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Hypersoft Set with Neutrosophic Sets for Quality Evaluation of Visual Communication Design Professional Courses

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Abstract: The quality evaluation of the Visual Communication program is a comprehensive assessment of course design, teaching effectiveness, and student learning outcomes. Through evaluation, the rationality of course content, achievement of teaching objectives, and effectiveness of teaching methods can be understood. It helps instructors improve their teaching strategies, ensuring that students acquire the necessary professional skills and theoretical knowledge. Additionally, evaluation results reflect whether the course keeps pace with industry trends and meets the needs of society and the market. Student feedback provides important references for course optimization, driving continuous improvement in teaching quality, and ultimately cultivating outstanding design talents who can adapt to industry development. The quality evaluation of visual communication design professional courses involves MAGDM. Currently, Multi-Objective Optimization Ratio Analysis (MOORA) approach has been utilized to address MAGDM challenges. To handle uncertain information during the quality evaluation of visual communication design professional courses, single valued neutrosophic sets (SVNSs) are conducted as a valuable tool. This paper introduces the implementation of the SVNSs MOORA approach to effectively manage MAGDM problems. Additionally, a numerical study is conducted to validate the application of this approach for quality evaluation of visual communication design professional courses.

Keywords: Multiple-attribute group decision-making (MAGDM); MOORA approach; quality evaluation

1. Introduction

The talent cultivation plan for the Visual Communication Design program emphasizes students' practical abilities and focuses on developing their skills in identifying, analyzing, and solving problems. Outcome-based curriculum reform is a reform that starts from students' professional competencies, aiming to enhance students' vocational methods, professional skills, and social abilities, as well as their corresponding work attitudes, technical practice capabilities, and social values in course development. Due to the particularity of the discipline, compared to general knowledge learning, the outcome-based Visual Communication Design courses, which focus on professional competencies, emphasize personalized learning methods and the cultivation of students' overall qualities. More attention is paid to how students demonstrate initiative, creativity, and collaboration in design activities. Traditional teaching evaluations primarily focused on assessing the teacher's performance, mainly evaluating teaching quality and classroom effectiveness. However, with the emergence of formats like micro-courses and MOOCs, learning behaviors have become increasingly diversified, and the existing evaluation methods find it difficult to meet the needs of outcome-based teaching reform. To assess the effectiveness of teaching reforms, a matching course evaluation system needs to be established, which pays more attention to the learning process and the individualized development of students. Developing an outcome-based teaching evaluation system that aligns with the characteristics of the Visual Communication Design program will help monitor student progress and improve the quality of teaching activities. Tao and Wu [1] explored the challenges of improving teaching quality in the visual communication design major and discussed the growing gap between the rapidly expanding university programs and the demands of the job market. According to their research, design companies were reluctant to hire recent graduates because the students' skills did not meet the practical needs of the industry. Li [2] focused on the improvement of teaching quality in Sino-foreign cooperative education programs, using the visual communication design program at Nanyang Normal University as a case study. The research emphasized the need to enhance teaching quality by learning from foreign education systems. Li highlighted that despite the rapid development of Sino-foreign cooperative programs, there were still numerous bottlenecks, and the study offered insights into addressing these challenges through better teaching quality assurance systems. Han [3] investigated the reform of graduation thesis requirements based on the national standards for teaching quality in design disciplines. Han advocated replacing the traditional written thesis with a design report, which aligned better with the practical nature of the discipline and improved both student engagement and the quality of the final projects. In a different study, Cao and Xia [4] constructed a course quality evaluation system for visual communication design based on an outcome-oriented approach. They aimed to build evaluation metrics that would improve both teaching quality and the comprehensive and professional abilities of students. Dong [5] addressed the evaluation and feedback mechanisms for teaching quality in visual communication design at Jiangxi Fashion Institute and emphasized the importance of leveraging campus networks for efficient teaching quality management, monitoring, and feedback and suggested that such mechanisms could significantly contribute to improving teaching quality in specialized institutions like Jiangxi Fashion Institute. Ma and Xu [6] examined the quality control system for graduation internships. They identified several issues in the existing system, such as students' lack of professionalism, dispersed internship placements, and outdated management practices. The study proposed a multifaceted approach to address these problems, including integrating internships with graduation projects, expanding industry-university collaboration, and strengthening dual-qualification teaching staff. Ma [7] developed a more detailed framework for evaluating the quality of graduation internships. Ma proposed a comprehensive system involving internal and external supervisors, as well as assessment from a review panel. The study also recommended categorizing the standards for internship quality based on the different roles involved in the evaluation process and outlined three stages for assessing internship performance: selecting internship units, conducting the internship, and reporting the results. Jiang [8] explored the quality construction of computer-aided design (CAD) courses in visual communication design education. The article underscored the growing importance of CAD courses due to technological advancements and the increasing demands of the creative industry. Jiang identified several existing challenges in the current curriculum and proposed strategies for enhancing course quality to meet the needs of modern society.

