University student cyber psychological fuzzy comprehensive evaluation

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ABSTRACT

The paper carries out university student cyber psychological status analysis, it gets present university student psychology of viewing cyber things, university student attitude of commenting on one incident, conformity attitude and emotionality occupy larger proportions, which are about the same as student rational reflecting problems' proportions by comparing. The paper by analyzing modern university student cyber psychological health, it applies fuzzy comprehensive evaluation model to analyze. It gets fuzzy comprehensive evaluation value, $Z=U^*\cdot B=(0.31 \quad 0.29 \quad 0.23 \quad 0.17)$, due to $0.31>0.29>0.23>0.17$, it shows its located indicators range is within the score interval among 0-60. Therefore, it can show that contemporary students' cyber psychological health evaluation index is lower; this should be taken more seriously.

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KEYWORDS

Psychological health;
Fuzzy evaluation;
Cyber psychology;
Student psychology.

INTRODUCTION

Network technique rapid development drives students' life high speed convenience and development, and meanwhile it seriously affects university student psychological health, network is a double-edged sword, on one hand, it brings into good development way and opportunities for education, sets up new prospects, and provides high effective network learning platform, however, on the other hand, it causes serious threaten to students psychological health, therefore cyber psychological health is particular important for university student development.

Cyber psychological health and actual psychological health have great differences, especially in education environment virtualization, so to cyber psychological education and improvements, it has severe tests.

The paper gets each kind of network application utilization rate (partial) from 2010 to 2011, by data indication; it gets status analysis as TABLE 1 shows.

By Figure 1 it is clear that university student attitude of commenting on one incident, conformity attitude and emotionality occupy larger proportions, which are about the same as student rational reflecting problems' proportions by comparing.

MODEL ESTABLISHMENTS

Fuzzy comprehensive evaluation model

(1) Utilize fuzzy comprehensive evaluation, steps are as following:

Establish factor set U,

TABLE 1 : Each kind of network application utilization rate (partial) from 2010 to 2011

Application	Year 2011		Year 2010		Annual growth rate
	User scale (ten thousand)	Utilization rate	User scale (ten thousand)	Utilization 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%
Netnews	36687	71.5%	35304	77.2%	3.9%
Online video	32531	63.4%	28398	62.1%	14.6%
Online game	32428	63.2%	30410	66.5%	6.6%
Blogs/personal space	31864	62.1%	29450	64.4%	8.2%
Microblog	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%
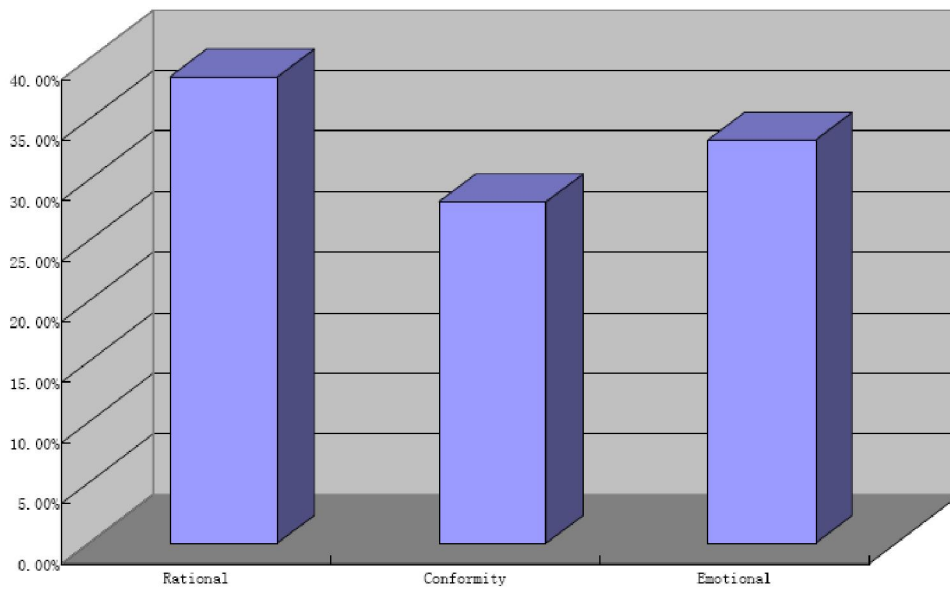
Figure 1 : University student attitude of commenting on one incident

$$U = \begin{pmatrix} U_1 & U_2 & \cdots & U_k \end{pmatrix}$$

(2) Establish judgment set V (evaluation set),

(3) Establish judgment 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 reflects the line influence factors to object judgment extent, and meanwhile, R every column reflects the column influence factors to object judgment extent.

