by the lines remain unchanged.

Step 7. Repeat the procedure from step 4 till an optimum solution is attained.

Problem:

To describe the method using fuzzy number one assignment problem is represented using cost matrix. Here all the elements reflect the times a computer takes to complete the respective jobs in hours. In this complexity time is reduced.

Solution:

The number of rows =10 and columns =10

	A	B	C	D	E	F	G	H	I	J
I	(1,2,3,4,5, 6,7,8,9,10)	(8,9,10,11, 12,13,14, 15,16,17)	(5,6,7,8, 9,10,11, 12,13,14)	(41,42,43, 44,45,46, 47,48,49, 50)	(13,14,15, 16,17,18, 19,20,21, 22)	(32,33,34, 35,36,37, 38,39,40, 41)	(2,3,4,5, 6,7,8,9, 10,11)	(3,4,5,6, 7,8,9,10, 11)	(51,52,53, 54,55,56, 57,58,59, 60)	(7,8,9,10, 11,12,13, 14,15,16)
II	(19,20,21, 22,23,24, 25,26,27, 28)	(20,21,22, 23,24,25, 26,27,28, 29)	(16,17,18, 19,20,21, 22,23,24, 25)	(61,62,63, 64,65,66, 67,68,69, 70)	(12,13,14, 15,16,17, 18,19,20, 21)	(9,10,11, 12,13,14 15,16,17, 18)	(12,13,14, 15,16,17, 18,19,20, 21)	(31,32,33, 34,35,36, 37,38,39, 40)	(25,26,27, 28,29,30, 31,32,33, 34)	(15,16,17, 18,19,20, 21,22,23, 24)

III	(16,17,18,19,20,21,22,23,24,25)	(8,9,10,11,12,13,14,15,16,17)	(3,4,5,6,7,8,9,10,11,12)	(5,6,7,8,9,10,11,12,13,14)	(19,20,21,22,23,24,25,26,27,28)	(15,16,17,18,19,20,21,22,23,24)	(15,16,17,18,19,20,21,22,23,24)	(0,1,2,3,4,5,6,7,8,9)	(21,22,23,24,25,26,27,28,29,30)	(7,8,9,10,11,12,13,14,15,16)
IV	(15,16,17,18,19,20,21,22,23,24)	(21,22,23,24,25,26,27,28,29,30)	(8,9,10,11,12,13,14,15,16,17)	(2,3,4,5,6,7,8,9,10,11)	(24,25,26,27,28,29,30,31,32,33)	(7,8,9,10,11,12,13,14,15,16)	(16,17,18,19,20,21,22,23,24,25)	(12,13,14,15,16,17,18,19,20,21)	(7,8,9,10,11,12,13,14,15,16)	(13,14,15,16,17,18,19,20,21,22)
V	(9,10,11,12,13,14,15,16,17,18)	(3,4,5,6,7,8,9,10,11,12)	(0,1,2,3,4,5,6,7,8,9)	(3,4,5,6,7,8,9,10,11,12)	(18,19,20,21,22,23,24,25,26,27)	(10,11,12,13,14,15,16,17,18,19)	(40,41,42,43,44,45,46,47,48,49)	(2,3,4,5,6,7,8,9,10,11)	(12,13,14,15,16,17,18,19,20,21)	(20,21,22,23,24,25,26,27,28,29)
VI	(4,5,6,7,8,9,10,11,12,13)	(6,7,8,9,10,11,12 13,14,15)	(29,30,31,32,33,34,35,36,37,38)	(5,6,7,8,9,10,11,12,13,14,15)	(23,24,25,26,27,28,29,30,31,32)	(30,31,32,33,34,35,36,37,38,39)	(16,17,18,19,20,21,22,23,24,25)	(12,13,14,15,16,17,18,19,20,21)	(7,8,9,10,11,12,13,14,15,16)	(5,6,7,8,9,10,11,12,13,14)
VII	(7,8,9,10,11,12,13,14,15,16)	(51,52,53,54,55,56,57,58,59,60)	(3,4,5,6,7,8,9,10,11,12,13)	(2,3,4,5,6,7,8,9,10,11)	(32,33,34,35,36,37,38,38,40,41)	(13,14,15,16,17,18,19,20,21,22)	(41,42,43,44,45,46,47,48,49,50)	(5,6,7,8 9,10,11,12,13,14)	(8,9,10,11,12,13,14,15,16,17)	(1,2,3,4,5,6,7,8,9,10)
VIII	(19,20,21,22,23,24,25,26,27,28)	(5,6,7,8,9,10,11,12,13,14,15)	(8,9,10,11,12,13,14,15,16,17)	(3,4,5,6,7,8,9,10,11,12)	(16,17,18,19,20,21,22,23,24,25)	(0,1,2,3,4,5,6,7,8,9,10)	(1,2,3,4,5,6,7,8,9,10)	(1,2,3,4,5,6,7,8,9,10)	(7,8,9,10,11,12,13,14,15,16)	(21,22,23,24,25,26,27,28,29,30)
IX	(9,10,11,12,13,14,15,16,17,18)	(12,13,14,15,16,17,18,19,20,21)	(20,21,22,23,24,25,26,27,28,29)	(12,13,14,15,16,17,18,19,20,21)	(0,1,2,3,4,5,6,7,8,9,10)	(25,26,27,28,29,30,31,32,33,34)	(15,16,17,18,19,20,21,22,23,24)	(19,20,21,22,23,24,25,26,27,28)	(31,32,33,34,35,36,37,38,39,40)	(61,62,63,64,65,66,67,68,69,70)
X	(24,25,26,27,28,29,30,31,32,33)	(15,16,17,18,19,20,21,22,23,24)	(7,8,9,10,11,12,13,14,15,16)	(40,41,42,43,44,45,46,47,48,49)	(5,6,7,8,9,10,11,12,13,14)	(28,29,30,31,32,33,34,35,36,37)	(12,13,14,15,16,17,18,19,20,21)	(6,7,8,9,10,11,12 13,14,15)	(1,2,3,4,5,6,7,8,9,10)	(7,8,9,10,11,12,13,14,15,16)

