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Construction of a model for assessing the intercultural communicative competence of international Chinese teaching talents under natural language processing

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Abstract The globalization process promotes the rapid development of international Chinese language education, and the cross-cultural communicative competence of teaching personnel has become a key factor affecting the quality of teaching. This paper constructs a natural language processing-based assessment model of international Chinese teaching talents' intercultural communicative competence. Methodologically, Python crawler technology is used to collect online comment data from Chinese university MOOC platform, and text mining is applied with LDA topic modeling to construct an evaluation system containing three primary indicators of language skills, cultural understanding, and communicative strategies and 10 secondary indicators. Then, the weights of the indicators are determined by the AHP-CRITIC game theory combination assignment method, and the evaluation model is established by combining the theory of mixtures elemental topable. The results show that listening comprehension has the highest weight of 0.145, cultural sensitivity has the highest weight of 0.163, and the dimension of communicative strategy has the highest importance among the three first-level indicators. Taking A international school as an example for empirical analysis, the overall correlation is -0.2751, and the assessment grade is “good”. The assessment model constructed in this paper takes subjective and objective factors into consideration, realizes the quantitative assessment of intercultural communicative competence, and provides a scientific basis for the cultivation of international Chinese teaching talents.

Index Terms Natural Language Processing, International Chinese Teaching Talents, Intercultural Communication Competence, Game Theory Combinatorial Empowerment, Object Meta-Topology, Evaluation Model

I. Introduction

Since entering the 21st century, as China's economic strength and comprehensive national power continue to grow, more and more international students are learning Chinese, and what kind of people should be cultivated in international Chinese language education has become a topic worthy of continuous discussion. Increasingly close transnational exchanges and cooperation promote the exchange of languages and cultures, and the interoperability of languages and cultures is a prerequisite for promoting friendly exchanges among transnational people [1], [2]. At the same time, the collision of multiple cultures makes cross-cultural communication become the focus, and language and culture are closely connected and inseparable [3], [4]. In such a background, the study of students' intercultural communicative competence in international Chinese language education has become one of the most popular hotspots, which has triggered extensive discussions in the academic community.

Intercultural communicative competence is the process by which communicators interact with members from different cultures to achieve successful communication [5]. Under today's trend of globalization, it has become the focus of international Chinese language teaching to cultivate students to communicate across linguistic and cultural differences, and to learn new communication behaviors and interaction methods [6]-[8]. To build a scientific and perfect model of intercultural communication training, teaching objectives, curriculum design and implementation, and teaching assessment must be inseparable [9], [10]. Understanding intercultural communicative competence as a gradual and dynamic development process implies that not only the individual characteristics of communicators or the results of interaction should be assessed, but also the various stages and different levels of intercultural competence development [11]-[13]. Therefore, the design of intercultural communicative competence assessment methods as a way to detect students' learning outcomes and to provide feedback on the whole teaching and learning process is crucial.

This paper innovatively introduces natural language processing technology into the field of intercultural communicative competence assessment, extracts evaluation dimensions from online comments through text mining

methods, integrates subjective and objective assignment methods using game theory ideas, and employs material element topology to deal with ambiguities and uncertainties in assessment. Specifically, firstly, the MOOC platform comment data are obtained through crawler technology, and the LDA topic model is applied to mine the evaluation topics to form a preliminary index system. Secondly, expert experience weights are obtained based on hierarchical analysis method, data relevance weights are calculated based on CRITIC method, and optimal weight allocation is sought through game theory combination assignment. Finally, construct the object-element topable assessment model to realize the quantitative assessment and grade determination of intercultural communication competence.

II. NLP-based intercultural communication competence

In order to construct the evaluation index system of intercultural communication competence of international Chinese teaching talents, this paper takes online courses as the research object, obtains MOOC online comment text data, uses the method of text mining to extract the themes embedded in the online comments, so as to get the evaluation index of intercultural communication competence of international Chinese teaching talents, and uses entropy weighting to obtain the weight of the indexes and construct the evaluation index system.

II. A. Text capture

In this paper, we take the online comment data of “China University MOOC” as the data source, and use Python crawler technology to collect the text.The MOOC platform has a large number of open courses in the award, and the coverage of courses is wide, so this paper chooses the MOOC platform to carry out the research. At the same time, Python crawler technology, as an excellent method of data collection, can simulate the way people browse the web to crawl the data, easy to use and efficient, so this paper writes Python code to crawl the course data.

