Hindawi
Mobile Information Systems
Volume 2023, Article ID 9896276, 1 page
https://doi.org/10.1155/2023/9896276

Retraction

Retracted: Multiobjective Optimization Model of Quality Education Reform in Research and Learning Activities

Mobile Information Systems

Received 8 August 2023; Accepted 8 August 2023; Published 9 August 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] Y. Liu, J. Zhang, and S. Ding, "Multiobjective Optimization Model of Quality Education Reform in Research and Learning Activities," *Mobile Information Systems*, vol. 2022, Article ID 7520707, 7 pages, 2022.

Hindawi
Mobile Information Systems
Volume 2022, Article ID 7520707, 7 pages
https://doi.org/10.1155/2022/7520707

Research Article

Multiobjective Optimization Model of Quality Education Reform in Research and Learning Activities

Yonglang Liu,[1,2] Jitao Zhang,[2] and Sanqing Ding[1]

[1]*School of Public Policy and Management School of Emergency Management, China University of Mining and Technology, Xuzhou 221116, Jiangsu, China*
[2]*Jiangxi University of Technology, Nanchang 330098, Jiangxi, China*

Correspondence should be addressed to Sanqing Ding; 1351130083@xzyz.edu.cn

Received 23 June 2022; Revised 3 August 2022; Accepted 18 August 2022; Published 7 September 2022

Academic Editor: Yajuan Tang

In order to solve the problem of quality education reform in research activities, a multiobjective optimization model for the optimal performance distribution of college teachers is proposed. We mainly use the multiobjective optimization method to study the allocation of optimal performance. On the basis of considering individual differences, a multiobjective optimization model is established with the goal of maximizing the total satisfaction of all assessment objects and balancing the satisfaction as much as possible by introducing the score conversion function and the satisfaction function. The results show that the variation trends of the weak Pareto fronts at five different confidence levels are basically the same; that is, different confidence levels have little effect on the results. *Conclusion*. The use of a multiobjective optimization model can improve the optimal performance distribution of college teachers, so as to effectively promote the reform of quality education in research activities.

1. Introduction

Quality education mainly refers to a new educational model that aims to improve students' quality in all aspects and promote students' personal development to adapt to social development [1]. With the continuous reform of quality education, colleges and universities, as the main position to cultivate high-quality talents, should firmly grasp the pulse of the development of the times. It is particularly urgent to reform and practice characteristic quality education. As a unique group with vigor and vitality, college students' curiosity, independence, and thirst for knowledge all have distinctive personal characteristics and characteristics of the times. We should carry out characteristic quality education in Colleges and universities, strengthen education guidance, send more compound talents to the society, promote the all-round development of the social economy, and make positive contributions to the prosperity of the country and the revitalization of the nation. Therefore, we should carry out the reform and practice of characteristic quality education, gradually establish and improve a scientific and reasonable characteristic quality education system for college students, and continuously cultivate diversified and all-round talents with a sense of responsibility on the premise of fully respecting the wishes and actual conditions of college students, so as to respond to the needs of national development for talents.

As we all know, the research on performance distribution has very important theoretical significance and application value for the efficient operation of government, enterprises, schools, hospitals, and other institutions [2]. However, at present, few people use the multiobjective optimization model to study the performance distribution. At the same time, we also note that the optimal performance distribution scheme not only depends on the effective aggregation of index scores at all levels but also is related to many factors such as the individual differences of the appraisees and the requirements of basic workload [3]. Inspired by the research work, this paper mainly studies the application of a multiobjective optimization model in the optimal performance allocation problem. Based on the individual differences of the appraisees in the performance distribution, all appraisees are classified. Taking the control parameters reflecting the incentive degree and the basic workload of all appraisees as variables, the score conversion function and the satisfaction function describing the satisfaction of the appraisees are introduced to establish a multiobjective optimization model with the goal of maximizing the overall satisfaction of all appraisees and balancing the satisfaction as much as possible [4]. Furthermore, the existence of weak efficient solutions of the multiobjective optimization model is proved by using the constraint scalarization method. In its application, this paper takes the scientific research work and mathematical work completed by the examinee as the evaluation index, uses the multiobjective optimization model to study the optimal performance allocation of teachers in a university, and uses a genetic algorithm to carry out numerical experiments [5] as shown in Figure 1.