Multiple-Attribute Group Decision-Making (MAGDM) refers to the process of assessing and selecting among decision options that involve multiple attributes or criteria, with the participation of multiple decision-makers[9-12]. These types of decisions typically involve several goals, standards, or attributes, each of which may have different levels of importance. Since the decision-makers in the group may have varying preferences for different attributes, it is necessary to integrate all opinions to comprehensively evaluate and arrive at the optimal decision[13-17]. The common steps in multi-attribute group decision making include identifying the decision problem, selecting decision-makers, determining decision attributes and their weights, collecting evaluation opinions from each decision-maker, aggregating and analyzing the information, and ultimately selecting the optimal or compromise solution [18-25]. To address the issue of conflicting opinions among decision-makers, methods such as weighted averaging, fuzzy set theory, TODIM, GRA, TOPSIS, and AHP (Analytic Hierarchy Process) are often used to integrate different viewpoints[26-30]. MAGDM is widely applied in various complex decision scenarios, such as project selection, supplier evaluation, and policy making[31]. It allows for a more comprehensive consideration of multiple factors, making the decision results more inclusive and rational[32, 33].

The quality evaluation of visual communication design courses involves MAGDM. To address the challenges associated with MAGDM, recent methods have employed the MOORA approach [34, 35]. Additionally, 2TLNSs [36] have been utilized to represent uncertain information in the evaluation process. This paper introduces the MOORA method, specifically designed to handle MAGDM problems using SVNSs. First, the fundamental concepts of SVNSs are reviewed. Then, the MOORA approach is applied to address MAGDM. Finally, a numerical study is conducted to validate the effectiveness of the SVNSs-MOORA method in the quality evaluation of visual communication design courses.

A hypersoft set is an extension of soft set theory that enables dealing with uncertainties in multi-attribute decision-making, especially when attributes have multiple sub-attributes. It’s particularly useful in complex scenarios where attributes are not singular but are grouped into more detailed sub-categories. Hypersoft sets add another layer of flexibility by considering these sub-attributes explicitly, which soft sets do not. This study employed the hypersoft with SVNSs and MOORA method to compute the criteria weights and rank the alternatives.

The structure of this paper is organized as follows: Section 2 provides steps of the MOORA method and hypersoft set. In Section 3, a numerical example is given to demonstrate the evaluation of visual communication design professional courses. Section 4 shows the sensitivity analysis. Lastly, Section 5 presents concluding remarks to summarize the study.

2. Sof Decision-Making Methodology for Evaluation Problem

We defined the set of definitions of the hypersoft set as:

Definition 1. The soft set

Let q be a universe of discourse, (q) the power set of q and R set of attributes. Then the pair $(F, q), F: R \rightarrow q$ is called a soft set

Definition 2. The hypersoft set

Let q be a universe of discourse, (q) the power set of q. Let $r_1, r_2, \dots, r_n \; for \; n \geq 1$, be n distinct attributes, whose corresponding attributes are respectively the set of $R_1, R_2, \dots, R_n \; with \; R_i \cap R_j = \emptyset, for \; i \neq j$ Then the pair $\left(F, R_1 \times R_2 \times \dots R_n \rightarrow (q)\right)$ is called a hypersoft set.

Definition 3.

We can compute the crisp values by using the score function as:

$S(x) = \frac{2+T-I-F}{3}$

The MOORA method is introduced as a MCDM method. The MOORA method used to solve the decision-making issues with conflicting criteria. The MOORA method is used to order the set of alternatives. The MOORA method used the ratio system to rate the alternatives based on a set of criteria. Figure 1 shows the steps of the SVN-MOORA method.

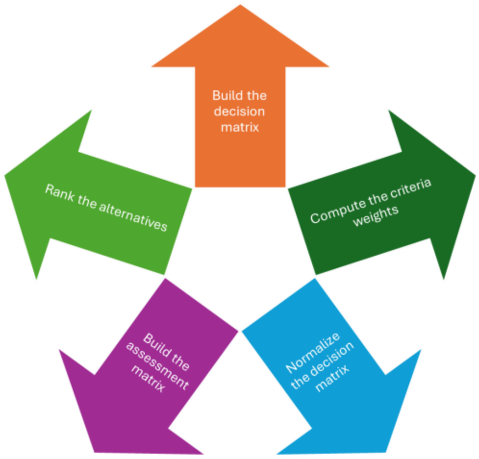

Figure 1. The steps of the MOORA method.

1. The first stage is defined the decision matrix with a set of criteria and alternatives. The decision matrix is defined as:

$$X = \begin{pmatrix} x_{11} & \cdots & x_{1v} \\ \vdots & \ddots & \vdots \\ x_{u1} & \cdots & x_{uv} \end{pmatrix} \quad (1)$$

Where $i = 1,2,3 \dots, u$ $alternatives; j = 1,2,3, \dots, v$ $criteria$

2. Compute the criteria weights.

The criteria weights are obtained using the average method.

3. Normalize the decision matrix.

The normalizing is used to convert the decision matrix into values same value. This step divided each value in the decision matrix by the sum of each value in the decision matrix as:

$$N_{ij} = \frac{x_{ij}}{\sqrt{\sum_{j=1}^{v} x_{ij}^2}} \quad (2)$$

4. Build the assessment matrix

$$R_j = \sum_{j=1}^{g} N_{ij} * w_j - \sum_{j=g+1}^{v} N_{ij} * w_j \quad (3)$$

5. Final rank of alternatives.

Rank the alternatives.