II. B. Text mining

The themes embedded in online reviews were extracted from the text as an important factor in measuring course quality. Sentiment analysis of the textual content of online reviews using the LDA theme model after data processing of the acquired review data.

II. C. Construction of evaluation index system

II. C. 1) Assessment principles

(1) The importance of objectivity, comprehensiveness and operability

Objectivity, comprehensiveness and operability are the three core principles in constructing the assessment system of intercultural communication competence. Objectivity requires that the assessment process be free from subjective bias and personal feelings to ensure the fairness and accuracy of the assessment results. This needs to be achieved through a standardized assessment process and clear assessment criteria to reduce the influence of the assessor's subjective judgment on the results. Comprehensiveness, on the other hand, emphasizes that the assessment should cover all aspects of intercultural communication competence, including language skills, cultural understanding, communication strategies and other dimensions, in order to comprehensively reflect the competence level of international Chinese language teaching talents. Finally, operability is the key to the effective implementation of the assessment system, which requires that the assessment method be simple and easy to implement, and the assessment tools be easy to obtain and use, so as to ensure the smooth implementation of the assessment work.

(2) Setting of assessment objectives and standards

Setting clear assessment goals and standards is the first task in building an assessment system. The assessment objectives should focus on the core elements of intercultural communication competence, aiming at understanding the communication competence and performance of international Chinese language teaching personnel in different cultural contexts through assessment. The assessment criteria are specific and quantitative to the assessment objectives, which are used to measure whether the international Chinese language teaching talents meet the predefined competence requirements. These criteria should be measurable, operational and achievable to ensure the objectivity and accuracy of the assessment results.

II. C. 2) Design of assessment indicators

(1) Construction of Multi-dimensional Assessment Indicators

In order to comprehensively assess the intercultural communicative competence of international Chinese teaching talents, it is necessary to construct a set of multi-dimensional assessment index system. These dimensions should cover all aspects of intercultural communication competence, including language skills, cultural understanding, communication strategies and so on. Each dimension can be subdivided into specific assessment indicators, such as listening, speaking, reading and writing skills under the dimension of language skills, awareness

and respect for cultural differences under the dimension of cultural understanding, and effective communication strategies and skills under the dimension of communication strategies. Through the construction of multi-dimensional assessment indexes, we can have a more comprehensive and in-depth understanding of the level of cross-cultural communication competence of international Chinese teaching talents.

(2) Specific Assessment Indicators for Language Skills, Cultural Understanding and Communication Strategies

For the three dimensions of language skills, cultural understanding and communication strategies, specific assessment indicators need to be designed to guide the assessment work. The final constructed evaluation index system is shown in Table 1. For the dimension of language skills, we can start from listening comprehension, oral expression, reading comprehension and written expression, and design the corresponding assessment tasks and scoring criteria. For the dimension of cultural comprehension, the international Chinese teaching talents can be examined in terms of their cognitive level of different cultures, sensitivity and adaptability to cultural differences, etc., and questionnaires, case studies and other assessment methods can be designed. For the dimension of communicative strategies, we can focus on the communication strategies, conflict resolution skills and negotiation skills used by international Chinese language teaching personnel in cross-cultural communication, and design assessment activities such as role-playing and simulated dialogues.

Table 1: Evaluation index system

Target layer	Criterion layer	Index layer
The international Chinese teaching talents cross-cultural communication ability evaluation index system (A)	Language skill (B1)	Hearing comprehension (C1)
		Oral expression (C2)
		Reading comprehension (C3)
		Written expression (C4)
	Cultural understanding (B2)	Cultural cognition (C5)
		Cultural sensitivity (C6)
		Cultural compatibility (C7)
	Communicative strategy (B3)	Communication strategy (C8)
		Conflict resolution (C9)
		Negotiating capacity (C10)

II. C. 3) Assessment methods and tools

(1) Combination of quantitative and qualitative assessment

In the assessment of intercultural communication competence, quantitative assessment and qualitative assessment have their own advantages and disadvantages, so they should be used in combination. Quantitative assessment measures the competence level of international Chinese teaching talents through numerical methods, which is objective and comparable. Qualitative assessment, on the other hand, provides an in-depth understanding of the performance and characteristics of international Chinese teaching talents through textual descriptions and case studies, and is comprehensive and in-depth. By combining the use of these two assessment methods, the intercultural communication competence of international Chinese teaching talents can be assessed more comprehensively and accurately.

