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Sensitivity Analysis of TOPSIS Technique: AnApproach to Archives Websites' Performance Evaluation in Our Country with Interval Intuitionistic Fuzzy Information

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Abstract: *In this paper, we investigate the multiple attribute decision making (MADM) problemsfor evaluating the archives websites' performance with interval intuitionistic fuzzy information.Then,based on the TOPSIS method, calculation steps for solving MADM problems for evaluating thearchives websites' performance with interval intuitionistic fuzzy information are given. The weightedHamming distances property that leads to have the weight hamming distances the relative closeness degree to the positive ideal solution is calculated to rank all alternatives and to form most desirable archives website:*

Keywords:*Multiple Attribute Decision-making (MAGM), Interval Intuitionistic Fuzzy Information, The Construction of Archives' Websites, Performance Evaluation, Sensitivity analysis, TOPSIS technique.*

I. Introduction

Since the beginning of the 1980s, information Network of government affairs has been opened in succession in the many countries. Studying on the websites' performance evaluation of government affairs have been the hot topic in academic circle at home and abroad. With the government information becoming into the open, the construction of archives websites was brought forward. However, we just find a few study of archives websites' performance appraisal in our country. The study of archives websites' performance evaluation in "appraised what", "how to appraise" has not formed the unified understanding and blindness and spontaneity coexist in the process of operating, which hold back archives websites' performance evaluation in our country. How to makes justice, fairly and publicity appraisal of the construction of archives websites, and guides the construction of archives websites to the correct direction is a question that archives department is positively discussing and thinking. Based on this, the article thoroughly analyzes the questions of archives websites' performance evaluation in our country and summarizes the core factors of the construction of archives websites[1].

The problem of evaluating archives websites' performance with interval intuitionistic fuzzy information is the multiple attribute decision making (MADM) problems[2-15].The aim of this paper is to investigate the MADM problems for evaluating the archives websites' performance with interval intuitionistic fuzzy information. Then, we utilize the interval intuitionistic trapezoidal fuzzy weighted averaging (IITFWA) operator to aggregate the interval intuitionistic trapezoidal fuzzy information corresponding to each alternative and get the overall value of the alternatives, then rank the alternatives and select the most desirable one(s). Finally, an illustrative example is given.

II. Preliminaries

In the following, we shall introduce some basic concepts related to intuitionistic trapezoidal fuzzy numbers and interval intuitionistic trapezoidal fuzzy numbers.

Definition 1. Let X be a universe of discourse, then a fuzzy set is defined as: $A=\{(x,\mu_A(x))/x\epsilon X\}$ Which is characterized by a membership function $\mu_A : X\rightarrow[0,1]$, where $\mu_A(x)$ denotes the degree of membership of the element xto the set A[16]. Atanassov[17, 18] extended the fuzzy set to the IFS, shown as follows:

Definition 2. An IFS A in X is given by

$$A=\{(x,\mu_A(x),v_A(x))/x\epsilon X\} \qquad (2)$$

Where $\mu_A : X\rightarrow [0,1]$ and $v_A(x): X\rightarrow [0,1]$ with the condition
$0\leq \mu A(x)+v_A(x)\leq 1 \forall x\epsilon X$ The numbers $\mu_A(x)$ and $v_A(x)$ represent, respectively, the membership degree and non- membership degree of the element to the set A[17, 18].

Definition 3. For each IFS A in X , if

$$\pi_A(x)=1-\mu_A(x)-v_A(x), \forall x\,\epsilon X \qquad (3)$$

Then $\pi_A(x)$ is called the degree of indeterminacy of xto A[17, 18].

Definition4. Let X be a universe of discourse, An IVIFS $\tilde{A}$ over X is an object having the form [19- 20]:

$$\tilde{A} = \left\{ \left\langle x, \tilde{\mu}_A(x), \tilde{v}_A(x) \right\rangle / x \in X \right\} \quad (4)$$

Where $\tilde{\mu}_A(x) \subset [0,1]$ and $\tilde{v}_A(x) \subset [0,1]$ are interval numbers, and $0 \le \sup(\tilde{\mu}_A(x)) + \sup \tilde{v}_A(x)) \le 1, \forall x \in X$ For convenience, let $\tilde{\mu}_A(x)$ =[a, b] , $\tilde{v}_A(x)$ =[c,d] , so $\tilde{A} = ([a,b],[c,d])$