3. Case Study

The quality evaluation of Visual Communication courses is a crucial means of improving teaching effectiveness, optimizing course content, and enhancing the student learning experience. It is not only an assessment of the course itself but also a comprehensive evaluation of the achievement of teaching objectives, the effectiveness of teaching methods, and the actual knowledge and skills acquired by students. Through a systematic evaluation mechanism, schools can effectively monitor course quality, ensuring that the teaching content aligns with industry needs and market trends, thus better preparing students for their future careers. First, course quality evaluation ensures the scientific and rational nature of the course content. As a discipline closely related to technology, art, and the market, the content of Visual Communication courses needs to be continuously updated to keep pace with industry developments. Through evaluation, schools can determine whether the current courses are staying at the forefront of the industry and whether they cover the core skills and theoretical knowledge students need for their future careers. Additionally, the evaluation can reveal the applicability of the course content in actual teaching, i.e., whether the integration of theory and practice is effective and whether it fosters students' innovation and problem-solving abilities. Second, course quality evaluation reflects the extent to which teaching objectives are achieved. Each course has specific teaching goals, and quality evaluation can assess whether these objectives have been met by analyzing student learning outcomes. Specifically, by analyzing student assignments, projects, and exam results, the evaluation can determine whether students have mastered the key knowledge points of the course and whether they have developed the necessary design skills and critical thinking abilities. Moreover, through student feedback and teacher self-evaluations, the evaluation can identify any shortcomings in the achievement of teaching objectives, guiding subsequent course adjustments. Third, course quality evaluation plays a crucial role in improving teaching methods.

The diversity and effectiveness of teaching methods directly influence students' learning experiences and outcomes. Through quality evaluation, teachers can understand whether the teaching methods they employ are suitable for students at different levels and whether they can inspire students' interest and creativity. The evaluation can also help teachers identify weak points in their teaching, such as specific aspects of the course that fail to resonate with students or are difficult to understand. This prompts teachers to improve their teaching methods by adopting more effective techniques, such as case-based teaching, interactive discussions, project-based learning, etc., to enhance overall teaching effectiveness. Additionally, student feedback holds significant value in course quality evaluation. As direct participants in the course, students have the most immediate perception of the difficulty of the course, the suitability of teaching methods, and the practical relevance of the course content. By regularly collecting student feedback, schools can promptly understand students' needs and learning dynamics, providing a basis for course optimization and improvement. Student feedback not only helps teachers adjust their teaching strategies but also promotes the continuous updating of course content, making it more aligned with students' learning needs and career development paths. In conclusion, the quality evaluation of Visual Communication courses is a multidimensional and systematic process that helps educational institutions continually improve teaching quality, ensuring that course content remains up to date and effectively cultivates students' innovation and practical abilities. Through comprehensive assessments of course design, teaching methods, and learning outcomes, schools can continuously optimize the curriculum, enhance teaching standards, and ultimately produce more well-rounded and skilled Visual Communication professionals for the industry. The quality evaluation of visual communication design professional courses falls under the framework of MADM. In this evaluation, there are twenty potential vocational and technical colleges to choose through six attributes:

We defined six criteria with 20 alternatives in this study based on the opinions of experts. Then we used 18 attributes values for all criteria.

The six criteria and 16 attributes.

C1 = Evaluation and Feedback

C2 = Effectiveness of Teaching Methods

C3 = Project-Based Learning

C4 = Instructional Quality

C5 = Learning Resources

C6 = Course Content

The attributes values are:

$R_1 = \{Feedback\ Mechanisms, Assessment\ Variety, Continuous\ Improvement\}$

$R_2 = \{High, Medium, Low\ \}$

$R_3 = \{Real - World\ Projects, Group\ Work, Portfolio\ Development\}$

$R_2 = \{Instructor\ Expertise, Teaching\ Methodology, Student\ Engagement\}$

$R_2 = \{Software\ and\ Tools, Reference\ Materials, Studio\ and\ Lab\ Facilities\}$

$R_2 = \{Relevance\ to\ Industry, Depth\ of\ Theory, Hands - on\ Application\}$

Let $C = C_1 \times C_2 \times C_3 \times C_4 \times C_5 \times C_6$ and the attributes values are $(R_1, R_2, R_3, \ldots, R_{18})$, we select the 6 attributes values, Then we applied the MOORA method.

1. We used Eq. (1) to build the decision matrix by using the linguistic terms of single-valued neutrosophic numbers as shown in Table A1. Then we used the score function to obtain the crisp values. Then we combined the decision matrix.

2. Compute the criteria weights.

Figure 2 shows the weights of criteria.

3. Eq. (2) is used to normalize the decision matrix as shown in Table 1.

4. Then we build the assessment matrix by using Eq. (3) as shown in Table 2.

5. Then we rank the alternatives as shown in Figure 3.

Table 1. The normalized decision matrix.