(2) Selection and application of assessment tools

In order to effectively implement the assessment work, it is necessary to choose appropriate assessment tools. Common assessment tools include tests, questionnaires, observation records and so on. Tests are one of the effective means to assess the language skills of international Chinese language teaching personnel, and they can be used to examine the language skills of international Chinese language teaching personnel by designing test tasks in listening, speaking, reading and writing. Questionnaires are suitable for assessing international Chinese language teaching personnel's awareness of cultural differences, cultural sensitivity and other aspects. Observation records can be used to record the performance and behavioral characteristics of international Chinese language teaching personnel in actual communication scenarios, providing strong support for qualitative assessment. When choosing assessment tools, factors such as their applicability, validity and reliability need to be considered to ensure the accuracy and validity of the assessment results.

III. Assessment modeling and implementation

III. A. Construction of the assessment model

III. A. 1) Data pre-processing

In order to eliminate the comparative differences brought about by the type and outline of different evaluation indexes and to ensure the validity and accuracy of data analysis, the study carried out a series of dimensionless pre-processing on the values of the original evaluation indexes, with the following specific steps.

(1) Constructing the original evaluation index matrix X_{ij}

There are m international Chinese teaching talents to be evaluated, n evaluation indexes of intercultural communicative competence, x_{ij} is the value to be quantized for the i evaluation indexes corresponding to $(i=1,2,\cdots,n; j=1,2,\cdots,m)$ on the j evaluation object, the original evaluation matrix X_{ij} is shown in Equation (1):

$$X_{ij}=(x_{ij})_{m\times n} \tag{1}$$

(2) Standardized processing of the original evaluation matrix

In this study, the secondary evaluation indicators involved are subdivided into three major categories, including language skill-based indicators, cultural understanding-based indicators and communication strategy-based indicators, in order to reflect the comprehensive effect indicator system of cross-cultural communication competence of international Chinese teaching talents.

Language skill-based indicators mean that the larger the value of an indicator is, the better the value of the indicator is, and the better the effect of cross-cultural communicative competence is. The standardization of language skill-based indicators is shown in equation (2):

$$a_{ij}=\frac{x_{ij}-\min x_j}{\max x_j-\min x_j} \tag{2}$$

where, a_{ij} - the evaluation indicator value of the i th evaluation object standardized on the j th evaluation indicator, x_j - the value of the j th evaluation indicator to be quantified.

Cultural understanding type indicator means that the smaller the value of a certain indicator, the better the value of the indicator represents, and the better the effect of intercultural communicative competence. The standardization of cultural understanding type indicators is shown in equation (3):

$$a_{ij}=\frac{\max x_j-x_{ij}}{\max x_j-\min x_j} \tag{3}$$

The communication strategy indicator means that the value of the indicator should be kept within a certain range, and the closer it is to a certain value, the better the value of the indicator is, which also represents the better effect of intercultural communication competence. Improving the data processing formula of the communication strategy indicator to the point that the closer to the average value of an indicator, the better the value of the indicator, which can reflect the balance between the indicator data and the overall data and facilitate the comparison and sorting, improves the reliability and practicability of the indicator data processing and decision-making.

The standardization of the communication strategy-based indicators is shown in equation (4):

$$a_{ij}=1-\frac{|x_{ij}-x_{j,mean}|}{\max\{|x_{ij}-x_{j,mean}|\}} \tag{4}$$

where, $x_{j,mean}$ - the average of the values of the same evaluation indicator.

The evaluation normalization matrix A_{ij} is obtained in equation (5):

$$A_{ij}=(a_{ij})_{m\times n} \tag{5}$$

III. A. 2) Determination of weights based on game-theoretic portfolio assignment methods

(1) Subjective empowerment based on hierarchical analysis method

Hierarchical analysis is a relatively intuitive and popular multi-criteria decision-making method that can provide a more systematic and rational analytical tool in complex decision-making situations [14]. The basic steps for determining subjective weights using hierarchical analysis are as follows:

1) First, the decision-making problem is decomposed into a number of constituent factors, which are categorized into the goal level, criterion level and program level, etc., according to the control hierarchy.

2) The judgment matrix $A=(a_{ij})_{n\times n}$ is constructed by expert scoring method, and the weight vector is calculated.

3) Conduct consistency test based on the relative weights of the indicators and calculate the maximum eigenvalue of the judgment matrix $\lambda_{\max}$.

Define the consistency indicator in equation (6):

$$CI = \frac{\lambda_{\max} - n}{n-1} \tag{6}$$

If $CI = 0$, it indicates that the matrix has full consistency and there is no logical contradiction, the larger the value of CI, the greater the degree of inconsistency in the matrix.

