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Universities of nationalities network self-determined learning effects monitoring and evaluation research

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ABSTRACT

Popularization of universities of nationalities network self-determined learning has greatly improved teaching speed, and with the rapidly development of universities learning digitalization and informatization, network campus implementation lets campus learning cultures to have new platforms and environment. In universities of nationalities, apply network to carry out self-determined knowledge learning, its attributes have high capacity, fast timeliness, rapidly updating as well as other features. The paper utilizes comprehensive evaluation model to make fuzzy comprehensive evaluation on universities of nationalities network self-determined learning effects, carries out evaluation and analysis from network learning tools, sites, network learning time distribution, universities network learning attention, universities network self-determined learning contents. It gets good evaluation results.

KEYWORDS

Universities of nationalities; Network self-determined learning; Fuzzy comprehensive evaluation; Mathematical model.

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INTRODUCTION

Usage of network cannot do without contemporary university students, in university students daily learning life, chat, communication, e-mail, news, videos and other various aspects, all reflect network importance, the paper gets year2010-2011 each kind of network application usage rate (partial), by data indication, it gets status analysis, as TABLE 1 shows.

TABLE 1 : Year 2010-2011 all kinds of network application usage rates

Application	Year 2011		Year 2010		
	User scale (ten thousand)	Usage rate	User scale (ten thousand)	Usage rate	Annual growth rate
Instant messaging	41510	80.9%	35258	77.1%	17.7%
Search engine	40740	79.4%	37453	81.9%	8.8%
Network music	38585	75.2%	36218	79.2%	6.5%
Network news	36687	71.5%	35304	77.2%	3.9%
Network videos	32531	63.4%	28398	62.1%	14.6%
Network games	32428	63.2%	30410	66.5%	6.6%
Blogs/ personal space	31864	62.1%	29450	64.4%	8.2%
Micro-blog	24988	48.7%	6311	13.8%	296.0%
E-mail	24577	47.9%	24969	54.6%	-1.6%
Social network site	24424	47.6%	23505	51.4%	3.9%
Forum/BBS	14469	28.2%	14817	32.4%	-2.3%
Traveling reservation	4207	8.2%	3613	7.9%	16.5%

By TABLE 1 expressed results indicating, the paper carries out evaluation and analysis from network learning tools, sites, network learning time distribution, universities network learning attention, universities network self-determined learning contents

MODEL ESTABLISHMENTS

Generalization of fuzzy comprehensive evaluation model

Utilize fuzzy comprehensive evaluation, steps are as following:

(1)Establish factor set U ,$U = \begin{pmatrix} U_1 & U_2 & \cdots & U_k \end{pmatrix}$

(2)Establish evaluation set V (assessment set), $V = \begin{pmatrix} V_1 & V_2 & \cdots & V_n \end{pmatrix}$

According to general evaluation system, define evaluation grade domain:

$$V = \{V_1, V_2, V_3, V_4\}$$

$$= \{very\ good\ ,\ good\ ,\ normal\ ,\ bad\}$$

(3)Establish evaluation matrix fuzzy mapping from U to V , it gets fuzzy relation as following matrix shows :

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & & \vdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix}$$

(4) Establish weight set, $A = (a_1, a_2, \cdots, a_n)$,it meets conditions:

$$\sum_{i=1}^{n} a_i = 1 \quad a_i \geq 0$$

(5) Fuzzy relation R every line will reflect the line influence factors to object judgment degree, meanwhile, R every column will reflect the column influence factors to object judgment degree.

$$\sum_{i=1}^{n} r_{ij} \quad j = 1, 2, 3, \cdots, m$$

$$B = A \cdot R$$

$$= (a_1, a_2, a_3, \cdots, a_n) \cdot \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & & \vdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix}$$

$$= (b_1, b_2, b_3, \cdots, b_n)$$

In V, fuzzy combination is evaluation set B. Based on above described facts, actual change model is:
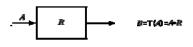

Figure 1 : Change model

As Figure 1 show, it gets fuzzy comprehensive evaluation change model, and can establish corresponding every factor grade evaluation transformation function, evaluation factors u1, u2, u3,u4, u5 membership functions can be expressed as following:

$$u_{v1}(u_1) = \begin{cases} 0.5(1 + \dfrac{u_i - k_1}{u_i - k_2}), & u_i \geq k_1 \\ 0.5(1 - \dfrac{k_1 - u_i}{k_1 - k_2}), & k_2 \leq u_i < k_1 \\ 0, & u_i < k_2 \end{cases}$$

$$u_{v2}(u_1) = \begin{cases} 0.5(1 - \dfrac{u_i - k_1}{u_i - k_2}), & u_i \geq k_1 \\ 0.5(1 + \dfrac{k_1 - u_i}{k_1 - k_2}), & k_2 \leq u_i < k_1 \\ 0.5(1 - \dfrac{u_i - k_3}{k_2 - k_3}), & k_3 \leq u_i < k_2 \\ 0.5(1 - \dfrac{k_3 - u_i}{k_2 - u_i}), & u_i < k_3 \end{cases}$$

$$u_{v1}(u_1) = \begin{cases} 0, & u_i \geq k_2 \\ 0.5(1 - \dfrac{k_1 - u_i}{k_2 - k_3}), & k_3 \leq u_i < k_2 \\ 0.5(1 + \dfrac{k_3 - u_i}{k_2 - u_i}), & u_i < k_3 \end{cases}$$

Combine with fuzzy evaluation model to evaluate universities of nationalities network self-determined learning effects

Establish factor set U, $U = (U_1 \quad U_2 \quad U_3 \quad U_4)$. Among them, network learning tools, sites U_1, network learning time distribution U_2, universities network learning attention U_3, universities network self-determined learning contents U_4, it gets TABLE 2.