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

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$$B = A \cdot R$$

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

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

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

As Figure 2 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 university cyber psychology

According to TABLE 2 data, establish factor set U,

$U = (U_1 \quad U_2 \quad U_3 \quad U_4)$ 0from which network communication tool U_1, online time distribution U_2, university cyber psychology attention U_3, university cyber psychology education U_4, it gets TABLE 3.

By TABLE 3 listed factors, it gets evaluation sets.

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

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

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

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

By collecting data and analyzing, it gets four kinds of factors importance degrees ranking statistics, as TABLE 4 shows.

By sorting TABLE 2, it gets network communication tool, online time distribution, university cyber psychology attention, and university cyber psychology education 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:

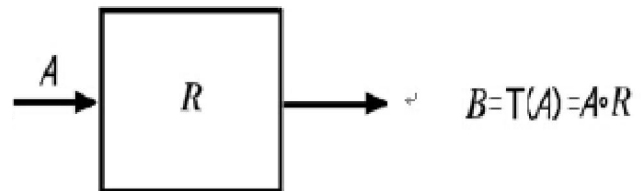$U_1^* = 0.35$, $U_2^* = 0.3$, $U_3^* = 0.2$, $U_4^* = 0.15$

Figure 2 : Change model

TABLE 2 : Cyber psychology consulting effect influence factors

	Network communication tool	Counselor professional level	Counselor language skills	Consultant adaptability degree	Consultant problem property
Total frequency number N	174	570	411	204	246
Sum frequency%	16.7%	54%	39%	19.5%	23.5%

TABLE 3 : University cyber psychology evaluation indicator system

Network communication tool U_1	Online time distribution U_2	University cyber psychology attention U_3	University cyber psychology education U_4
Instant messaging u_{11}	Online game time u_{21}	Netnews real time u_{31}	Psychological education course u_{41}
Search engine u_{12}	Computer knowledge learning u_{22}	Network psychology course u_{32}	Psychological counseling cyber psychology u_{42}
Online video u_{13}	Online course education time u_{23}	Police network attention u_{33}	Student cyber psychology learning status u_{43}
Online game u_{14}	Other networks consumed time u_{24}	Campus network monitoring u_{34}	
Microblog u_{15}			

TABLE 4 : Four kinds of factors importance degree ranking statistics

Classification	Rank 1	Rank 2	Rank3	Rank 4
Network communication tool U_1	23	7	4	0
Online time distribution U_2	7	18	8	0
University cyber psychology attention U_3	0	9	13	12
University cyber psychology education U_4	3	0	9	21

TABLE 5 : Remarks membership

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

It gets:

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

The paper gets remarks membership by evaluating university cyber psychology, as TABLE 5 shows.

The paper obtained evaluation on one university cyber psychology each indicator, it gets TABLE 6.

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

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

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

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

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

By TABLE 6, and combine with TABLE 3 evaluation remarks membership, the paper gets network communication tool, online time distribution, university cyber

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TABLE 6 : One university cyber psychology each indicator obtained evaluation value

Each layer indicator	Evaluation value	Each layer indicator	Evaluation value
Instant messaging u_{11}	Very good	Netnews real time u_{31}	Very good
Search engine u_{12}	Very good	Network psychology course u_{32}	Good
Online video u_{13}	Normal	Police network attention u_{33}	Good
Online game u_{14}	Normal	Campus network monitoring u_{34}	Normal
Microblog u_{15}	Normal	Psychological education course u_{41}	Good
Online game time u_{21}	Very good	Psychological counseling cyber psychology u_{42}	Very good
Computer knowledge learning u_{22}	Very good	Student cyber psychology learning status u_{43}	Normal
Online course education time u_{23}	Very good		
Other networks consumed time u_{24}	Good		

psychology attention, and university cyber psychology education each aspect evaluation set:

$$\text{Network communication tool } U_1 = \begin{pmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.95 & 0.05 \\ 0 & 0.05 & 0.95 & 0.05 \\ 0 & 0.05 & 0.95 & 0.05 \end{pmatrix}$$

$$\text{Online time distribution } U_2 = \begin{pmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0 & 0.05 & 0.95 \\ 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.9 & 0.05 \end{pmatrix}$$