Define the consistency ratio CR see equation (7):

$$CR = \frac{CI}{RI} \tag{7}$$

where, RI - the average stochastic consistency index of the judgment matrix, the value of which is related to the judgment matrix order n. When $CR < 0.1$, the consistency of the judgment matrix is acceptable. If $CR \geq 0.1$, the consistency is considered poor and the judgment matrix needs to be readjusted.

4) Determination of weights. After passing the consistency test, calculate the eigenvector $\lambda_{\max}$ corresponding to the largest eigenvalue W' of the judgment matrix, and then normalize the eigenvector to get the subjective weight value φ_i of each evaluation index.

(2) Objective assignment based on CRITIC method

The CRITIC assignment method is an objective assignment method in multi-attribute decision analysis, different from the entropy weight method that only considers the degree of data dispersion, the CRITIC method also takes into account the correlation between the evaluation indexes in the determination of weights [15]. The basic steps for determining objective weights using the CRITIC method are as follows.

First calculate the information degree measure C_i see equation (8):

$$C_i = \sigma_i \sum_{l=1}^{n} (1 - \rho_{il}) \tag{8}$$

σ_i - standard deviation of the i th evaluation indicator data.

ρ_{il} - Pearson correlation coefficient between the i,l th indicator data.

The larger the value of C_i, the more important the evaluation index is in the whole system of evaluation indexes of intercultural communicative competence, and more weight should be assigned to it.

The objective weight value β_i of the intercultural communicative competence indicator i is further obtained as shown in equation (9):

$$\beta_i = \frac{C_i}{\sum_{i=1}^{n} C_i} \tag{9}$$

(3) Combined assignment method based on game theory

When evaluating the assignment of indicators, purely subjective or objective assignment may lead to insufficiently accurate weight allocation, while the game theory of combinatorial assignment method is designed to integrate the advantages of the two, and to improve the scientific and rationality of the weight allocation by finding the optimal compromise margin between the subjective and objective weights [16], the basic steps are as follows.

1) Construct a linear combination of subjective and objective weights W^* (this linear combination is a step in the operation of game theoretic combinatorial assignment) see equation (10):

$$W^* = \alpha_1 \omega_1^T + \alpha_2 \omega^T \tag{10}$$

α_1, α_2 - linear combination coefficients.

ω_1^T - identified vector of subjective weight transpositions.

ω_2^T - identified vector of objective weight transpositions.

2) Combination coefficient optimization. According to the game theory model idea, the combination coefficients α_1 and α_2 are optimized to seek the best linearity of the weights. The optimization objective function is based on the criterion of minimizing the deviation, and the specific form is shown in equation (11):

$$\min \| W^* - \omega_k \|_2, k = 1, 2 \tag{11}$$

3) Solve for the optimal combination of coefficients. According to the matrix differentiation property, the above optimization problem is transformed into a system of linear differential equations with optimal first-order derivative conditions, see equation (12):

$$\begin{bmatrix} \omega_1 \omega_1^T & \omega_1 \omega_2^T \\ \omega_2 \omega_1^T & \omega_2 \omega_2^T \end{bmatrix} \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} = \begin{bmatrix} \omega_1 \omega_1^T \\ \omega_2 \omega_2^T \end{bmatrix} \tag{12}$$

4) Determine the game-theoretic optimal combination weights. Based on the obtained optimal linear combination coefficients α_1 and α_2, normalization is performed to obtain the composite weight vector W based on the game-theoretic assignments, see Equation (13):

$$\begin{cases} W = \alpha_1^* \omega_1^T + \alpha_2^* \omega_2^T \\ \alpha_1^* = \dfrac{\alpha_1}{\alpha_1 + \alpha_2} \\ \alpha_2^* = \dfrac{\alpha_2}{\alpha_1 + \alpha_2} \end{cases} \tag{13}$$

