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Research on network environment ideological and political information access by using analytic hierarchy process

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ABSTRACT

Network becomes important tool for students learning ideological and political subjects, network information amount is big, cover scope is broad that let students and teachers can easily find out needed information. The paper aims to look for comprehensive website, political and military website, network forum, and relative blog these four kinds of network paths' ideological and political information access best path. Use analytic hierarchy process; make research on information contents authenticity, form novelty and diversity, evaluable and discussable properties, information share feature these four aspects. Research result shows that political and military website is the best website to access to ideological and political information.

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KEYWORDS

Ideological and political information;
Access;
Analytic hierarchy process;
Politics and military;
Mathematical model.

INTRODUCTION

Presently, in society, network application is most widespread, to educational workers and students; network is important working and learning tools. Ideological and political course is primary course in students learning, the course impacts on students' ideological trend, life value. They affect Chinese future development.

In 2004, Xie Ying in the article "Secondary normal school ideological and political course research-based teaching mode exploration under network environment", she pointed out that scientific information technological development built basis for speeding up ideological and political curriculum reformation. Learning mode in network environment was a kind of new teaching mode, it needed to naturally connect network applied technology with teaching process. The article analyzes ideo-

logical and political course research-based teaching mode theoretical basis, after target being fulfilled, put emphasis on stating educational mode implementation form. In 2013, Liu Hui in the article "Perfect university network ideological and political education system research", she explained network fast information transmission and broad covering scope as well as other features. Network could enrich ideological and political education resources, it was helpful for students understanding ideological and political relative information, and more helpful for teachers collecting classroom contents correlated information and enriching teaching forms. The article started from ideological and political network education guiding thought, objective, principle and contents, perfected the whole network ideological and political education system, and further did good job in current ideological and political teaching. The article pointed out, it summarized university ideological

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and political education system and stated network ideological and political education essence and future development direction. Kept up with the trend of times and guided students growth correct directions were the first requirement on perfecting education system. In 2011, Lin Jian-Jun, Yang Qin in the article "Graduate ideological and political education system research in the background of network", they took Chongqing University graduate as investigation object, analyzed current graduate ideological and political education complex and development, analysis result explained that networked ideological and political education had necessity of implementation, according to graduate education status and teaching objective, authors given detailed suggestions that impelled graduate ideological and political education advancement. In 2011, Zhao Yu-Hua in the article "University ideological and political education confronted problems and measure research under network environment", he explained that network opened up important channels to students learn knowledge while it also brought some malicious information and negative effects. When students used network to learn, school and society should strengthen campus network management. The article researched on university ideological and political status under current network environment, pointed out current existing problems, and put forward reasonable suggestions. The article pointed out those western developed countries utilized lots of ways to advertise capitalist class decadent and extravagant lifestyles that generated serious impacts on Chinese university students' ideological and political value.

The paper will study students' best ideological and political information access under network environment, researches from information contents authenticity, form novelty and diversity, evaluable and discussable properties, information share feature these four perspectives, and looks for best path from comprehensive website, political and military website, network forum, and relative blog these four kinds of network paths.

MODEL ESTABLISHMENT

AHP can solve relative tedious and vague problems' decision-making problems. Use the method to construct model, it roughly needs four steps:

- 1) Establish hierarchical structure scheme;
 - 2) Construct every layer that fully used in judgment matrix;
 - 3) Hierarchical single arrangement and consistency test;
 - 4) Hierarchical total arrangement and consistency test;
- In the following, it respectively states each step detailed process.

Hierarchical structure

AHP solved problems are required to be hierarchic, orderly and logic. Only then it can construct hierarchical scheme. Let tedious problems' elements to form into multiple hierarchies according to its attributes, membership and its relations. Last hierarchical element plays a dominate role in next hierarchical relative elements. In general, these hierarchies can be divided into 3 types:

(1) Top layer

Only one element in this hierarchy, it normally is final target of analytic problems. The layer is also called target hierarchy.

(2) Middle hierarchy

In this hierarchy, it includes intermediate links that get involved to fulfill targets, which can be composed of some hierarchies that include multiple and multilayer criterions that required to consider. It can also be called criterion hierarchy.

(3) The bottom hierarchy

This hierarchy includes optional each method and way to fulfill targets. It can also be called measure hierarchy.