Definition 5.Let $\tilde{a}_1 = ([a_1,b_1],[c_1,d_1])$ *and* $\tilde{a}_2 = ([a_2,b_2],[c_2,d_2])$ be two interval-valued intuitionistic fuzzy numbers, then the Hamming distance between $\tilde{a}_1 = ([a_1,b_1],[c_1,d_1])$ *and* $\tilde{a}_2 = ([a_2,b_2],[c_2,d_2])$ is defined as follows:

$$d(\tilde{a}_1, \tilde{a}_2) = \frac{|a_1 - a_2| + |b_1 - b_2| + |c_1 - c_2| + |d_1 - d_2|}{2} \quad (5)$$

III. An Approach to Archives Websites' Performance Evaluation in Our Country with Interval Intuitionistic Fuzzy Information

The following assumptions or notations are used to represent the MADM problems for evaluating archives websites' performance with interval intuitionistic fuzzy information. Let $A=\{A_1,A_2,\ldots,A_M\}$ be a discrete set of alternatives. Let $G=\{G_1, G_2,\ldots,G_n\}$ be a set of attributes. The information about attribute weights is completely known. Let $w=\{w_1,w_2,\ldots,w_n\}$ be the weight vector of attributes, where $w_j \ge 0$. Suppose that $\tilde{R} = (\tilde{r}_{ij}) = ([a_{ij},b_{ij}],[c_{ij},d_{ij}])_{m\times n}$ is the interval intuitionistic fuzzy decision matrix, where ,$[a_{ij},b_{ij}]$ indicates the degree that the alternative A_i satisfies the attribute G_j given by the decision maker, ,$[c_{ij},d_{ij}]$ indicates the degree that the alternative $A_i$doesn't satisfy the attribute G_j given by the decision maker,$[a_{ij},b_{ij}] \subseteq [0,1],[c_{ij},d_{ij}] \subseteq [0,1], b_{ij} + d_{ij} \le 1, i = 1,2,\ldots,m, j = 1,2,\ldots,n.$. In the following, we apply the TOPSIS method to MADM problems for evaluating the archives websites' performance with interval intuitionistic fuzzy information. The method involves the following steps:

Step 1. Determine the positive ideal and negative ideal solution based on interval-valued intuitionistic fuzzy information.

$$\tilde{r}^{+} = \left(\left[a^{+}_{1}+b^{+}_{1}\right],\left[c^{+}_{1}+d^{+}_{1}\right],\left[a^{+}_{2}+b^{+}_{2}\right]\left[c^{+}_{2}+d^{+}_{2}\right],\ldots,\left[a^{+}_{n}+b^{+}_{n}\right]\left[c^{+}_{n}+d^{+}_{n}\right]\right) \quad (6)$$

$$\tilde{r}^{-} = \left(\left[a^{-}_{1}+b^{-}_{1}\right],\left[c^{-}_{1}+d^{-}_{1}\right],\left[a^{-}_{2}+b^{-}_{2}\right]\left[c^{-}_{2}+d^{-}_{2}\right],\ldots,\left[a^{-}_{n}+b^{-}_{n}\right]\left[c^{-}_{n}+d^{-}_{n}\right]\right) \quad (7)$$

$$\text{where } \left(\left[a^{+}_{j}+b^{+}_{j}\right],\left[c^{+}_{j}+d^{+}_{j}\right]\right) = \left(\left[\max_i a_{ij}, \max_i b_{ij}\right],\left[\min_i c_{ij}, \min_i d_{ij}\right]\right)$$

$$\left(\left[a^{-}_{j}+b^{-}_{j}\right],\left[c^{-}_{j}+d^{-}_{j}\right]\right) = \left(\left[\max_i a_{ij}, \max_i b_{ij}\right],\left[\min_i c_{ij}, \min_i d_{ij}\right]\right) \quad j \in 1,2\ldots.,n.$$

Step 2. Calculate the weighted hamming distances. The weighted hamming distances of each alternative from the ideal solution is given as

$$\begin{aligned} d\left(\tilde{r},\tilde{r}^{+}\right) &= \sum_{j=1}^{n} d\left(\tilde{r}_{ij},\tilde{r}_j^{+}\right) w_j \\ &= \sum_{j=1}^{n} w_l \left[\frac{|a_{ij}-a^{+}_{j}|+|b_{ij}-b^{+}_{j}|+|c_{ij}-c^{+}_{j}|+|d_{ij}-d^{+}_{j}|}{2}\right], i = 1,2,\ldots.m \end{aligned} \quad (8)$$

