FUZZY ASSIGNMENT PROBLEM USING HEXADECAGONAL FUZZY NUMBER BY COMPARING SOME METHOD

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ABSTRACT:

In this paper, A Hexadecagonal fuzzy assignment problem employing a fuzzy

new ranking technique is applied. This method requires less number of iterations to succeed in anoptimal solution. The most common method used to solve the APs in the Hungarian assignment method (HAM) due to H.W. Kuhn (1955), which produces optimal assignment plan almost all thetime. In the recent years several methods have been projected by several researchers for solving APs. Among them we used some methods and compare.

KEYWORDS: Hexadecagonal fuzzy numbers, centroids of centroid ranking methods,assignment problem, new approach method, revised ones method.

INTRODUCTION:

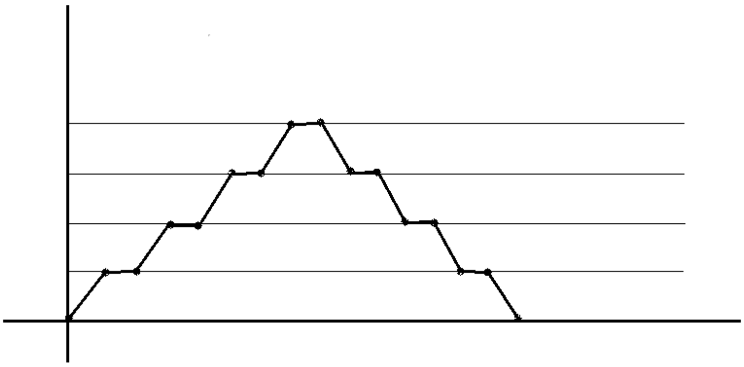
The error function Fuzzy sets (uncertain sets) are sets whose elements have degrees of membership. Fuzzy sets were introduced independently by Lotfi A. Zadeh and Dieter Kalua in 1965 as an extension of the classical notion of set. At the same time, Saili (1965) defineda more general kind of structure called an L-relation, which he studied in an abstract algebraic context. Fuzzy relations, which are now used throughout fuzzy mathematics and have applicationsin areas such as linguistics (De Cock, Bodendorfer and Kerre 2000), decision-making (Kuzmin 1982), and clustering (Bezdek 1978), are special cases of L-relations when L is the unit interval [0,1]. The problem instance has a number of agents and a number of tasks. Any agent can be assigned to perform any task, incurring some cost that may vary depending on the agent-task assignment. It is required to perform as many tasks as possible by assigning at most one agent to each task and at most one task to each agent, in such a way that the total cost of the assignment isminimized.

Operations research (O.R.) is defined as the scientific process of transformingdata into insights to making better decisions. Analytics is the application of scientific & mathematical methods to the study & analysis of problems involving complex systems.

PRELIMINARIES:

HEXADECAGONAL FUZZY NUMBERS:

$$\mu_{HD}(x)=\begin{cases} 0 & x \le a_1 \\ k_1\left(\frac{x-a_1}{a_2-a_1}\right) & a_1 \le x \le a_2 \\ k_1 & a_2 \le x \le a_3 \\ k_1+(k_2-k_1)\left(\frac{x-a_3}{a_4-a_3}\right) & a_3 \le x \le a_4 \\ k_2 & a_4 \le x \le a_5 \\ k_2+(k_3-k_2)\left(\frac{x-a_5}{a_6-a_5}\right) & a_5 \le x \le a_6 \\ k_3 & a_6 \le x \le a_7 \\ k_3+(1-k_3)\left(\frac{x-a_7}{a_8-a_7}\right) & a_7 \le x \le a_8 \\ 1 & a_8 \le x \le a_9 \\ k_3+(1-k_3)\left(\frac{a_{10}-x}{a_{10}-a_9}\right) & a_9 \le x \le a_{10} \\ k_3 & a_{10} \le x \le a_{11} \\ k_2+(k_3-k_2)\left(\frac{a_{12}-x}{a_{12}-a_{11}}\right) & a_{11} \le x \le a_{12} \\ k_2 & a_{12} \le x \le a_{13} \\ k_1+(k_2-k_1)\left(\frac{a_{14}-x}{a_{14}-a_{13}}\right) & a_{13} \le x \le a_{14} \\ k_1 & a_{14} \le x \le a_{15} \\ k_1\left(\frac{a_{16}-x}{a_{16}-a_{15}}\right) & a_{15} \le x \le a_{16} \\ 0 & a_{16} \le x \end{cases}$$