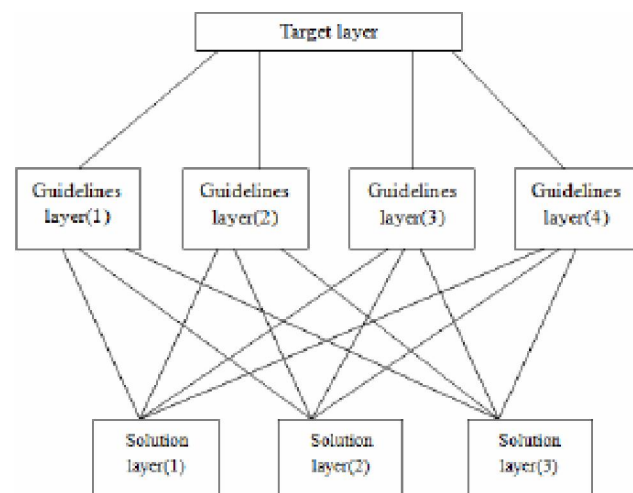


Figure 1 : Hierarchical structure chart

archy or scheme hierarchy.

Hierarchy numbers in hierarchical structure have something to do with problem's complicated degree as well as analysis detailed requirements, normally the hierarchy numbers are not limited, each element in every hierarchy governs less than 9 elements. Hierarchical structure is as Figure 1.

In Figure 1, layer 1 is target layer that is the purpose which is required to finally fulfill for researching problems, layer 2 is criterion layer that is the medium process that researching problems go through, layer 3 is scheme layer that is each kind of referencing schemes. In general, layer one is one factor, layer two and layer three have multiple factors and quantity is not fixed.

Judgment matrix construction

Each layer structure can show factors relationships, but in middle layer, each factor occupied proportion in target evaluation basically will not be fully the same, in the heart of evaluators, each factor has certain proportions.

When define each factor proportion that is to compare n pieces of factors $X = \{x_1, \dots, x_n\}$ to factor Z impacts. Saaty and others proposed to carry out paired comparison among factors, and constructed comparison matrix method. That is to say, it selects two factors x_i and x_j every time, uses a_{ij} to express x_i and x_j to Z impacts ratios, all comparison is using matrix

$A = (a_{ij})_{n \times n}$ to express, A has become judgment matrix between $Z - X$. From matrix, it is clear that if x_i and x_j to Z impact ratio is a_{ij} , then and to impact ratio is $a_{ji} = \frac{1}{a_{ij}}$.

According to linear algebra theoretical knowledge, if matrix $A = (a_{ij})_{n \times n}$ meets $a_{ij} > 0$ and $a_{ji} = \frac{1}{a_{ij}} (i, j = 1, 2, \dots, n)$, then matrix A is positive reciprocal matrix.

a_{ij} Value determination can accord scale table, contents are as following TABLE 1.

Judgment matrix construction

Matrix A corresponding maximum feature value λ_{max} feature vector W , it is the priority weight of same hierarchy corresponding elements relative importance to last hierarchy some element through normalization, the process is called hierarchical single arrangement. Though the process can reduce other factors interference, it is hard to avoid appearing inconsistency to some extent when integrate all comparison results. If comparison results are consistent, then A factor should also meet:

TABLE 1 : Scale table

| Scale | Definition |
|------------|--|
| 1 | Indicates two factors have equal importance by comparing |
| 3 | Indicates the former is slightly more important than the later by comparing two factors |
| 5 | Indicates the former is obviously more important than the later by comparing two factors |
| 7 | Indicates the former is intensely more important than the later by comparing two factors |
| 9 | Indicates the former is extremely more important than the later by comparing two factors |
| 2, 4, 6, 8 | Indicates middle level of above judgment |
| Reciprocal | If importance ratio between i and j is a_{ij} , then importance ratio between j and i is $a_{ji} = \frac{1}{a_{ij}}$. |

TABLE 2: RI value

| n | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|---|---|------|------|------|------|------|------|------|
| RI | 0 | 0 | 0.58 | 0.90 | 1.12 | 1.24 | 1.32 | 1.41 | 1.45 |

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$$a_{ij}a_{jk} = a_{ik}, \forall i, j, k = 1, 2, \dots, n \tag{1}$$

The positive reciprocal matrix that meets above formula is called consistent matrix. To easy define A can be accepted or not, it should test A inconsistency is very serious or not.