Similarly, the weighted hamming distances from the negative ideal solution is given as

$$\begin{aligned} d\left(\tilde{r},\tilde{r}^{-}\right) &= \sum_{j=1}^{n} d\left(\tilde{r}_{ij},\tilde{r}_j^{-}\right) w_j \\ &= \sum_{j=1}^{n} w_l \left[\frac{|a_{ij}-a^{-}_{j}|+|b_{ij}-b^{-}_{j}|+|c_{ij}-c^{-}_{j}|+|d_{ij}-d^{-}_{j}|}{2}\right], i = 1,2,\ldots.m \end{aligned} \quad (9)$$

The basic principle of the TOPSIS method is that the chosen alternative should have the "shortest distance" from the positive ideal solution and the "farthest distance" from the negative ideal solution.

Obviously, for the weight vector given, the smaller $d\left(\tilde{r},\tilde{r}^{+}\right)$ and the larger $d\left(\tilde{r},\tilde{r}^{-}\right)$, the better alternative Ai .

Step 3. Calculate the relative closeness to the ideal solution. The relative closeness of the alternative A_i with respect to $\tilde{r}^{+}$ is define as $c\left(\tilde{r}_i,\tilde{r}^{+}\right)=\dfrac{d\left(\tilde{r}_i,\tilde{r}^{-}\right)}{d\left(\tilde{r}_i,\tilde{r}^{+}\right)+d\left(\tilde{r}_i,\tilde{r}^{-}\right)}, i=1,2,...,m\cdot$ (10)

Step 4. Rank all the alternatives A_i(i=1,2,….m)and select the best one(s) in accordance with $c\left(\tilde{r}_i,\tilde{r}^{+}\right)$ (i=1,2,….m).

IV. Developing a New Method for Sensitivity Analysis of MADM Problems

Earlier researches on the sensitivity analysis of MADM problems often focused on determining the most sensitive attribute. They also focused on finding the least value of the change. However, a new method for sensitivity analysis of MADM problems is considered in this article that calculates the changing in the final score of alternatives when a change occurs in the weight of one attribute.

4.1. The effect of change in the weight of one attribute on the weight of other attributes

The vector for weights of attributes is $W^t=\left(w_1,w_2,...,w_k\right)$ wherein weights are normalized with a sum of 1, that is:

$\sum_{j=1}^{k} w_j = 1$

(11) With these assumptions, if the weight of one attribute changes, then the weight of other attributes change accordingly, and the new vector of weights transformed into $W''=\left(w_1',w_2',...,w_k'\right)$

The next theorem depicts changes in the weight of attributes.

Theorem 4.1.1. In the MADM model, if the weight of the *P*P_{th} attribute, changes by Δ_p, then the weight of other attributes change by Δ_j, where:

$$\Delta_j=\frac{\Delta_p.w_j}{w_p-1}; j=1,2,...,k, \quad j\neq p \tag{12}$$

Proof: If the new weight of the attribute is w_j' and the new weight of the P_{th}attribute changes as:

$$w_p'=w_p+\Delta_p \tag{13}$$

Then, the new weight of the other attributes would change as

$$w_j'=w_j+\Delta_j; j=1,2,...,k, \quad j\neq p \tag{14}$$

And because the sum of weights must be 1 then:

$$\sum_{j=1}^{k} w_j'=\sum_{j=1}^{k} w_j+\sum_{j=1}^{k}\Delta_j \Rightarrow \sum_{j=1}^{k}\Delta_j=0 \tag{15}$$

Therefore:

$$\Delta_p=-\sum_{\substack{j=1\\ j\neq p}}^{k}\Delta_j \tag{16}$$

Where:

$$\Delta_j=\frac{\Delta_p.w_j}{w_p-1}; j=1,2,...,k \;, j\neq p \tag{17}$$

Since:

$$-\Delta_p=\sum_{\substack{j=1\\ j\neq p}}^{k}\Delta_j=\sum_{\substack{j=1\\ j\neq p}}^{k}\frac{\Delta_p.w_j}{w_p-1}=\frac{\Delta_p}{w_p-1}\sum_{\substack{j=1\\ j\neq p}}^{k} w_j=\frac{\Delta_p}{w_p-1}\left(1-w_p\right)=-\Delta_p \tag{18}$$