	C_1	C_2	C_3	C_4	C_5	C_6
A_1	0.157343	0.083438	0.065336	0.108589	0.113493	0.113707
A_2	0.122378	0.144325	0.124138	0.147517	0.149333	0.128538
A_3	0.074301	0.090203	0.098004	0.094247	0.14336	0.019775
A_4	0.087413	0.047357	0.150272	0.114736	0.061724	0.034607
A_5	0.093969	0.083438	0.154628	0.075808	0.079644	0.070861
A_6	0.10708	0.096968	0.09147	0.098345	0.057742	0.092284
A_7	0.10708	0.051867	0.093648	0.104492	0.081635	0.062621
A_8	0.087413	0.067652	0.045735	0.047124	0.103538	0.080749
A_9	0.045892	0.126284	0.056624	0.067612	0.127431	0.060973
A_{10}	0.115822	0.14658	0.113249	0.088101	0.045795	0.100524
A_{11}	0.098339	0.15109	0.124138	0.069661	0.073671	0.110411
A_{12}	0.074301	0.076673	0.082759	0.133175	0.117475	0.123595
A_{13}	0.093969	0.090203	0.098004	0.145469	0.097564	0.08734
A_{14}	0.13986	0.126284	0.100181	0.063514	0.073671	0.060973
A_{15}	0.148601	0.135304	0.056624	0.081954	0.041813	0.034607
A_{16}	0.100524	0.085693	0.065336	0.094247	0.063715	0.052734
A_{17}	0.056818	0.090203	0.12196	0.069661	0.087609	0.072509
A_{18}	0.065559	0.047357	0.082759	0.084003	0.113493	0.08734
A_{19}	0.063374	0.051867	0.098004	0.088101	0.099555	0.117003
A_{20}	0.039336	0.110499	0.065336	0.069661	0.061724	0.100524

Table 2. The assessment decision matrix.

	C_1	C_2	C_3	C_4	C_5	C_6
A_1	0.025288	0.01316	0.010586	0.018284	0.01911	0.020782
A_2	0.019668	0.022764	0.020114	0.024839	0.025145	0.023493
A_3	0.011941	0.014227	0.015879	0.015869	0.024139	0.003614
A_4	0.014049	0.007469	0.024348	0.019319	0.010393	0.006325
A_5	0.015102	0.01316	0.025054	0.012764	0.01341	0.012951
A_6	0.01721	0.015295	0.014821	0.016559	0.009723	0.016867
A_7	0.01721	0.008181	0.015173	0.017594	0.013746	0.011445
A_8	0.014049	0.010671	0.00741	0.007935	0.017434	0.014758
A_9	0.007376	0.019918	0.009175	0.011385	0.021457	0.011144
A_{10}	0.018615	0.02312	0.018349	0.014834	0.007711	0.018373
A_{11}	0.015805	0.023831	0.020114	0.01173	0.012405	0.02018
A_{12}	0.011941	0.012093	0.013409	0.022424	0.01978	0.022589
A_{13}	0.015102	0.014227	0.015879	0.024494	0.016428	0.015963

A_{14}	0.022478	0.019918	0.016232	0.010695	0.012405	0.011144
A_{15}	0.023883	0.021341	0.009175	0.013799	0.007041	0.006325
A_{16}	0.016156	0.013516	0.010586	0.015869	0.010728	0.009638
A_{17}	0.009132	0.014227	0.019761	0.01173	0.014752	0.013252
A_{18}	0.010537	0.007469	0.013409	0.014144	0.01911	0.015963
A_{19}	0.010185	0.008181	0.015879	0.014834	0.016763	0.021385
A_{20}	0.006322	0.017429	0.010586	0.01173	0.010393	0.018373

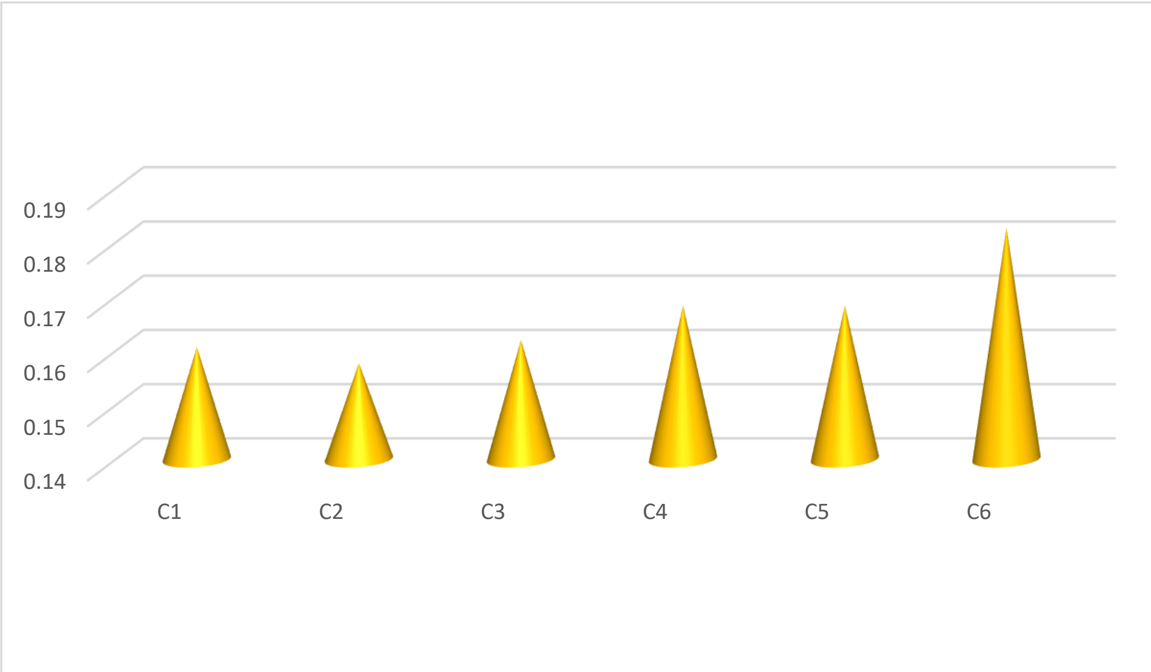

Figure 2. The criteria weights.