III. B. Implementation of the assessment model

III. B. 1) Determination of classical domains, section domains and evaluation object elements

The object element topological model can be used to solve the problem of dealing with the incompatibility of things, and the theory characterizes things in terms of three basic quantities forming an ordered group $R = (N, C, V)$, where N stands for the name of the thing, C is the characteristic of the thing, and V is the value of the thing with respect to the characteristic's quantity [17]. where the classical domain is denoted as R_j:

$$R_j = (N_j, C, V_j) = \begin{bmatrix} N_j & C_1 & V_{j1} \\ & C_2 & V_{j2} \\ & \vdots & \vdots \\ & C_n & V_{jn} \end{bmatrix} = \begin{bmatrix} N_j & C_1 & [a_{j1}, b_{j1}] \\ & C_2 & [a_{j2}, b_{j2}] \\ & \vdots & \vdots \\ & C_n & [a_{jn}, b_{jn}] \end{bmatrix} \tag{14}$$

where, R_j is the classical domain, N_j represents the division level, C_i is the indicator V_{ji} represents the range of values of the j th grading of the i th indicator, and a_{ji}, b_{ji} denote the upper and lower limits of the values of each grading level, respectively.

The section domain is denoted as R_p:

$$R_p = (N_p, C, V_p) = \begin{bmatrix} N_p & C_1 & V_{p1} \\ & C_2 & V_{p2} \\ & \vdots & \vdots \\ & C_n & V_{pn} \end{bmatrix} = \begin{bmatrix} N_p & C_1 & [a_{p1}, b_{p1}] \\ & C_2 & [a_{p2}, b_{p2}] \\ & \vdots & \vdots \\ & C_n & [a_{pn}, b_{pn}] \end{bmatrix} \tag{15}$$

where, R_p is the section domain, and a_{pi}, b_{pi} represent the upper and lower limits of the full range of values of the indicators under each level, respectively.

The objects to be evaluated can be composed into object elements R:

$$R = \begin{bmatrix} N_u & C_1 & V_1 \\ & C_2 & V_2 \\ & \vdots & \vdots \\ & C_n & V_n \end{bmatrix} \tag{16}$$

where, V_i is the measured value corresponding to the indicator.

III. B. 2) Calculation of correlation functions

The degree of association K can be expressed as:

$$K_j(v_i) = \begin{cases} \dfrac{-\rho(v_i, V_{ji})}{|V_{ji}|} v_i \in V_{ji} \\ \dfrac{\rho(v_i, V_{ji})}{\rho(v_i, V_{ji}) - \rho(v_i, V_{ji})} v_i \notin V_{ji} \text{ and } \rho(v_i, V_{ji}) \neq 0 \\ -\rho(v_i, V_{ji}) - 1 v_i \notin V_{ji} \text{ and } \rho(v_i, V_{ji}) = 0 \end{cases} \tag{17}$$

$$|V_{ji}|=b_{ij}-a_{ji}\begin{cases}\rho(v_i,V_{ji})=|v_i-\dfrac{(a_{ji}+b_{ji})}{2}|-\dfrac{b_{\hat{g}}-a_{ji}}{2}\\ \rho(v_i,V_R)=|v_i-\dfrac{(a_{pi}+b_{pi})}{2}|-\dfrac{b_{pi}-a_{pi}}{2}\end{cases} \tag{18}$$

where, $K_j(v_i)$ represents the correlation degree of each indicator, $\rho(v_i,V_{ji}),\rho(v_i,V_{ti})$ represent the distance of v_i from the finite intervals V_{ji},V_{ti}.

III. B. 3) Rating

The evaluation level is judged by calculating the integrated correlation, based on the principle of maximum affiliation, where the integrated correlation is calculated by the formula:

$$K_j(q)=\sum_{i=1}^{n}w_iK_j(v_i) \tag{19}$$

where, $K_j(q)$ represents the composite correlation, and w_i is the indicator weight, determined by game theory.

IV. Empirical analysis

In this chapter, the object element topable theory model is introduced into the assessment of intercultural communication competence of international Chinese teaching talents, and the weights of the indicators are determined based on the game theory, with A international school as the research object in order to verify the reliability of the model.

IV. A. Determination of indicator weights

Through AHP, CRITIC and the game theory based combination assignment algorithm designed in this paper, this paper obtains the results of each index weight. The results of the weights of the evaluation indicators of intercultural communication competence are shown in Table 2. The first column of indicators in the table shows the 10 specific indicators in this paper, the second column w_{AHP} shows the subjective weighting results of each assessment indicator obtained through the experience and subjective preference of experts, the third column w_{CRITIC} shows the objective weighting of each assessment indicator obtained through the correlation and conflict of indicator data, and the fourth column $w*$ shows the optimal weights of each assessment indicator obtained by the game theory combination assignment algorithm designed in this paper, and the result is the weight value obtained by balancing.