2. Literature Review

At present, there are two main changes in the construction of general education courses in Chinese colleges and Universities: first, general education elective courses have grown from scratch, from less to more, and have developed from focusing on increasing “quantity” to improving “quality”, starting to build the core courses of general education. After more than 20 years of development, colleges and universities have opened as many as 200 or 300 general education elective courses, most of which cover the three knowledge fields of humanities, social sciences, and natural sciences. Most colleges and universities adopt the method of distributed electives; that is, the general elective courses are divided into several modules according to the nature of the discipline, requiring students to take certain credits from different fields. The general education elective course is an independent course set up by Chinese colleges and universities to highlight the idea and characteristics of quality education. At the initial stage of its establishment, due to the lack of deep understanding and effective management, general education elective courses generally had the problems of “miscellaneous content, disordered structure, poor quality, and low status,” which made it difficult to effectively play the role of quality education. In recent years, some universities have strengthened the top-level design and policy support of general elective courses and started to focus on building a number of “general core courses” on the basis of the original general elective courses. Some colleges and universities have also set up general education curriculum committees to hire scholars from multiple disciplines to conduct overall design and quality audits of general education curriculum. This series of measures have made general education elective courses develop towards “systematization, standardization, high-quality products, and core,” and the quality and status of the curriculum are improving. This puts forward higher requirements for the optimal performance of university teachers.

Even so, in universities with a large number of professional colleges and departments, quality education or general education institutions without discipline and specialty inevitably have to be in an awkward position of “powerless and powerless”. Therefore, in order to fundamentally improve the status of general education, we also need deeper organizational system reform. In fact, the Department of a University is not only a first-class administrative institution but also an institution that connects a certain type of discipline and specialty. That is to say, the organizational form of the Department holds the personnel of different disciplines together, further clarifies the boundaries between different disciplines, and forms discipline barriers in the form of administrative institutions. Accordingly, the curriculum and teaching system are also organized with the discipline as the center, thus realizing the goal of professional talent training. On the surface, the implementation of quality education needs to reform the curriculum. In fact, it is a comprehensive reform of the University. It is a reconsideration of the educational purpose of the University, a repositioning of the teaching objective of undergraduate education, and a reconstruction of the talent training mode and will eventually involve the reform of the management system and even the organizational system of the University.

Aiming at this research problem, Yao, W. W. believes that colleges and universities, as the main position for talent training, mean to promote the all-round development of students in all aspects through the training of college students [6]. We should fully realize the importance of the reform of characteristic quality education and put the characteristic quality education through the whole process of higher education, so that the cultivation of quality talents in Colleges and universities is no longer superficial. Nyamutata believes that, on the one hand, it can improve students’ ideological construction, cultivate students’ awareness of self-study, competition and innovation, and enable students to learn and grow under the correct guidance of education; on the other hand, the characteristic quality education activities can also cultivate students’ innovation ability and practical ability, stimulate students’ learning potential to the greatest extent, link the cultivation of talents with the needs of the market, enterprises, and society, and promote students’ social employment and life development [7]. Diab believes that performance evaluation is widely used in many aspects, such as the comprehensive performance assessment of enterprise employees, the work quality assessment of university teachers or administrative personnel, the comprehensive performance assessment of bank employees, and the ecological environment assessment [8].

On the basis of the current research, this paper proposes a multiobjective optimization model for the optimal performance allocation of university teachers, specifically taking the scientific research and mathematical work completed by the assessment object as the assessment index, using the multiobjective optimization model to study the optimal performance allocation of a university teacher, and using the genetic algorithm to carry out numerical experiments [9].

3. Research Methods

3.1. Construction of Score Conversion Function Model. As the performance distribution needs to reflect a certain degree of incentives to the appraisees and the quantitative standards of different types of indicator scores may be different, it is necessary to introduce the score conversion function to

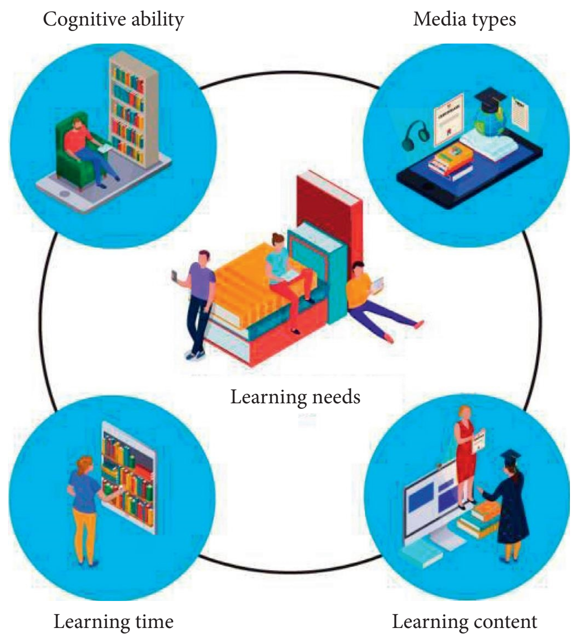

Figure 1: Multiobjective optimization of quality-oriented education reform.