University cyber psychology attention

$$U_3 = \begin{pmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.9 & 0.05 \\ 0 & 0.05 & 0.9 & 0.05 \\ 0.05 & 0.9 & 0.05 & 0 \end{pmatrix}$$

University cyber psychology education

$$U_4 = \begin{pmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.9 & 0.05 \\ 0 & 0.05 & 0.9 & 0.05 \end{pmatrix}$$

$$B_i = A_i \cdot R_i$$

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

$$\bar{B} = \begin{pmatrix} B_1 \\ B_2 \\ B_3 \\ B_4 \end{pmatrix} = \begin{pmatrix} 0.07 & 0.27 & 0.13 & 0.53 \\ 0 & 0.1 & 0.4 & 0.5 \\ 0.08 & 0.46 & 0.38 & 0.08 \\ 0.14 & 0.2 & 0.3 & 0.36 \end{pmatrix}$$

It gets comprehensive evaluation value: $Z = U^* \cdot B = (0.31 \quad 0.29 \quad 0.23 \quad 0.17)$

CONCLUSION

Fuzzy mathematics is from people cognition on external world, due to suffer numerous factors impacts; human race cognitive things are fuzzy. Fuzzy mathematics is a theoretical system that formed by fuzzy set and fuzzy logic, fuzzy mathematics applies in pattern recognition and artificial intelligence, as a newer discipline, fuzzy mathematics present some factor sets again into people's

awareness. By establishing attribute scales on one object, carry out fuzzy mathematical analysis of one object, firstly the object should have fuzziness or uncertainty, and researched objects should have multiple influence factors' constraints. The paper gets comprehensive evaluation value according to fuzzy comprehensive evaluation model analysis, because $0.31 > 0.29 > 0.23 > 0.17$, it shows its located indicators range is within the score interval among 0-60, therefore it can show that contemporary students' cyber psychological health evaluation index is lower, which should be taken more seriously.

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REFERENCES

[1] Chen Yi-hong; The Application of Micro-blogging in Ideological and Political Education of College Students[J]. Journal of Wuhan Institute of Technology, **12(2)**, 113-116 **(2013)**.

[2] Du Cheng-yu; The ideological and political education of college students under the background of the rising of micro-blog[J]. Journal of Nanchang College of Education, **9**, 25-26 **(2012)**.

[3] Fan Hui-ying; College Students' Internet Ideological and Political Education Interaction[J]. Journal of Jimei University, **11(4)**, 79-83 **(2010)**.

[4] Guo Hongming, Wang Yongcan; The Micro-blog Interactive Mode of Ideological and Political Education in Colleges and Universities[J]. Journal of higher Education Management, **6**, 106-110 **(2013)**.

[5] Guo Yu-wei; Study on the Interactive Relationship between College Studentsÿ Career Planning Education and Ideological and Political Education[J]. Liaoning Higher Vocational Technical Institute Journal, **8**, 85-86 **(2013)**.

[6] Hu Lijun; Research on the ideological and political education for the college students under the inOuence of micro blog[J]. Journal of Nanjing Radio & Television University, **3**, 31-34 **(2012)**.

[7] Sun Qiang; On the Core Principle of College Ideological and Political Education[J]. Journal of Yangzhou University (Higher Education Study Edition), **14(5)**, 78-81 **(2010)**.

[8] Wang Yi; Application Design and Discussion about College Ideological and Political Education Microblog[J]. Journal of Qiqihar Junior Teachers' College, **4**, 5-7 **(2012)**.

[9] Yang Ying; Constructing the Micro Mode of College Students' Ideological and Political Education[J]. Journal of Ningbo Institute of Education, **4**, 20-22 **(2012)**.