ASSIGNMENT PROBLEM:

Assignment problem is a **special type of linear programming problemwhich deals with the allocation of the various resources to the various activities onone to one basis**. It does it in such a way that the cost or time involved in the process isminimum and profit or sale is maximum.

BALANCED AND UNBALANCED PROBLEM:

Balanced Assignment Problem is an **assignment problem where thenumber of facilities is equal to the number of jobs**..

Unbalanced Assignment problem is an assignment problem where thenumber of facilities is not equal to the number of jobs.

DEFINITION :

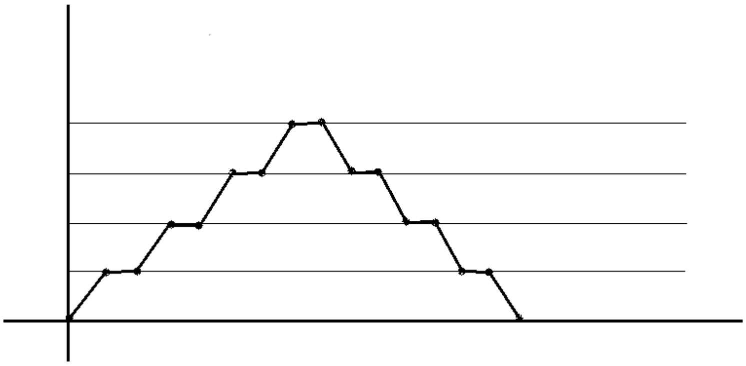
The set AH in the normal real number set is described as a generalized hexagonal fuzzy number, and its membership function has the following characteristics. LL(u) Left incremental function, LL(v) left incremental function, UR(v) right incremental function, UR(u) right incremental function.

RANKING OF NONAGONAL FUZZY NUMBERS:(XAH , YAH)

=(2ha1+3ha2+4ha3+3ha4+4ha5+3ha6+4ha7+3ha8+3ha9+4ha10+3ha11+4ha12+3ha13+4ha14+3ha15+2ha16)/52 , (66w/256)

Ranking function of, Ah = (ha1/ha2/ha3/ha4/ha5/ha6/ha7/ha8/ha9/ha10/ha11/ha12/ha13/ha14/ha15/ha16 ; w) maps the set of allfuzzy number to a set of real numbers as

R(AH) = (x^2 AH + Y^2 AH) ^ 1/2



Numerical example:

Four row involves A, B, C, and D, and the four column represents Job1, Job-2, Job-3,and Job-4, A cost matrix [Cij] is given, the elements of which are hexadecagonal numbers. The problem is to find a suitable position, so the total cost of recruitment becomes minimal.