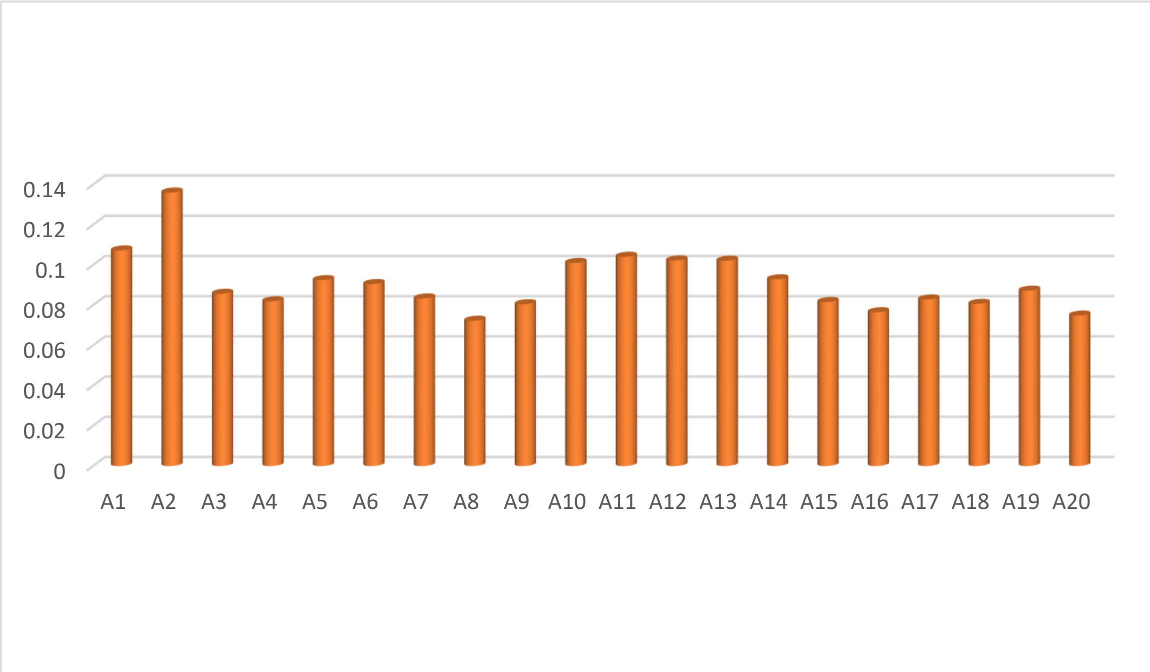

Figure 3. The rank of alternatives.

4. Sensitivity Analysis

This section discusses the sensitivity analysis to show the different ranks of alternatives under different cases. We change the criteria weights with seven cases as shown in Figure 4. In the first case, we put all criteria with the same weights. In the second case, we put the first criterion with 0.2 weights and other criteria with the same weight. Then we applied the MOORA method under different seven cases. Then we rank the alternatives under different cases as shown in Figure 5. We show the alternative 8 is the best and alternative 2 is the worst.

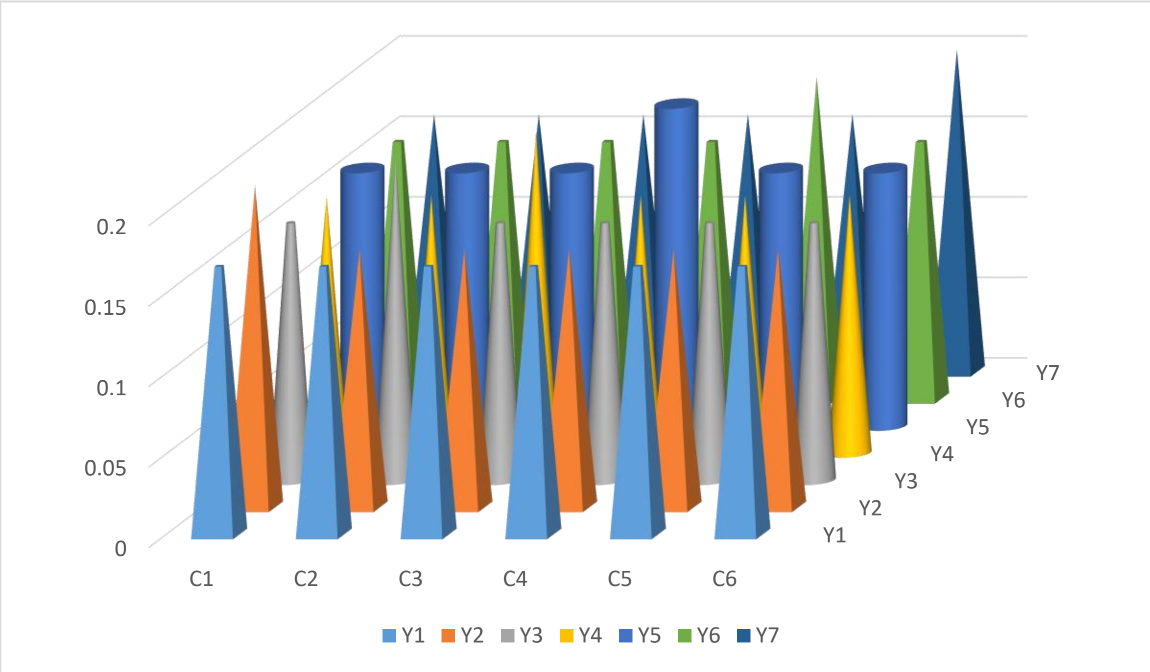

Figure 4. The different weights of criteria.