TABLE 2 : Universities of nationalities network self-determined learning effects evaluation indicator system

Network learning tools, sites U_1	Network learning time distribution U_2	Universities network learning attention U_3	Universities network self-determined learning contents U_4
Instant messaging, campus information issuing u_{11}	Network learning time u_{21}	Network real-time learning news u_{31}	University network learning course u_{41}
Inside and outside school network learning timeliness u_{12}	Computer literacy learning u_{22}	Network course distribution u_{32}	University network learning homework u_{42}
Network video learning u_{13}	Network course education time u_{23}	Teachers' focus u_{33}	Universities network learning examination u_{43}
Network learning phase self testing u_{14}	Other network used time u_{24}	Universities policies u_{34}	
Experience sharing u_{15}			

By TABLE 2 listed factors, it gets evaluation set.

$$U_1 = \{u_{11}, u_{12}, u_{13}, u_{14}\}$$

$$U_2 = \{u_{21}, u_{22}, u_{23}, u_{24}, u_{25}\}$$

$$U_3 = \{u_{31}, u_{32}, u_{33}\}$$

$$U_4 = \{u_{41}, u_{42}, u_{43}, u_{44}\}$$

By collecting data and analyzing, it gets four kinds of factors importance ranking statistics, as TABLE 3 show.

TABLE 3 : Four kinds of factors importance degree ranking statistics

Classification	Rank1	Rank 2	Rank 3	Rank 4
Network learning tools, sites U_1	23	7	4	0
Network learning time distribution U_2	7	18	8	0
Universities network learning attention U_3	0	9	13	12
Universities network self-determined learning contents U_4	3	0	9	21

By TABLE 3 sorting, it gets network learning tools, sites, network learning time distribution, universities network learning attention, universities network self-determined learning contents four aspects' rank matrix:

$$U_2 = \{23, 7, 4, 0\}$$

$$U_2 = \{7, 18, 8, 0\}$$

$$U_3 = \{0, 9, 13, 12\}$$
$$U_4 = \{3, 0, 9, 21\}$$

Obtained weighted vector from rank 1 to rank 2:

$$\beta = \{\beta_1, \beta_2, \beta_3, \beta_4\} = \{0.4, 0.3, 0.2, 0.1\}$$

$$U_i^* = U_i \cdot \beta^T$$

$$U_1^* = 12, U_2^* = 9.7, U_3^* = 6, U_4^* = 5$$

The paper takes normalization processing:

$$U_1^* = 0.35, U_2^* = 0.3, U_3^* = 0.2, U_4^* = 0.15$$

It gets:

$$\overline{A} = \begin{pmatrix} 0.35 & 0.3 & 0.2 & 0.15 \end{pmatrix}$$

By universities network psychological measurement, the paper gets remarks membership, as TABLE 4 show.

TABLE 4 : Universities of nationalities network self-determined learning effects remarks memberships

Evaluation way	Set scores interval			
	0-60	**60-80**	**80-90**	**90-100**
Very good	0	0	0.05	0.95
Good	0	0.05	0.9	0.05
Normal	0.05	0.9	0.05	0
Bad	0.95	0.05	0	0

By universities network psychological measurement each indicator obtained evaluation, the paper gets TABLE 5.

TABLE 5 : One university of nationalities network self-determined learning effects evaluation each indicator obtained evaluation value

Each layer indicator	Evaluation value	Each layer indicator	Evaluation value
Instant messaging, campus information issuing u_{11}	Very good	Network real-time learning news u_{31}	Very good
Inside and outside school network learning timeliness u_{12}	Very good	Network course distribution u_{32}	Good
Network video learning u_{13}	Normal	Teachers' focus u_{33}	Good
Network learning phase self testing u_{14}	Normal	Universities policies u_{34}	Normal
Experience sharing u_{15}	Normal	University network learning course u_{41}	Good
Network learning time u_{21}	Very good	University network learning homework u_{42}	Very good
Computer literacy learning u_{22}	Very good	Universities network learning examination u_{43}	Normal
Network course education time u_{23}	Very good		
Other network used time u_{24}	Good		