Here the given problem is balanced.

Step1: find out the each row minimum element and subtract it from that row.

	A	B	C	D	E	F	G	H	I	J
I	(0,0,0,0,	(7,7,7,7,	(4,4,4,4,	(40,40,40,	(12,12,12,	(31,31,31,	(1,1,1,1,	(2,2,2,2,	(50,50,50,	(6,6,6,6,

	A	B	C	D	E	F	G	H	I	J
	0,0,0,0, 0,0)	7,7,7,7, 7,7)	4,4,4,4, 4,4)	40,40,40, 40,40,40, 40)	12,12,12, 12,12,12, 12)	31,31,31, 31,31,31, 31)	1,1,1,1, 1,1)	2,2,2,2, 2,2)	50,50,50, 50,50,50, 50)	6,6,6,6, 6,6)
II	(10,10,10, 10,10,10, 10,10,10, 10)	(11,11,11, 11,11,11, 11,11,11, 11)	(7,7,7,7, 7,7,7,7, 7,7)	(52,52,52, 52,52,52, 52,52,52, 52)	(3,3,3,3, 3,3,3,3, 3,3)	(0,0,0,0, 0,0,0,0, 0,0)	(3,3,3,3, 3,3,3,3, 3,3)	(22,22,22, 22,22,22, 22,22,22, 22)	(16,16,16, 16,16,16, 16,16,16, 16)	(6,6,6,6, 6,6,6,6, 6,6)
III	(16,16,16, 16,16,16, 16,16,16, 16)	(8,8,8,8, 8,8,8,8, 8,8)	(3,3,3,3, 3,3,3,3, 3,3)	(5,5,5,5, 5,5,5,5, 5,5)	(19,19,19, 19,19,19, 19,19,19, 19)	(15,15,15, 15,15,15, 15,15,15, 15)	(15,15,15, 15,15,15, 15,15,15, 15)	(0,0,0,0, 0,0,0,0, 0,0)	(21,21,21, 21,21,21, 21,21,21, 21)	(7,7,7,7, 7,7,7,7, 7,7)
IV	(13,13,13, 13,13,13, 13,13,13, 13)	(19,19,19, 19,19,19, 19,19,19, 19)	(6,6,6,6, 6,6,6,6, 6,6)	(0,0,0,0, 0,0,0,0, 0,0)	(22,22,22, 22,22,22, 22,22,22, 22)	(5,5,5,5, 5,5,5,5, 5,5)	(14,14,14, 14,14,14, 14,14,14, 14)	(10,10,10, 10,10,10, 10,10,10, 10)	(5,5,5,5, 5,5,5,5, 5,5)	(11,11,11, 11,11,11, 11,11,11, 11)
V	(9,9,9,9, 9,9,9,9, 9,9)	(3,3,3,3, 3,3,3,3, 3,3)	(0,0,0,0, 0,0,0,0, 0,0)	(3,3,3,3, 3,3,3,3, 3,3)	(18,18,18, 18,18,18, 18,18,18, 18)	(10,10,10, 10,10,10, 10,10,10, 10)	(40,40,40, 40,40,40, 40,40,40, 40)	(2,2,2,2, 2,2,2,2, 2,2)	(12,12,12, 12,12,12, 12,12,12, 12)	(20,20,20, 20,20,20, 20,20,20, 20)