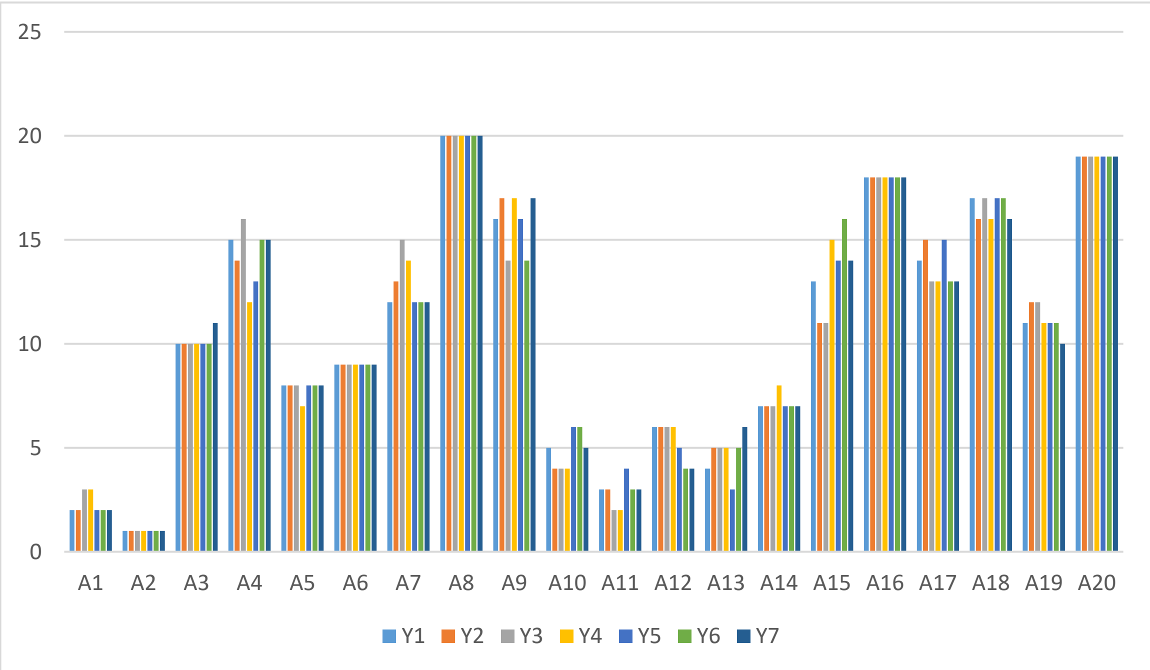

Figure 5. The different rank of alternatives.

5. Conclusion

The significance of evaluating the quality of Visual Communication courses lies in ensuring the scientific and practical nature of the curriculum. Through systematic evaluation, schools can effectively assess whether the course structure aligns with industry standards and market demands, helping students acquire essential design skills. At the same time, evaluation can identify shortcomings in teaching, prompting instructors to improve their methods and enhance classroom effectiveness. Additionally, student feedback provides important insights for course optimization, making education more attuned to students' needs. Overall, course quality evaluation not only improves teaching standards but also drives the development of discipline, fostering more competitive visual communication design professionals. The quality evaluation of visual communication design professional courses involves MAGDM. In recent times, MOORA approach was employed to manage MAGDM. To address the quality evaluation of visual communication design professional courses, the utilization of SVNS proves valuable for representing uncertain information. In this study, we propose the SVNSs-MOORA approach to effectively handle MAGDM. Additionally, a numerical study is conducted to validate the implementation of this approach for the quality evaluation of visual communication design professional courses.

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Appendix

Table A1. The decision matrix.