If A is consistent matrix, then

- ① A surely is positive reciprocal matrix.
- ② Transposed matrix A^T is consistent matrix.
- ③ A matrix any two lines are in proportions, and factors are above 0, therefore $rank(A) = 1$, so is the column.
- ④ In A , $\lambda_{max} = n$, n is matrix order number. Other features roots of A is 0.
- ⑤ λ_{max} corresponding feature vector $W = (w_1, \dots, w_n)^T$,

then $a_{ij} = \frac{w_i}{w_j}, \forall i, j = 1, 2, \dots, n$, so:

$$A = \begin{bmatrix} \frac{w_1}{w_1} & \frac{w_1}{w_2} & \dots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & \dots & \frac{w_2}{w_n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \dots & \frac{w_n}{w_n} \end{bmatrix} \tag{2}$$

A is n order positive reciprocal matrix, when it is consistent matrix, when and only when $\lambda_{max} = n$ as well as when A is inconsistent, it surely has $\lambda_{max} > n$. Thereupon, use λ_{max} and n relationship to test whether A is consistent matrix or not.

A consistency test steps:

Calculate consistency indicator CI ,

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{3}$$

Consult corresponding average random consistency indicator RI . Saaty Researched RI value, RI value could refer to TABLE 2.

RI Value is got in this way that randomly constructs 500 sample matrixes. Random select numbers from 1 to 9 as well as its reciprocals to construct positive reciprocal matrix, and determine average value of

maximum feature root λ'_{max} , and define:

$$RI = \frac{\lambda'_{max} - n}{n - 1} \tag{4}$$

Solve consistency ratio CR :

$$CR = \frac{CI}{RI} \tag{5}$$

When $CR < 0.10$, it is thought that A consistency is acceptable, otherwise it should make proper correction.

In the process, it also includes hierarchical total arrangement and consistency test, due to article lengths are limited, no theoretical statements here, directly apply it in the following.

CONSTRUCT BEST PROMOTING ITEM MODEL

The paper aims to look for the best way to get ideological and political information; therefore target layer factor should be the best way to get information. By referencing lots of relative documents, ideological and political information access influence factors roughly divides into four that are respectively information contents authenticity, form novelty and diversity, evaluable and discussable properties, information share feature. Therefore, criterion layer should include the four influence factors. Assume during this time, it compares three

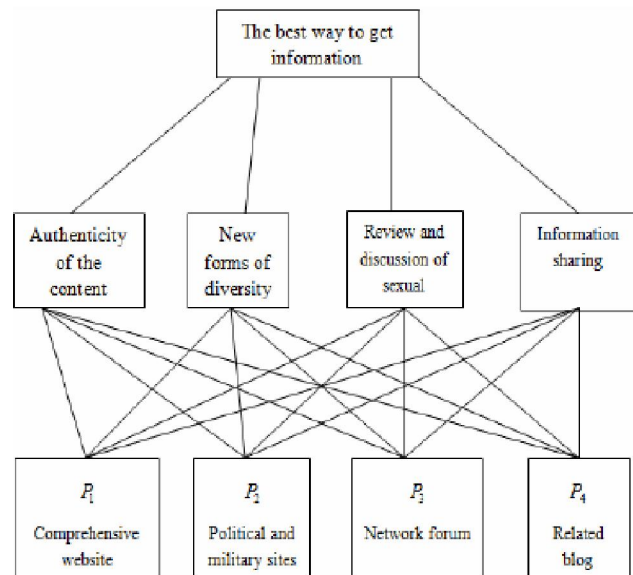


Figure 2 : The hierarchy chart of the best way to get information

TABLE 3 : Five factors influence status

| | Number of people | Percentage (%) | Rank |
|--------------------------------------|------------------|----------------|------|
| Information contents authenticity | 124 | 62 | 1 |
| Form novelty and diversity | 47 | 23.5 | 4 |
| Evaluable and discussable properties | 94 | 47 | 2 |
| Information share feature | 75 | 37.5 | 3 |

TABLE 4 : Target layer paired comparison matrix

| A | B ₁ | B ₂ | B ₃ | B ₄ |
|----------------|----------------|----------------|----------------|----------------|
| B ₁ | 1 | 5 | 2 | 3 |
| B ₂ | 1/5 | 1 | 1/3 | 1/2 |
| B ₃ | 1/2 | 3 | 1 | 2 |
| B ₄ | 1/3 | 2 | 1/2 | 1 |

TABLE 5 : Criterion paired matrix one

| B ₁ | P ₁ | P ₂ | P ₃ | P ₄ |
|----------------|----------------|----------------|----------------|----------------|
| P ₁ | 1 | 1/5 | 4 | 3 |
| P ₂ | 5 | 1 | 7 | 6 |
| P ₃ | 1/4 | 1/7 | 1 | 2 |
| P ₄ | 1/3 | 1/6 | 1/2 | 1 |