VI	(0,0,0,0, 0,0,0,0, 0,0)	(2,2,2,2, 2,2,2,2, 2,2)	(25,25,25, 25,25,25, 25,25,25, 25)	(1,1,1,1, 1,1,1,1, 1,1)	(19,19,19, 19,19,19, 19,19,19, 19)	(26,26,26, 26,26,26, 26,26,26, 26)	(12,12,12, 12,12,12, 12,12,12, 12)	(8,8,8,8, 8,8,8,8, 8,8)	(3,3,3,3, 3,3,3,3, 3,3)	(1,1,1,1, 1,1,1,1, 1,1)
VII	(6,6,6,6, 6,6,6,6, 6,6)	(50,50,50, 50,50,50, 50,50,50, 50)	(2,2,2,2, 2,2,2,2, 2,2)	(1,1,1,1, 1,1,1,1, 1,1)	(31,31,31, 31,31,31, 31,31,31, 31)	(12,12,12, 12,12,12, 12,12,12, 12)	(40,40,40, 40,40,40, 40,40,40, 40	(4,4,4,4, 4,4,4,4, 4,4)	(7,7,7,7, 7,7,7,7, 7,7)	(0,0,0,0, 0,0,0,0, 0,0)
VIII	(19,19,19, 19,19,19, 19,19,19, 19)	(5,5,5,5, 5,5,5,5, 5,5)	(8,8,8,8, 8,8,8,8, 8,8)	(3,3,3,3, 3,3,3,3, 3,3)	(16,16,16, 16,16,16, 16,16,16, 16)	(0,0,0,0, 0,0,0,0, 0,0)	(1,1,1,1, 1,1,1,1, 1,1)	(1,1,1,1, 1,1,1,1, 1,1)	(7,7,7,7, 7,7,7,7, 7,7)	(21,21,21, 21,21,21, 21,21,21, 21)
IX	(9,9,9,9, 9,9,9,9, 9,9)	(12,12,12, 12,12,12, 12,12,12, 12)	(20,20,20, 20,20,20, 20,20,20, 20)	(12,12,12, 12,12,12, 12,12,12, 12)	(0,0,0,0, 0,0,0,0, 0,0)	(25,25,25, 25,25,25, 25,25,25, 25)	(15,15,15, 15,15,15, 15,15,15, 15)	(19,19,19, 19,19,19, 19,19,19, 19)	(31,31,31, 31,31,31, 31,31,31, 31)	(61,61,61, 61,61,61, 61,61,61, 61)
X	(23,23,23, 23,23,23, 23,23,23, 23)	(14,14,14, 14,14,14, 14,14,14, 14)	(6,6,6,6, 6,6,6,6, 6,6)	(39,39,39, 39,39,39, 39,39,39, 39)	(4,4,4,4, 4,4,4,4, 4,4)	(27,27,27, 27,27,27, 27,27,27, 27)	(11,11,11, 11,11,11, 11,11,11, 11)	(5,5,5,5, 5,5,5,5, 5,5)	(0,0,0,0, 0,0,0,0, 0,0)	(6,6,6,6, 6,6,6,6, 6,6)

Step2: Find out the each column minimum element and subtract it from the column.

