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, \( Z = U \cdot B = (0.31 \ 0.29 \ 0.23 \ 0.17) \), 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.

INTERNRODUCTION

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 \( U \).
Establish judgment set \( V \) (evaluation set),

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

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

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

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

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.

\[
\sum_{i=1}^{n} r_{ij} = j = 1, 2, 3, \cdots, m
\]
B = A · R

\[
B = \begin{bmatrix}
    r_{11} & r_{12} & \cdots & r_{1n} \\
    r_{21} & r_{22} & \cdots & r_{2n} \\
    \vdots & \vdots & \ddots & \vdots \\
    r_{m1} & r_{m2} & \cdots & r_{mn}
\end{bmatrix}
\]

= \begin{pmatrix}
    a_1, a_2, a_3, \cdots, a_n \\
    a_{n1}, a_{n2}, a_{n3}, \cdots, a_{nn}
\end{pmatrix}

= \begin{pmatrix}
    b_1, b_2, b_3, \cdots, b_n
\end{pmatrix}

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 \( u_1, u_2, u_3, u_4, u_5 \) membership functions can be expressed as following:

\[
u_i(u_i) = \begin{cases}
    0.5(1 + \frac{k_i - u_i}{k_i - k_i}), & u_i \geq k_i \\
    0.5(1 - \frac{k_i - u_i}{k_i - k_i}), & k_i \leq u_i < k_i \\
    0, & u_i < k_i
\end{cases}
\]

\[
u_i(u_i) = \begin{cases}
    0.5(1 - \frac{k_i - u_i}{k_i - k_i}), & u_i \geq k_i \\
    0.5(1 + \frac{k_i - u_i}{k_i - k_i}), & k_i \leq u_i < k_i \\
    0, & u_i < k_i
\end{cases}
\]

\[
u_i(u_i) = \begin{cases}
    0.5(1 + \frac{k_i - u_i}{k_i - k_i}), & k_i \leq u_i < k_i \\
    0.5(1 - \frac{k_i - u_i}{k_i - k_i}), & u_i < k_i
\end{cases}
\]

Combine with fuzzy evaluation model to evaluate university cyber psychology

According to TABLE 2 data, establish factor set \( U \),

\[
U = \begin{pmatrix}
    U_1 & U_2 & U_3 & U_4
\end{pmatrix}
\]

from 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.

\[
U_2 = \{23, 7, 4, 0\}
\]

\[
U_3 = \{7, 18, 80\}
\]

\[
U_3 = \{0, 9, 13, 12\}
\]

\[
U_4 = \{3, 0, 9, 21\}
\]

Obtained weighted vector from rank 1 to rank 2:

\[
\beta = \{0.4, 0.3, 0.2, 0.1\}
\]

\[
U_i^* = U_i \cdot \beta^T
\]

\[
U_1^* = 12, \ U_2^* = 9.7, \ U_3^* = 6, \ U_4^* = 5
\]

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](image-url)
TABLE 3: University cyber psychology evaluation indicator system

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

TABLE 4: Four kinds of factors importance degree ranking statistics

<table>
<thead>
<tr>
<th>Classification</th>
<th>Rank 1</th>
<th>Rank 2</th>
<th>Rank3</th>
<th>Rank 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network communication tool $U_1$</td>
<td>23</td>
<td>7</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Online time distribution $U_2$</td>
<td>7</td>
<td>18</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>University cyber psychology attention $U_3$</td>
<td>0</td>
<td>9</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>University cyber psychology education $U_4$</td>
<td>3</td>
<td>0</td>
<td>9</td>
<td>21</td>
</tr>
</tbody>
</table>

TABLE 5: Remarks membership

<table>
<thead>
<tr>
<th>Evaluation way</th>
<th>Set scores interval</th>
<th>0-60</th>
<th>60-80</th>
<th>80-90</th>
<th>90-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0.05</td>
<td>0.95</td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td>0</td>
<td>0.05</td>
<td>0.9</td>
<td>0.05</td>
</tr>
<tr>
<td>Normal</td>
<td></td>
<td>0.05</td>
<td>0.9</td>
<td>0.05</td>
<td>0</td>
</tr>
<tr>
<td>Bad</td>
<td></td>
<td>0.95</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

It gets:

$A = (0.35 \ 0.3 \ 0.2 \ 0.15)$

The paper obtains 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:

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

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

$U_3 = \{U_{31}, U_{32}, U_{33}, U_{34}\} = \{0.4, 0.3, 0.1, 0.2\}$

$U_4 = \{U_{41}, U_{42}, U_{43}\} = \{0.3, 0.4, 0.3\}$

By TABLE 6, and combine with TABLE 3 evaluation remarks membership, the paper gets network communication tool, online time distribution, university cyber psychology.
TABLE 6: One university cyber psychology each indicator obtained evaluation value

<table>
<thead>
<tr>
<th>Each layer indicator</th>
<th>Evaluation value</th>
<th>Each layer indicator</th>
<th>Evaluation value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instant messaging $u_{11}$</td>
<td>Very good</td>
<td>Netnews real time $u_{31}$</td>
<td>Very good</td>
</tr>
<tr>
<td>Search engine $u_{12}$</td>
<td>Very good</td>
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<td>Good</td>
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<td>Good</td>
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<td>Online game $u_{14}$</td>
<td>Normal</td>
<td>Campus network monitoring $u_{34}$</td>
<td>Normal</td>
</tr>
<tr>
<td>Microblog $u_{15}$</td>
<td>Normal</td>
<td>Psychological education course $u_{41}$</td>
<td>Good</td>
</tr>
<tr>
<td>Online game time $u_{21}$</td>
<td>Very good</td>
<td>Psychological counseling cyber psychology $u_{42}$</td>
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<td>Computer knowledge learning $u_{22}$</td>
<td>Very good</td>
<td>Student cyber psychology learning status $u_{43}$</td>
<td>Normal</td>
</tr>
<tr>
<td>Online course education time $u_{23}$</td>
<td>Very good</td>
<td>Other networks consumed time $u_{24}$</td>
<td>Good</td>
</tr>
</tbody>
</table>

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

$$U_i = \begin{bmatrix} 0 & 0 & 0.05 & 0.95 \\ 0 & 0 & 0.05 & 0.95 \\ 0 & 0.05 & 0.95 & 0.05 \\ 0 & 0.05 & 0.95 & 0.05 \end{bmatrix}$$

Network communication tool

$$B = A_i \cdot R_i$$

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

$$B = \begin{bmatrix} 0.07 & 0.27 & 0.13 & 0.53 \\ 0.01 & 0.1 & 0.4 & 0.5 \\ 0.08 & 0.46 & 0.38 & 0.08 \\ 0.14 & 0.2 & 0.3 & 0.36 \end{bmatrix}$$

It gets comprehensive evaluation value:

$$Z = U^* \cdot B = (0.31, 0.29, 0.23, 0.17)$$

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.

ACKNOWLEDGMENT

Supported by General Institutions of Higher Learning, postgraduate students’ scientific research and innovation funding plan of Jiangsu Province (Grant No. CXZZ13_0142).

REFERENCES