Table 2: The results of the evaluation index of cross-cultural communication ability

Index	w_{AHP}	w_{CRITIC}	$w*$
C1	0.073	0.103	0.145
C2	0.096	0.092	0.136
C3	0.147	0.152	0.1
C4	0.084	0.092	0.063
C5	0.127	0.132	0.068
C6	0.085	0.085	0.163
C7	0.109	0.106	0.082
C8	0.14	0.129	0.068
C9	0.084	0.064	0.101
C10	0.055	0.045	0.074

In order to more intuitively compare the degree of importance of each indicator characterized by the weights obtained by AHP, CRITIC, and the game theory combination assignment method proposed in this paper, this paper analyzes the three first-level indicators in terms of two dimensions: the degree of importance of the three first-level indicators, and the degree of importance of each second-level indicator in the first-level indicator in which it is located.

The weights of the first-level indicators obtained by AHP, CRITIC, and the game-theoretic combinatorial assignment method proposed in this paper are shown in Figure 1. The weighting results obtained from the model proposed in this paper show that communicative strategies are the most important and language skills are the least important. In contrast, AHP is based on the results obtained from experts' experience, which is affected by experts' subjective preferences but has higher authority, and the ranking results of the three first-level indicators by the model proposed in this paper and AHP are consistent.

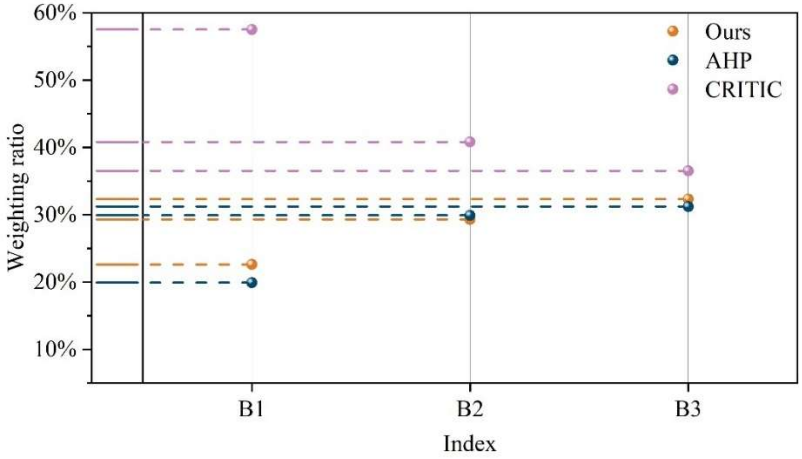

Figure 1: The first index is the ratio of each weight

The specific weights of the secondary indicators are obtained through AHP, CRITIC and the game theory combination assignment method proposed in this paper as shown in Figure 2. The weights obtained by the game theory combination assignment theory provided in this paper comprehensively consider the experience of the experts and the characteristics of the data, and therefore are more accurate and scientific in expressing the importance of the indicators.