	Job-1	**Job-2**	**Job-3**	**Job-4**
A	1,2,3,4,5,6,7,9 ,1,9,3,2,4,5,6, 7;0	1,2,3,4,5,8,9,1 0,9,0,3,2,3,3,1 ,2;0	0,1,1,2,3,2,2,3 ,4,5,2,7,3,1,1, 1;1	7,8,6,7,8,8,8,2 ,4,4,2,2,3,2,1, 0;1
B	4,4,3,3,2,2,1,1 ,5,5,6,6,7,7,8, 8;1	1,1,3,3,8,8,8,7 ,2,2,2,2,3,4,1, 3;1	3,3,2,2,4,4,8,8 ,9,1,1,3,4,11,1 0,1;0	1,1,1,1,2,2,2,2 ,0,1,1,1,2,2,2, 2;1
C	1,3,4,1,2,2,8,9 ,3,3,4,4,4,5,6, 5;0	5,6,2,0,3,1,7,4 ,8,5,2,9,3,1,2, 1;0	2,4,6,8,3,5,7,1 ,6,4,2,8,9,3,1, 7;1	1,3,5,7,7,6,4,2 ,5,3,7,1,2,4,3, 6,;1
D	1,3,4,7,8,9,2,5 ,6,7,2,4,3,4,5, 6;1	2,2,3,4,6,7,8,8 ,1,1,5,2,7,9,4, 1;0	1,1,3,1,2,6,8,2 ,3,4,5,7,4,3,1, 8;0	5,8,9,1,6,3,4,5 ,1,2,5,7,9,6,8, 2;1

Solution:

RANKING OF HEXADECAGONAL FUZZY NUMBER:

Aij= {2(1)+3(2)+4(3)+3(4)+4(5)+3(6)+4(7)+3(9)+3(1)+4(9)+3(3)+4(2)+3(4)+4(5)+3(6)+2(7)**}**/52, 66(0)/256.

= 240/52 , 0

= 4.65,0

R(Ah)= [(4.65)^2 +(0)^2**]**^½

a12=4.65.

By using New Approach Method [3] :

	Job-1	Job-2	Job-3	Job-4
A	4.65	3.73	2.54	4.53
B	4.46	3.87	4.75	1.46
C	4.08	3.81	4.81	4.13
D	3.75	4.53	4.88	5.19

	Job-1	Job-2	Job-3	Job-4
A	2.11	1.19	0	1.99
B	3	2.41	3.29	0
C	0.27	0	1	0.32
D	0	0.78	1.13	1.44

ROW	COLUMN
A	3
B	4
C	2
D	1

We can assign assignment is A-3, B-4, C-2and D-1.The fuzzy optimal total cost: a13+a24+a32+a41 =
(0,1,1,2,3,2,2,3,4,5,2,7,3,1,1,1)+(1,1,1,1,2,2,2,2,0,1,1,1,2,2,2,2)+(5,6,2,0,3,1,7,4,8,
5,2,9,3,1,2,1)+(1,3,4,7,8,9,2,5,6,7,2,4,3,4,5,6)
=(7,11,8,10,16,14,13,14,18,18,7,21,11,8,10,10)

REVISED ONES METHOD[2]:

	Job-1	Job-2	Job-3	Job-4
A	4.65	3.73	2.54	4.53
B	4.46	3.87	4.75	1.46
C	4.08	3.81	4.81	4.13
D	3.75	4.53	4.88	5.19

	Job-1	Job-2	Job-3	Job-4
A	1.83	1.46	1	1.78
B	3.05	2.65	3.25	1
C	1.07	1	1.26	1.08
D	1	1.20	1.30	1.38

ROW	COLUMN
A	3
B	4
C	2
D	1

We can assign assignment is A-3, B-4, C-2and D-1.The fuzzy optimal total cost: a13+a24+a32+a41 =

(0,1,1,2,3,2,2,3,4,5,2,7,3,1,1,1)+(1,1,1,1,2,2,2,2,0,1,1,1,2,2,2,2)+(5,6,2,0,3,1,7,4,8,

5,2,9,3,1,2,1)+(1,3,4,7,8,9,2,5,6,7,2,4,3,4,5,6)

=(7,11,8,10,16,14,13,14,18,18,7,21,11,8,10,10)

CONCLUSION:

In this paper, we uses the Hexadecagonal fuzzy assignment probleminto crisp assignment problem, and directly uses the traditional knowledge method to obtain the optimal solution. This new method takes less time to solve task problems that are to understand and apply. No optimization test is needed because it always obtains the best solution by assigning a function to each row and each column. Numerical examples compare the new approach method andrevised ones method.

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