I	(0,0,0,0, 0,0,0,0, 0,0)	(5,5,5,5, 5,5,5,5, 5,5)	(4,4,4,4, 4,4,4,4, 4,4)	(40,40,40, 40,40,40, 40,40,40, 40)	(12,12,12, 12,12,12, 12,12,12, 12)	(31,31,31, 31,31,31, 31,31,31, 31)	(0,0,0,0, 0,0,0,0, 0,0)	(2,2,2,2, 2,2,2,2, 2,2)	(50,50,50, 50,50,50, 50,50,50, 50)	(6,6,6,6, 6,6,6,6, 6,6)
II	(10,10,10, 10,10,10, 10,10,10, 10)	(9,9,9,9, 9,9,9,9, 9,9)	(7,7,7,7, 7,7,7,7, 7,7)	(52,52,52, 52,52,52, 52,52,52, 52)	(13,13,13, 13,13,13, 13,13,13, 13)	(0,0,0,0, 0,0,0,0, 0,0)	(2,2,2,2, 2,2,2,2, 2,2)	(22,22,22, 22,22,22, 22,22,22, 22)	(16,16,16, 16,16,16, 16,16,16, 16)	(6,6,6,6, 6,6,6,6, 6,6)
III	(16,16,16, 16,16,16, 16,16,16, 16)	(6,6,6,6, 6,6,6,6, 6,6)	(3,3,3,3, 3,3,3,3, 3,3)	(5,5,5,5, 5,5,5,5, 5,5)	(19,19,19, 19,19,19, 19,19,19, 19)	(15,15,15, 15,15,15, 15,15,15, 15)	(14,14,14, 14,14,14, 14,14,14, 14)	(0,0,0,0, 0,0,0,0, 0,0)	(21,21,21, 21,21,21, 21,21,21, 21)	(7,7,7,7, 7,7,7,7, 7,7)
IV	(13,13,13, 13,13,13, 13,13,13, 13)	(17,17,17, 17,17,17, 17,17,17, 17)	(6,6,6,6, 6,6,6,6, 6,6)	(0,0,0,0, 0,0,0,0, 0,0)	(22,22,22, 22,22,22, 22,22,22, 22)	(5,5,5,5, 5,5,5,5, 5,5)	(13,13,13, 13,13,13, 13,13,13, 13)	(10,10,10, 10,10,10, 10,10,10, 10)	(5,5,5,5, 5,5,5,5, 5,5)	(11,11,11, 11,11,11, 11,11,11, 11)
V	(9,9,9,9, 9,9,9,9, 9,9	(1,1,1,1, 1,1,1,1, 1,1)	(0,0,0,0, 0,0,0,0, 0,0)	(3,3,3,3, 3,3,3,3, 3,3)	(18,18,18, 18,18,18, 18,18,18, 18)	(10,10,10, 10,10,10, 10,10,10, 10)	(39,39,39, 39,39,39, 39,39,39, 39)	(2,2,2,2, 2,2,2,2, 2,2)	(12,12,12, 12,12,12, 12,12,12, 12)	(20,20,20, 20,20,20, 20,20,20, 20)
VI	(0,0,0,0, 0,0,0,0, 0,0)	(0,0,0,0, 0,0,0,0, 0,0)	(25,25,25, 25,25,25, 25,25,25, 25)	(1,1,1,1, 1,1,1,1, 1,1)	(19,19,19, 19,19,19, 19,19,19, 19)	(26,26,26, 26,26,26, 26,26,26, 26)	(11,11,11, 11,11,11, 11,11,11, 11)	(8,8,8,8, 8,8,8,8, 8,8)	(3,3,3,3, 3,3,3,3, 3,3)	(1,1,1,1, 1,1,1,1, 1,1)
VII	(6,6,6,6, 6,6,6,6, 6,6)	(48,48,48, 48,48,48, 48,48,48, 48)	(2,2,2,2, 2,2,2,2, 2,2)	(1,1,1,1, 1,1,1,1, 1,1)	(31,31,31, 31,31,31, 31,31,31, 31)	(12,12,12, 12,12,12, 12,12,12, 12)	(39,39,39, 39,39,39, 39,39,39, 39)	(4,4,4,4, 4,4,4,4, 4,4)	(7,7,7,7, 7,7,7,7, 7,7)	(0,0,0,0, 0,0,0,0, 0,0)
VIII	(19,19,19, 19,19,19, 19,19,19, 19)	(3,3,3,3, 3,3,3,3, 3,3)	(8,8,8,8, 8,8,8,8, 8,8)	(3,3,3,3, 3,3,3,3, 3,3)	(16,16,16, 16,16,16, 16,16,16, 16)	(0,0,0,0, 0,0,0,0, 0,0)	(0,0,0,0, 0,0,0,0, 0,0)	(1,1,1,1, 1,1,1,1, 1,1)	(7,7,7,7, 7,7,7,7, 7,7)	(21,21,21, 21,21,21, 21,21,21, 21)
IX	(9,9,9,9, 9,9,9,9, 9,9)	(10,10,10, 10,10,10, 10,10,10, 10)	(20,20,20, 20,20,20, 20,20,20, 20)	(12,12,12, 12,12,12, 12,12,12, 12)	(0,0,0,0, 0,0,0,0, 0,0)	(25,25,25, 25,25,25, 25,25,25, 25)	(14,14,14, 14,14,14, 14,14,14, 14)	(19,19,19, 19,19,19, 19,19,19, 19)	(31,31,31, 31,31,31, 31,31,31, 31)	(61,61,61, 61,61,61, 61,61,61, 61)