TABLE 6 : Criterion paired matrix two

| B ₁ | P ₁ | P ₂ | P ₃ | P ₄ |
|----------------|----------------|----------------|----------------|----------------|
| P ₁ | 1 | 3 | 1/2 | 2 |
| P ₂ | 1/3 | 1 | 1/4 | 1/2 |
| P ₃ | 2 | 4 | 1 | 3 |
| P ₄ | 1/2 | 2 | 1/3 | 1 |

kinds of information accesses P_i , then scheme layer includes three schemes. Constructed hierarchical struc-

TABLE 7 : Criterion paired matrix three

| B ₁ | P ₁ | P ₂ | P ₃ | P ₄ |
|----------------|----------------|----------------|----------------|----------------|
| P ₁ | 1 | 4 | 3 | 2 |
| P ₂ | 1/4 | 1 | 1/5 | 2 |
| P ₃ | 1/3 | 5 | 1 | 1/3 |
| P ₄ | 1/2 | 3 | 2 | 1 |

TABLE 8 : Criterion paired matrix four

| B ₁ | P ₁ | P ₂ | P ₃ | P ₄ |
|----------------|----------------|----------------|----------------|----------------|
| P ₁ | 1 | 4 | 3 | 2 |
| P ₂ | 1/4 | 1 | 1/5 | 2 |
| P ₃ | 1/3 | 5 | 1 | 1/3 |
| P ₄ | 1/2 | 3 | 2 | 1 |

ture is as Figure 2.

Judgment matrix construction

Judgment matrix construction firstly needs to define ideological and political information access four influence factors importance. TABLE 3 is questionnaire survey result targeted students and teachers. From TABLE 3 data, we can see information contents authenticity, form novelty and diversity, evaluable and discussable properties, information share feature these four factors impacts degrees on ideological and political information access.

Thereupon, we establish target layer paired comparison matrix, as TABLE 4 show.

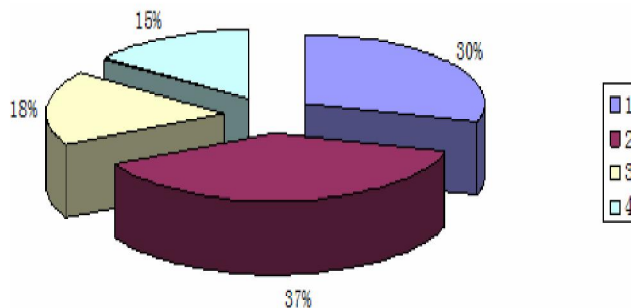


Figure 3 : The figure of evaluation results

TABLE 9 : Hierarchical total arrangement

| Criterion | Information contents authenticity | Form novelty and diversity | Evaluable and discussable properties | Information share feature | Total arrangement weight | |
|---------------------------------|-----------------------------------|----------------------------|--------------------------------------|---------------------------|--------------------------|----------|
| Criterion weight | 0.4829 | 0.0882 | 0.2720 | 0.1570 | | |
| Scheme layer single arrangement | Comprehensive website | 0.2092 | 0.2830 | 0.3946 | 0.3946 | 0.295267 |
| | Political and military website | 0.6367 | 0.0987 | 0.1451 | 0.1451 | 0.378416 |
| | Network forum | 0.0863 | 0.4792 | 0.2157 | 0.2157 | 0.176475 |
| | Relative blog | 0.0678 | 0.1391 | 0.2446 | 0.2446 | 0.149943 |

And then, establish criterion layer paired matrix, contents are as TABLE 5-8.

Computed result

By *Matlab* software program calculating, computed result is as TABLE 8.

In order to intuitional express comprehensive website, political and military website, network forum, and relative blog information access status, draw TABLE 8 total weight data into pie chart, as Figure 3.

By Figure 3, we can discover that political and military website is the best website to get ideological and political information. In future education, education workers should positively recommend the kind of network to students.

CONCLUSION

Analytic hierarchy process needs to abstract practical problems as hierarchical chart with logic structures. Analytic hierarchy process has a wide using range and flexible applying. The analysis method is applied to financial risk evaluations, coal mine safety and bank system security fields. The method needs to judge paired factors importance ratio, the part judgment includes certain subjective human factors, when ratios judgment are incorrect, obtained calculation results by analytic hierarchy process are also incorrect and go against with objective fact.

The paper applies analytic hierarchy process into researching on ideological and political information accessing path, by comparing ideological and political in-

formation influence factors, further finds out best way to get ideological and political information. The paper gets the conclusion that political and military website is the best website to get ideological and political information. Ideological and political information is political and military website main developing direction, in the website it includes relative professional authority released information and senior media person comments on current hot political news, social news, it can let people's ideological level to get further improved.

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