	C_1	C_2	C_3	C_4	C_5	C_6
A_1	(0.9,0.2,0.1)	(0.2,0.8,0.7)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.8,0.3,0.2)
A_2	(0.1,0.9,0.8)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.9,0.2,0.1)
A_3	(0.9,0.2,0.1)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.8,0.3,0.2)	(0.1,0.9,0.8)
A_4	(0.9,0.2,0.1)	(0.3,0.7,0.6)	(0.8,0.3,0.2)	(0.8,0.3,0.2)	(0.1,0.9,0.8)	(0.2,0.8,0.7)
A_5	(0.8,0.3,0.2)	(0.2,0.8,0.7)	(0.6,0.4,0.3)	(0.8,0.3,0.2)	(0.2,0.8,0.7)	(0.3,0.7,0.6)
A_6	(0.6,0.4,0.3)	(0.2,0.8,0.7)	(0.5,0.5,0.5)	(0.9,0.2,0.1)	(0.5,0.5,0.5)	(0.5,0.5,0.5)
A_7	(0.5,0.5,0.5)	(0.1,0.9,0.8)	(0.3,0.7,0.6)	(0.9,0.2,0.1)	(0.6,0.4,0.3)	(0.5,0.5,0.5)
A_8	(0.3,0.7,0.6)	(0.1,0.9,0.8)	(0.2,0.8,0.7)	(0.1,0.9,0.8)	(0.8,0.3,0.2)	(0.6,0.4,0.3)
A_9	(0.2,0.8,0.7)	(0.8,0.3,0.2)	(0.1,0.9,0.8)	(0.2,0.8,0.7)	(0.9,0.2,0.1)	(0.8,0.3,0.2)
A_{10}	(0.1,0.9,0.8)	(0.6,0.4,0.3)	(0.8,0.3,0.2)	(0.3,0.7,0.6)	(0.1,0.9,0.8)	(0.8,0.3,0.2)
A_{11}	(0.5,0.5,0.5)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.5,0.5,0.5)	(0.2,0.8,0.7)	(0.9,0.2,0.1)
A_{12}	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.6,0.4,0.3)	(0.6,0.4,0.3)	(0.3,0.7,0.6)	(0.9,0.2,0.1)
A_{13}	(0.9,0.2,0.1)	(0.9,0.2,0.1)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.6,0.4,0.3)	(0.1,0.9,0.8)
A_{14}	(0.9,0.2,0.1)	(0.8,0.3,0.2)	(0.3,0.7,0.6)	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.2,0.8,0.7)
A_{15}	(0.8,0.3,0.2)	(0.6,0.4,0.3)	(0.2,0.8,0.7)	(0.9,0.2,0.1)	(0.1,0.9,0.8)	(0.3,0.7,0.6)
A_{16}	(0.6,0.4,0.3)	(0.5,0.5,0.5)	(0.1,0.9,0.8)	(0.9,0.2,0.1)	(0.2,0.8,0.7)	(0.5,0.5,0.5)
A_{17}	(0.5,0.5,0.5)	(0.3,0.7,0.6)	(0.8,0.3,0.2)	(0.1,0.9,0.8)	(0.3,0.7,0.6)	(0.6,0.4,0.3)
A_{18}	(0.3,0.7,0.6)	(0.2,0.8,0.7)	(0.6,0.4,0.3)	(0.2,0.8,0.7)	(0.6,0.4,0.3)	(0.8,0.3,0.2)
A_{19}	(0.2,0.8,0.7)	(0.1,0.9,0.8)	(0.5,0.5,0.5)	(0.3,0.7,0.6)	(0.8,0.3,0.2)	(0.9,0.2,0.1)
A_{20}	(0.1,0.9,0.8)	(0.5,0.5,0.5)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.1,0.9,0.8)	(0.6,0.4,0.3)
	C_1	C_2	C_3	C_4	C_5	C_6
A_1	(0.8,0.3,0.2)	(0.2,0.8,0.7)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.8,0.3,0.2)
A_2	(0.9,0.2,0.1)	(0.8,0.3,0.2)	(0.6,0.4,0.3)	(0.8,0.3,0.2)	(0.8,0.3,0.2)	(0.9,0.2,0.1)
A_3	(0.1,0.9,0.8)	(0.9,0.2,0.1)	(0.5,0.5,0.5)	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.1,0.9,0.8)
A_4	(0.2,0.8,0.7)	(0.1,0.9,0.8)	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.1,0.9,0.8)	(0.2,0.8,0.7)
A_5	(0.3,0.7,0.6)	(0.2,0.8,0.7)	(0.9,0.2,0.1)	(0.1,0.9,0.8)	(0.2,0.8,0.7)	(0.3,0.7,0.6)
A_6	(0.5,0.5,0.5)	(0.3,0.7,0.6)	(0.1,0.9,0.8)	(0.2,0.8,0.7)	(0.3,0.7,0.6)	(0.5,0.5,0.5)
A_7	(0.6,0.4,0.3)	(0.5,0.5,0.5)	(0.2,0.8,0.7)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.6,0.4,0.3)
A_8	(0.8,0.3,0.2)	(0.6,0.4,0.3)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.8,0.3,0.2)