X	(23,23,23, 23,23,23, 23,23,23, 23)	(12,12,12, 12,12,12, 12,12,12, 12)	(6,6,6,6, 6,6,6,6, 6,6)	(39,39,39 , 39,39,39, 39,39,39, 39)	(4,4,4,4, 4,4,4,4, 4,4)	(27,27,27 , 27,27,27, 27,27,27, 27)	(10,10,10, 10,10,10, 10,10,10, 10)	(5,5,5,5, 5,5,5,5, 5,5)	(0,0,0,0, 0,0,0,0, 0,0)	(6,6,6,6, 6,6,6,6, 6,6)

Minimum cost (time) = Sum of cost of cells (I→A) (II→F) (III→H) (IV→D) (V→C) (VI→B) (VII→J) (VIII→G) (IX→E) (X→I)

=(1,2,3,4,5,6,7,8,9,10)+(9,10,11,12,13,14,15,16,17,18)+(0,1,2,3,4,5,6,7,8,9)+(2,3,4,5,6,7,8,9,10,11)+(0,1,2,3,4,5,6,7,8,9)+(6,7,8,9, 10,11,12,13,14,15)+(1,2,3,4,5,6,7,8,9,10)+(1,2,3,4,5,6,7,8,9,10)+(0,1,2,3,4,5,6,7,8,9)+(1,2,3,4,5,6,7,8,9,10)

Minimum cost (time)= (21,31,41,51,61,71,81,91,101,111)

CONCLUSION:

In this paper we mainly described Decagonal fuzzy number. To derive the theoretical result the definition of Decagonal fuzzy number is useful. Some arithmetic operations also discussed here to use in the experiment.

We have also solved an assignment problem using Decagonal fuzzy number. Mainly simple examples are used in this paper. We mainly used fuzzy number.The procedure of solving assignment problem using DFN may help us to solve many optimization problems.

Our methods can be effective and easy to involved in a Decagonal fuzzy Number Context for all engineering and science fields where imprecision occurs. Further we can use Intuitionistic and Type2 fuzzy number to solve this type of problems.

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