Main result. In a MADM problem, if the weight of the P_{th}attribute changes from w_p to w_p' as:

$$w_p'=w_p+\Delta_p \tag{19}$$

Then, the weight of other attributes would change as:

$$w'_j = \frac{1-w_p-\Delta_p}{1-w_p}.w_j = \frac{1-w'_p}{1-w_p}.w_j \quad j=1,2,...,k \ \ ,j \neq p \tag{20}$$

Since, for $j=1,2,...,k \ \ ,j \neq p$ we have:

$$w'_j = w_j + \Delta_j = w_j + \frac{\Delta_p.w_j}{w_p-1} = \frac{w_j\left(w_p-1\right)+\Delta_p.w_j}{w_p-1} \tag{21}$$

$$\Rightarrow w'_j = \frac{\left(1-w_p-\Delta_p\right).w_j}{1-w_p} = \frac{1-w'_p}{1-w_p}.w_j; \ j=1,2,...,k \ \ ,j \neq p \tag{22}$$

Then, new vector for weights of attributes would be $W'' = \left(w'_1, w'_2, ..., w'_k\right)$, that is:

$$w'_j = \begin{cases} w_j + \Delta_p & j = p \\ \dfrac{1-w'_p}{1-w_p}.w_j & j \neq p, \quad j=1,2,...,k \end{cases} \tag{23}$$

$$w'_p = w_p + \Delta_p \quad \Rightarrow \begin{cases} if \ w'_p > w_p & \Rightarrow w'_j < w_j \\ if \ w'_p < w_p & \Rightarrow w'_j > w_j \end{cases} \ j=1,2,...,k \ \ ,j \neq p \tag{24}$$

The sum of new weights of attributes that are obtained in (23) is 1,because:

$$\sum_{j=1}^{k} w'_j = \sum_{\substack{j=1 \\ j\neq p}}^{k} w'_j + w'_p = \sum_{\substack{j=1 \\ j\neq p}}^{k} \frac{w_j\left(1-w_p-\Delta_p\right)}{1-w_p} + w_p + \Delta_p$$

$$= \frac{\left(1-w_p-\Delta_p\right)}{1-w_p} \sum_{\substack{j=1 \\ j\neq p}}^{k} w_j + w_p + \Delta_p$$

$$= \frac{\left(1-w_p-\Delta_p\right)}{1-w_p}.\left(1-w_p\right) + w_p + \Delta_p$$

$$= 1 - w_p + w_p + \Delta_p = 1 \tag{25}$$

Theorem 4.2.1 In the MADM model of TOPSIS, if the weight of the P_{th}attribute changes by Δ_p, then the final score of the its alternative, $i=1,2,...,m$ would change as below:

$$c'\left(\tilde{r}_i, \tilde{r}^+\right) = \frac{d'\left(\tilde{r}_i, \tilde{r}^-\right)}{d'\left(\tilde{r}_i, \tilde{r}^+\right) + d'\left(\tilde{r}_i, \tilde{r}^-\right)} \ ,i=1,2,...,m \tag{26}$$

Where $d'\left(\tilde{r}_i, \tilde{r}^+\right)$, $d'\left(\tilde{r}_i, \tilde{r}^-\right)$, are calculated as follow:

$$\begin{aligned} d'\left(\tilde{r}, \tilde{r}^+\right) &= \sum_{j=1}^{n} d'\left(\tilde{r}_{ij}, \tilde{r}_j^+\right) w'_j \\ &= \sum_{j=1}^{n} w'_j \left[\frac{\left|a_{ij}-a^+{}_j\right| + \left|b_{ij}-b^+{}_j\right| + \left|c_{ij}-c^+{}_j\right| + \left|d_{ij}-d^+{}_j\right|}{2}\right] \ ,i=1,2,....m \end{aligned} \tag{27}$$

$$\begin{aligned} d'\left(\tilde{r}, \tilde{r}^-\right) &= \sum_{j=1}^{n} d'\left(\tilde{r}_{ij}, \tilde{r}_j^-\right) w'_j \\ &= \sum_{j=1}^{n} w'_j \left[\frac{\left|a_{ij}-a^-{}_j\right| + \left|b_{ij}-b^-{}_j\right| + \left|c_{ij}-c^-{}_j\right| + \left|d_{ij}-d^-{}_j\right|}{2}\right] \ ,i=1,2,....m \end{aligned} \tag{28}$$