A_9	(0.1,0.9,0.8)	(0.8,0.3,0.2)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.8,0.3,0.2)	(0.1,0.9,0.8)
A_{10}	(0.9,0.2,0.1)	(0.8,0.3,0.2)	(0.6,0.4,0.3)	(0.8,0.3,0.2)	(0.1,0.9,0.8)	(0.8,0.3,0.2)
A_{11}	(0.1,0.9,0.8)	(0.9,0.2,0.1)	(0.8,0.3,0.2)	(0.1,0.9,0.8)	(0.8,0.3,0.2)	(0.9,0.2,0.1)
A_{12}	(0.2,0.8,0.7)	(0.1,0.9,0.8)	(0.1,0.9,0.8)	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.9,0.2,0.1)
A_{13}	(0.3,0.7,0.6)	(0.2,0.8,0.7)	(0.2,0.8,0.7)	(0.9,0.2,0.1)	(0.1,0.9,0.8)	(0.8,0.3,0.2)
A_{14}	(0.5,0.5,0.5)	(0.3,0.7,0.6)	(0.3,0.7,0.6)	(0.1,0.9,0.8)	(0.2,0.8,0.7)	(0.9,0.2,0.1)
A_{15}	(0.6,0.4,0.3)	(0.5,0.5,0.5)	(0.5,0.5,0.5)	(0.2,0.8,0.7)	(0.3,0.7,0.6)	(0.1,0.9,0.8)
A_{16}	(0.8,0.3,0.2)	(0.6,0.4,0.3)	(0.6,0.4,0.3)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.2,0.8,0.7)
A_{17}	(0.1,0.9,0.8)	(0.8,0.3,0.2)	(0.8,0.3,0.2)	(0.5,0.5,0.5)	(0.6,0.4,0.3)	(0.3,0.7,0.6)
A_{18}	(0.3,0.7,0.6)	(0.1,0.9,0.8)	(0.1,0.9,0.8)	(0.6,0.4,0.3)	(0.8,0.3,0.2)	(0.5,0.5,0.5)
A_{19}	(0.2,0.8,0.7)	(0.1,0.9,0.8)	(0.5,0.5,0.5)	(0.8,0.3,0.2)	(0.1,0.9,0.8)	(0.6,0.4,0.3)
A_{20}	(0.1,0.9,0.8)	(0.5,0.5,0.5)	(0.3,0.7,0.6)	(0.1,0.9,0.8)	(0.1,0.9,0.8)	(0.8,0.3,0.2)
	C_1	C_2	C_3	C_4	C_5	C_6
A_1	(0.8,0.3,0.2)	(0.8,0.3,0.2)	(0.3,0.7,0.6)	(0.8,0.3,0.2)	(0.6,0.4,0.3)	(0.8,0.3,0.2)
A_2	(0.9,0.2,0.1)	(0.9,0.2,0.1)	(0.6,0.4,0.3)	(0.9,0.2,0.1)	(0.9,0.2,0.1)	(0.9,0.2,0.1)
A_3	(0.1,0.9,0.8)	(0.1,0.9,0.8)	(0.5,0.5,0.5)	(0.1,0.9,0.8)	(0.8,0.3,0.2)	(0.1,0.9,0.8)
A_4	(0.2,0.8,0.7)	(0.2,0.8,0.7)	(0.8,0.3,0.2)	(0.2,0.8,0.7)	(0.8,0.3,0.2)	(0.2,0.8,0.7)
A_5	(0.3,0.7,0.6)	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.3,0.7,0.6)	(0.9,0.2,0.1)	(0.8,0.3,0.2)
A_6	(0.5,0.5,0.5)	(0.9,0.2,0.1)	(0.8,0.3,0.2)	(0.5,0.5,0.5)	(0.1,0.9,0.8)	(0.9,0.2,0.1)
A_7	(0.5,0.5,0.5)	(0.1,0.9,0.8)	(0.9,0.2,0.1)	(0.5,0.5,0.5)	(0.2,0.8,0.7)	(0.1,0.9,0.8)
A_8	(0.2,0.8,0.7)	(0.2,0.8,0.7)	(0.1,0.9,0.8)	(0.1,0.9,0.8)	(0.3,0.7,0.6)	(0.2,0.8,0.7)
A_9	(0.3,0.7,0.6)	(0.3,0.7,0.6)	(0.2,0.8,0.7)	(0.2,0.8,0.7)	(0.5,0.5,0.5)	(0.3,0.7,0.6)
A_{10}	(0.8,0.3,0.2)	(0.8,0.3,0.2)	(0.3,0.7,0.6)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.5,0.5,0.5)
A_{11}	(0.9,0.2,0.1)	(0.9,0.2,0.1)	(0.5,0.5,0.5)	(0.5,0.5,0.5)	(0.2,0.8,0.7)	(0.5,0.5,0.5)
A_{12}	(0.1,0.9,0.8)	(0.1,0.9,0.8)	(0.5,0.5,0.5)	(0.8,0.3,0.2)	(0.8,0.3,0.2)	(0.8,0.3,0.2)
A_{13}	(0.2,0.8,0.7)	(0.2,0.8,0.7)	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.9,0.2,0.1)	(0.9,0.2,0.1)
A_{14}	(0.8,0.3,0.2)	(0.8,0.3,0.2)	(0.9,0.2,0.1)	(0.1,0.9,0.8)	(0.1,0.9,0.8)	(0.1,0.9,0.8)
A_{15}	(0.9,0.2,0.1)	(0.9,0.2,0.1)	(0.1,0.9,0.8)	(0.2,0.8,0.7)	(0.2,0.8,0.7)	(0.2,0.8,0.7)
A_{16}	(0.1,0.9,0.8)	(0.1,0.9,0.8)	(0.2,0.8,0.7)	(0.3,0.7,0.6)	(0.3,0.7,0.6)	(0.3,0.7,0.6)
A_{17}	(0.2,0.8,0.7)	(0.2,0.8,0.7)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.5,0.5,0.5)	(0.5,0.5,0.5)
A_{18}	(0.3,0.7,0.6)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.5,0.5,0.5)	(0.5,0.5,0.5)	(0.5,0.5,0.5)
A_{19}	(0.5,0.5,0.5)	(0.5,0.5,0.5)	(0.5,0.5,0.5)	(0.3,0.7,0.6)	(0.8,0.3,0.2)	(0.9,0.2,0.1)
A_{20}	(0.3,0.7,0.6)	(0.6,0.4,0.3)	(0.3,0.7,0.6)	(0.5,0.5,0.5)	(0.8,0.3,0.2)	(0.6,0.4,0.3)

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