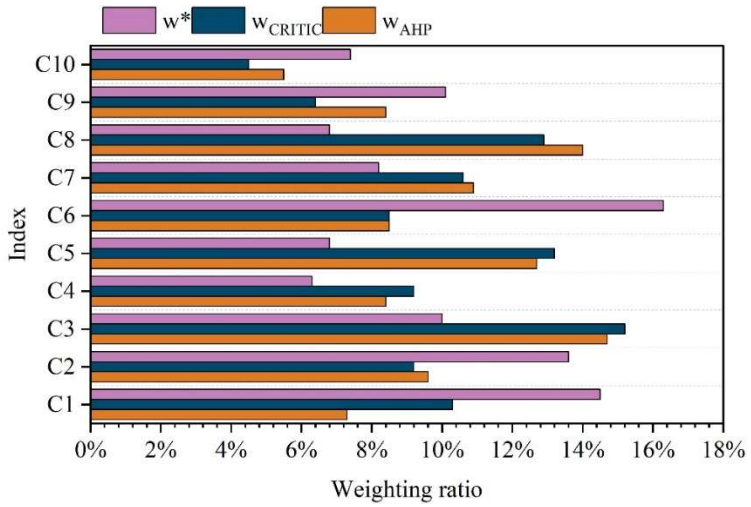

Figure 2: The secondary index is the ratio of each weight

In order to evaluate the accuracy of the scheme proposed in this paper, the evaluation results obtained from the AHP-based scheme, the evaluation results obtained from the CRITIC-based scheme, and the rating results obtained from the scheme proposed in this paper (Game Theory Combinatorial Empowerment) are compared with the real rating results from the experts' evaluation. Based on inputting the weights obtained by the three methods of AHP, CRITIC, and the combined empowerment method into the gray clustering algorithm, the probability of each decision object to be classified into each category is obtained. The experimental results of the comparison scheme are shown in Figure 3. Among them, the horizontal axis 1~10 is the number of the ten international Chinese teaching talents selected in this paper, and the vertical axis is the result of the intercultural communicative competence assessment evaluation of the ten international Chinese teaching talents. This paper compares the performance of the proposed model, AHP, and CRITIC, and it can be seen that the results obtained by the CRITIC-based scheme obtains overall higher assessment rating results on most of the selected samples, which is due to the fact that the principle of the CRITIC method is to take into account the indicator conflict and correlation of the distribution of the data, which is a serious deviation from the authoritative judgment of experts. In contrast, the evaluation ratings obtained by the game theory-based portfolio empowerment scheme proposed in this paper are closest to the real ratings, which

indicates that the evaluation results obtained by the scheme in this paper are more reflective of the real evaluation status of the samples.

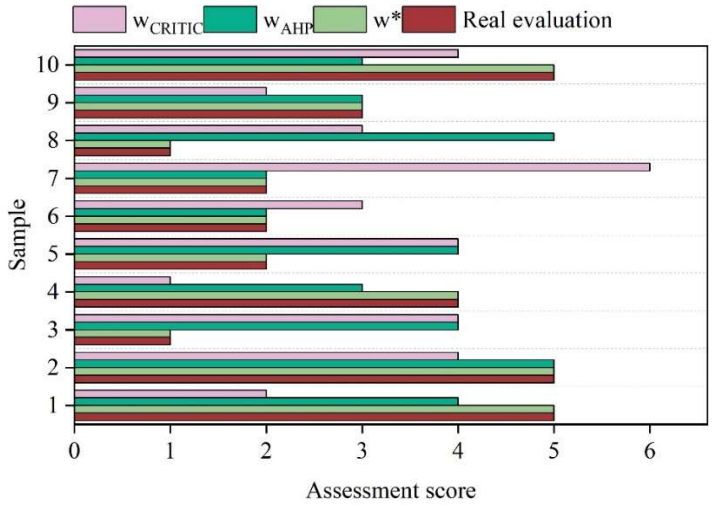

Figure 3: Comparison of experimental results of the comparison scheme

IV. B. Analysis of model applications

IV. B. 1) Calculation of the distance

The intercultural communicative competence of international Chinese teaching talents is categorized into five grades, which are Grade Ⅰ (excellent), Grade Ⅱ (good), Grade Ⅲ (average), Grade Ⅳ (poor) and Grade Ⅴ (very poor).

The distance of the 10 evaluation indicators in the evaluation index system of intercultural communicative competence regarding the evaluation levels of Ⅰ, Ⅱ, Ⅲ, Ⅳ and Ⅴ is calculated, and the results of its calculation are shown in Table 3 below.

Table 3: The distance between each evaluation index and each grade

Distance	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅴ
D1	-0.001	0.0053	-0.0168	0	-0.0034
D2	0	-0.0162	-0.0247	-0.0205	-0.0404
D3	-0.0808	0.0164	0.0038	-0.0492	-0.1082
D4	0	-0.0142	0	-0.0092	-0.0272
D5	-0.1284	-0.1011	0	0.0109	-0.0908
D6	-0.0337	0.0326	-0.0192	-0.0538	-0.0582
D7	0.0312	-0.031	-0.0666	-0.0541	-0.045
D8	-0.0251	-0.0173	-0.0051	-0.0181	-0.0536
D9	0	-0.0057	0.0056	-0.0461	-0.0117
D10	-0.0759	-0.0766	-0.0396	0.0479	-0.0518

IV. B. 2) Correlation calculation

In this paper, intercultural communication competence is categorized into five levels: excellent, good, fair, poor, and very poor, and the five evaluation categories are recorded as N_1, N_2, N_3, N_4 and N_5. Reflecting each evaluation level are a total of 10 indicators of language skills, cultural understanding, and communication strategies, which are denoted as $C_1, C_2, ..., C_{10}$.