The values $d'\left(\tilde{r}_i, \tilde{r}^+\right)$, $d'\left(\tilde{r}_i, \tilde{r}^-\right)$ in equations (27), (28) are calculated by their older values $d'\left(\tilde{r}_i, \tilde{r}^+\right)$, $d'\left(\tilde{r}_i, \tilde{r}^-\right)$, the value of change in the weight of the Pth attribute, Δ_p, and other available information in the model. These equations can be used in the software that use TOPSIS technique for solving MADM problems to obtain new results in light of change in the weight of one attribute.

V. Numerical example

Let us suppose there is an investment company, which wants to invest a sum of money for archives websites' construction. There is a panel with five possible archives websites (A_i=1,2,…,5) to invest the money. In order to evaluate archives websites' performance of five archives websites, the investment company must take a decision according to the following four attributes: (1) G_1 is the network infrastructure (The network infrastructure is application system, including the support platform with the website file network infrastructure standard, network structure, outer net, intranet); (2) G_2 is the hardware environment(Hardware environment is archives facility, including the main hard equipment and hardware maintenance procedures); (3) G_3 is the software environment(Software environment website file is the effective operation of the guarantee, including the operating system, database system, network management system and the business software); (4) G_4 is the operations management(Operations management refers to the process of operation website file in the implementation of the management, mainly including process management, security system management, business operation management, personnel management and system management). The five possible archives websites(A_i=1,2,…,5)are to be evaluated using the interval intuitionistic fuzzy information by the decision maker under the above four attributes whose weighting vector w=(0.2800,0.1900,0.3300,0.2000)^T, as listed in the following matrix:

$$\tilde{R} = \begin{array}{c} \\ A_1 \\ A_2 \\ A_3 \\ A_4 \\ A_5 \end{array} \begin{array}{c} \begin{array}{cccc} \quad G_1 \quad & \quad G_2 \quad & \quad G_3 \quad & \quad G_4 \quad \end{array} \\ \begin{bmatrix} ([0.3,0.6],[0.2,0.3]) & ([0.3,0.7],[0.1,0.3]) & ([0.2,0.5],[0.3,0.4]) & ([0.4,0.5],[0.1,0.2]) \\ ([0.4,0.8],[0.1,0.2]) & ([0.5,0.8],[0.1,0.2]) & ([0.2,0.7],[0.2,0.3]) & ([0.3,0.6],[0.2,0.4]) \\ ([0.2,0.6],[0.2,0.3]) & ([0.2,0.4],[0.1,0.5]) & ([0.1,0.6],[0.3,0.4]) & ([0.1,0.4],[0.3.0.5]) \\ ([0.1,0.4],[0.3,0.6]) & ([0.3,0.7],[0.1,0.2]) & ([0.3,0.6],[0.2,0.4]) & ([0.4,0.6],[0.2,0.3]) \\ ([0.2,0.5],[0.3,0.4]) & ([0.5,0.6],[0.2,0.4]) & ([0.4.0.7],[0.1,0.3]) & ([0.5,0.6],[0.3,0.4]) \end{bmatrix} \end{array}$$

Then, we utilize the approach developed to evaluate archives websites' performance of five archives websites.

Case:1

Step 1. Determine the positive ideal archives website and negative ideal archives websites

$$\tilde{r}^{+} = \left[([0.4,0.8],\ [0.1,0.2]),([0.5,0.8],[0.1,0.2]),([0.4,0.7]\ ,[0.1,0.3]),([0.5,0.6],[0.1,0.2])\right]$$

$$\tilde{r}^{-} = \left[([0.1,0.4],[0.3,0.6]),([0.2,0.4],[0.2,0.5]),([0.1,0.5],[0.3,0.4]),([0.1,0.4],[0.3,0.5])\right]$$

Step: 2. Calculate the weighted hamming distances of each archives website from the positive ideal archives websites and negative ideal archives website by utilizing the weight vector, respectively.