By above model, it gets single layer indicator weight factor fuzzy set is:

$$U_1^* = \{U_{11}, U_{12}, U_{13}, U_{14}, U_{15}\} = \{0.25 \quad 0.25 \quad 0.2 \quad 0.15 \quad 0.15\}$$

$$U_2^* = \{U_{21}, U_{22}, U_{23}, U_{24}\} = \{0.54 \quad 0.1 \quad 0.24 \quad 0.14\}$$

$$U_1^* = \{U_{31}, U_{32}, U_{33}, U_{34}\} = \{0.4 \ 0.3 \ 0.1 \ 0.2\}$$

$$U_1^* = \{U_{41}, U_{42}, U_{43}\} = \{0.3 \ 0.4 \ 0.3\}$$

By TABLE 5, and combine with TABLE 3 remarks membership, the paper gets network learning tools, sites, network learning time distribution, universities network learning attention, universities network self-determined learning contents each aspect evaluation set:

Network learning tools, sites—
$$U_1 = \begin{pmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.95 & 0.05 \\ 0 & 0.05 & 0.95 & 0.05 \\ 0 & 0.05 & 0.95 & 0.05 \end{pmatrix}$$

Network learning time distribution—
$$U_2 = \begin{pmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0 & 0.05 & 0.95 \\ 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.9 & 0.05 \end{pmatrix}$$

Universities network learning attention—
$$U_3 = \begin{pmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.9 & 0.05 \\ 0 & 0.05 & 0.9 & 0.05 \\ 0.05 & 0.9 & 0.05 & 0 \end{pmatrix}$$

Universities network self-determined learning contents—
$$U_4 = \begin{pmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.9 & 0.05 \\ 0 & 0.05 & 0.9 & 0.05 \end{pmatrix}$$

By formula calculating:

$$B_i = A_i \cdot R_i$$

Make normalization processing with obtained B_i, it gets fuzzy evaluation matrix:

$$\bar{B} = \begin{pmatrix} B_1 \\ B_2 \\ B_3 \\ B_4 \end{pmatrix} = \begin{pmatrix} 0.07 & 0.27 & 0.12 & 0.54 \\ 0 & 0.1 & 0.42 & 0.48 \\ 0.08 & 0.45 & 0.29 & 0.18 \\ 0.15 & 0.21 & 0.3 & 0.34 \end{pmatrix}$$

It gets comprehensive evaluation value :

$$Z = U^* \cdot B = (0.32 \quad 0.28 \quad 0.22 \quad 0.18)$$

By comprehensive evaluation value $0.32 > 0.28 > 0.22 > 0.18$, it shows universities network self-determined effects evaluation indicators located indicator range is in the interval of 80-90 scores.

CONCLUSION

Fuzzy mathematics is from people recognition on external world, due to suffer numerous factors influences, human recognized things are fuzzy. Fuzzy mathematics is a theoretical system that is formed by fuzzy set and fuzzy logic, fuzzy mathematics is applied in pattern recognition and artificial intelligence, as a relative brand new discipline, fuzzy mathematics collect some uncertain factors and then reflect into people consciousness. By establishing attributes scale on one object, carry out fuzzy mathematical analysis of one object.

The paper gets comprehensive evaluation value by fuzzy comprehensive evaluation model analysis, carries out evaluation and analysis from network learning tools, sites, network learning time distribution, universities network learning attention, universities network self-determined learning contents; by comprehensive evaluation value $0.32 > 0.28 > 0.22 > 0.18$, it shows located indicator range is in the interval of 80-90 scores, therefore it indicates contemporary universities of nationalities network self-determined learning effects evaluation index is lower that should attract higher attentions.

REFERENCES

[1] David Gautlett; Network research, Digital era media research reorientation, Peng lan and others interpreted, The first edition, Beijing, Xinhua Publishing House, 31-74, **(2004)**.

[2] Pan Wen-Jun; New media era universities of nationalities network cultural construction research-take southern lake ideological and political net as an example[D], South Central University for Nationalities, **5**, **(2012)**.

[3] Xiong Su-Chun, Shi Jin-Fang; Universities students self-determined learning features and teaching strategy [J], Education Academic Monthly Magazine, **2**, 94-95 **(2008)**.

[4] Ma Wei-Qi, Wang Rui-Hong; Universities campus network culture important effects on campus cultural construction, Journal of Yunnan Agricultural University, **5**, 53-56 **(2009)**.

[5] Chen Hua-Dong, Yu Zhao-Yang; Universities network cultural construction and management work contents and promotion strategy, Thoughts and Theories Education, **3**, 85-88**(2011)**.

[6] Li Xi-Lin, Wang Lai-Gui, Zhao Kui, Liu Ling; Fuzzy comprehensive evaluation method improvement and application in mine water's quality of water evaluation [J], Journal of Water Resource and Water Engineering, **5**, **(2009)**.

[7] Fu Xue-Wei; Analytic hierarchy process-based fuzzy comprehensive evaluation research and application [D], Harbin Institute of Technology, **(2011)**.

[8] Wu Dan; Fuzzy rules-based fuzzy systematic performance analysis [D], Zhejiang Sci.Tech.University, **(2014)**.

[9] Xie Chuan-Sheng, Zhang Wei, Wei Zhi-Heng; Fuzzy theory-based electricity clients' satisfaction index comprehensive evaluation [J], Electricity Demands and Management, **5**, **(2006)**.