(1) Construct the classical domain object element matrix R_0 based on the range of each level:

$$R_0 = \begin{pmatrix} N & N_1 & N_2 & N_3 & N_4 & N_5 \\ C_1 & (0,40) & (40,50) & (50,67) & (67,75) & (75,90) \\ C_2 & (90,100) & (60,90) & (10,60) & (5,10) & (0,5) \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ C_{10} & (80,100) & (60,80) & (40,60) & (20,40) & (0,20) \end{pmatrix} \tag{20}$$

(2) Construct a matrix R_p of nodal domain object elements based on the upper and lower bounds of the rank:

$$R_P = (P, C, V_P) = \begin{pmatrix} P & C_1 & [0,90] \\ & C_2 & [0,100] \\ & \vdots & \vdots \\ & C_{10} & [0,100] \end{pmatrix} \tag{21}$$

(3) Determine the weights of evaluation indicators

In this paper, the weight values calculated by using the AHP-CRITIC combination of financial rights are substituted into the object element topable model. $w_i = (0.145, 0.136, 0.1, 0.063, 0.068, 0.163, 0.082, 0.068)$.

(4) Determining the degree of correlation

MATLAB software is used to calculate the correlation degree of each index relative to each level, and the results of the calculation are shown in Table 4, for example. There are 10 evaluation indicators of intercultural communication competence, and the grades of excellent, good, poor, and very poor are 4, 3, 2, and 1 respectively, and there are no general indicators.

Table 4: The relative degree of each index relative to each class

$K_j(v_i)$	I	II	III	IV	V	$Ma(v_i)$	Grade
$K_1(v_1)$	-1.0853	4.528	-7.2952	-15.8964	-18.5452	4.5492	2
$K_2(v_2)$	0.0096	-0.032	-0.0207	-0.01	-0.0362	0	1
$K_3(v_3)$	-0.0681	0.01	0.0105	-0.0594	-0.1108	0.0022	2
$K_4(v_4)$	-0.0202	-0.0128	-0.015	-0.0093	-0.025	0	1
$K_5(v_5)$	-16.5946	-12.4995	-0.1911	0.2349	-10.988	0.2488	4
$K_6(v_6)$	-0.046	0.0246	-0.0235	-0.0599	-0.0872	0.0518	2
$K_7(v_7)$	0.0151	-0.0195	-0.05	-0.0437	-0.0496	0.0221	1
$K_8(v_8)$	-0.0142	-0.0158	-0.0032	-0.0133	-0.0018	0	5
$K_9(v_9)$	0.0085	-0.0123	-0.0201	-0.0303	-0.0056	0.018	1
$K_{10}(v_{10})$	-0.0867	-0.0737	-0.0453	0.0474	-0.0454	0.0389	4

(5) Comprehensive relevance calculation

The comprehensive relevance of each level is calculated according to the relevant formula to reflect the intercultural communication competence of international Chinese teaching talents. The correlation results of intercultural communication competence are shown in Table 5. According to the analysis of the comprehensive correlation results, it is concluded that International School A is in “good” status. The evaluation trend is basically consistent with the actual situation, so the evaluation results of the intercultural communication competence assessment model constructed in this paper can be used as a reference.

Table 5: The correlation of cross-cultural communication ability

$K_j(v_i)$	I	II	III	IV	V	$Ma(v_i)$	Evaluation result
$K1(B1)$	-0.0846	-0.0406	-0.0338	-0.1119	-0.1314	-0.0358	Good
$K2(B2)$	-0.154	-0.098	-0.0898	-0.1333	-0.2182	-0.0611	General
$K3(B3)$	-0.0954	-0.0697	-0.034	0.0583	-0.0554	0.0685	Excellence
Synthesize	-0.3079	-0.2576	-0.2824	-0.3487	-0.58	-0.2751	Good

V. Conclusion

The assessment model of intercultural communication competence for international Chinese teaching talents constructed in this study effectively realizes the combination of qualitative and quantitative assessment. The evaluation index system covers the three dimensions of language skills, cultural understanding and communication strategies, in which the weight of the cultural sensitivity index reaches 0.163, reflecting the core position of intercultural awareness in international Chinese teaching. The game theory combination assignment method balances subjective experience and objective data, and the combination weights of listening comprehension and

oral expression are 0.145 and 0.136 respectively, accurately reflecting the fundamental role of language communication. The application of the object element topable model solves the problem of ambiguity in the assessment of competence, and realizes the accurate grade determination through the correlation calculation.

The empirical analysis shows that the assessment model has good practicality and reliability, and the comprehensive assessment results of International School A are highly consistent with the actual situation. The model provides a scientific talent assessment tool for international Chinese language teaching organizations, which helps to find out the strengths and weaknesses of teaching talents in cross-cultural communication, and provides data support for targeted training and competence improvement.

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