$$d\left(\tilde{r}_1,\tilde{r}^{+}\right)=0.2635, d\left(\tilde{r}_2,\tilde{r}^{+}\right)=0.0895, d\left(\tilde{r}_3,\tilde{r}^{+}\right)=0.3845, d\left(\tilde{r}_4,\tilde{r}^{+}\right)=0.3065, d\left(\tilde{r}_5,\tilde{r}^{+}\right)=0.2275$$

$$d\left(\tilde{r}_1,\tilde{r}^{-}\right)=0.285, d\left(\tilde{r}_2,\tilde{r}^{-}\right)=0.429, d\left(\tilde{r}_3,\tilde{r}^{-}\right)=0.124, d\left(\tilde{r}_4,\tilde{r}^{-}\right)=0.222, d\left(\tilde{r}_5,\tilde{r}^{-}\right)=0.315$$

Step:3 Calculate the relative closeness to the positive ideal archives website

$$c\left(\tilde{r}_1,\tilde{r}^{+}\right)=0.5196, c\left(\tilde{r}_2,\tilde{r}^{+}\right)=0.8294, c\left(\tilde{r}_3,\tilde{r}^{+}\right)=0.2438, c\left(\tilde{r}_4,\tilde{r}^{+}\right)=0.4201, c\left(\tilde{r}_5,\tilde{r}^{+}\right)=0.581$$

Step: 4. Rank all the archives websites A_i (i=1,2,3,4,5) in accordance with the relative closeness $c\left(\tilde{r}_i,\tilde{r}^{+}\right)$ (i=1,2,3,4,5):$A_2 > A_5 > A_1 > A_4 > A_3$and thus the most desirable archives website is A_2 .

Case: 2

Step: 1 Now we assume that the weight of the 4th attribute increased by $\Delta_p = 0.2000$ and be $w_4' = w_4 + \Delta_4 = 0.2000 + 0.2000 = 0.4000$. Then by equation (23), the weight of other attributes change as (29):

$$w_j' = \frac{1-w_4'}{1-w_4}.w_j; \quad j=1,2,3$$

$$\Rightarrow w'' = (0.21, 0.1425, 0.2475, 0.4000). \tag{29}$$

Step: 2 Calculate the weighted hamming distances of each archives website from the positive ideal archives websites and negative ideal archives website by utilizing the new weight vector, respectively.

$$d'\left(\tilde{r}_1,\tilde{r}^{+}\right)=0.2076, d'\left(\tilde{r}_2,\tilde{r}^{+}\right)=0.1371, d'\left(\tilde{r}_3,\tilde{r}^{+}\right)=0.4408, d'\left(\tilde{r}_4,\tilde{r}^{+}\right)=0.2674, d'\left(\tilde{r}_5,\tilde{r}^{+}\right)=0.2101$$

$$d'\left(\tilde{r}_1,\tilde{r}^{-}\right)=0.3262, d'\left(\tilde{r}_2,\tilde{r}^{-}\right)=0.3968, d'\left(\tilde{r}_3,\tilde{r}^{-}\right)=0.0929, d'\left(\tilde{r}_4,\tilde{r}^{-}\right)=0.2665, d'\left(\tilde{r}_5,\tilde{r}^{-}\right)=0.3237$$

Step:3 Calculate the relative closeness to the positive ideal archives website $c'\left(\tilde{r}_1,\tilde{r}^+\right)=0.6110, c'\left(\tilde{r}_2,\tilde{r}^+\right)=0.7432, c'\left(\tilde{r}_3,\tilde{r}^+\right)=0.1741, c'\left(\tilde{r}_4,\tilde{r}^+\right)=0.4991, c'\left(\tilde{r}_5,\tilde{r}^+\right)=0.6064$

Step:4 Rank all the archives websites A_i (i=1,2,3,4,5) in accordance with the relative closeness $c'\left(\tilde{r}_i,\tilde{r}^+\right)$ (i=1,2,3,4,5):$A_2 > A_1 > A_5 > A_4 > A_3$ and thus the most desirable archives website is A_2 .

VI. Conclusion

In this paper, a novel of the multiple attributes decision making (MADM) problems for evaluating the archives websites' performance with interval intuitionistic fuzzy information.Then, based on the TOPSIS method, calculation steps for solving MADM problems for evaluating the archives websites' performance with interval intuitionistic fuzzy information are given. The weighted Hamming distances property that leads to have the weight hamming distances the relative closeness degree to the positive ideal solution is calculated to rank all alternatives and to form most desirable archives website:

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