convert the initial score. Note that the score conversion function should include control parameters that reflect the incentive degree and the basic workload of all appraisees and should meet the basic requirements that the higher the initial score, the higher the conversion score [10]. First, the complete order relation information is converted into a score matrix and normalized; based on the normalized score matrix, a comprehensive score matrix and a different degree matrix are constructed, and then, a matching degree matrix is constructed. Furthermore, a single-target matching model is constructed based on the matching degree matrix, and the matching scheme is determined through the model solution. Therefore, the score conversion function in the following form is adopted in this paper, as shown in the following formulas (1) and (2):

$$y_{ij} = \mu_{ij}\lambda_j\left(a_{ij} - x_j\right)^n, \tag{1}$$

$$n\geqslant 1, x_j\geqslant 0, \lambda_j\geqslant 0, \mu_{ij} = \begin{cases} 0, x_j\geqslant a_{ij} \\ 1, x_j < a_{ij} \end{cases} i = 1, 2, \cdots, p, j = 1, 2, \tag{2}$$

x_j represents the basic workload of indicator j, and y_{ij} represents the conversion score of indicator j of the i-th appraisee. Obviously, different values of λ_j and n will reflect different degrees of excitation, and the values of λ_j and n may also be different for different practical problems. Although there are many score conversion functions, the score conversion function selected in this paper satisfies $y'' > 0$; that is, the higher the actual score, the greater the increase of the conversion score [11]. Therefore, if the appraisee wants to get a higher conversion score, the actual score needs to be raised to a higher level, which reflects the incentive to the appraisee. In order to simplify the problem, this paper takes $n = 2$. Therefore, how to determine the optimal $\lambda = (\lambda_1, \lambda_2)$ and the basic workload of assessment indicators $x = (x_1, x_2)$ is the focus of this paper.

3.2. Range Estimation of Displacement. If $\lambda_1 = 0$ or $\lambda_2 = 0$, the conversion score of the first or second appraisal indicator of all appraisees is 0, which is inconsistent with the actual situation. Therefore, this paper assumes that $\lambda_j \geqslant l_j$, where l_j is a sufficiently small positive number. Similarly, if $\lambda_1 \longrightarrow +\infty$or $\lambda_2 \longrightarrow +\infty$, this is also inconsistent with the actual situation. Therefore, this paper assumes that $\lambda_j \leqslant u_j$, where $u_j < +\infty, j = 1, 2$. Obviously, the basic workload $x_j \geqslant 0, j = 1, 2$. However, the basic workload should be as large as possible. For example, when $x_j = \max\left\{a_{1j}, a_{2j}, \cdots, a_{pj}\right\}, j = 1, 2$, the conversion score of the j indicator of all appraisees is 0. This is obviously not in line with the actual situation. Therefore, it is necessary to estimate the upper bound of the basic workload [12]. It is assumed that the scores of each category of indicators of different types of appraisees are not all the same and follow the normal distribution [13]. Since the basic workload corresponding to various assessment indicators should not deviate too much from the average level of all assessment objects, this paper takes the upper bound of the expected value of normal distribution as the upper bound of the basic workload of assessment indicators. Let $\overline{X}_{1j}$ and $\overline{X}_{2j}$, respectively, represent the sample mean value of the j-th assessment indicator score of type I and type II appraisees, and then, formula (3) is as follows:

$$\begin{aligned} \overline{X}_{11} &= \frac{a_{11} + a_{21} + \cdots + a_{s1}}{s}, \\ \overline{X}_{12} &= \frac{a_{12} + a_{22} + \cdots + a_{s2}}{s}, \\ \overline{X}_{21} &= \frac{a_{s+1,1} + a_{s+2,1} + \cdots + a_{p1}}{p - s}, \\ \overline{X}_{22} &= \frac{a_{s+1,2} + a_{s+2,2} + \cdots + a_{p2}}{p - s}. \end{aligned} \tag{3}$$

Let S_{1j} represent the sample standard deviation of the score value of the type j appraisal indicator of the type I appraisee, and S_{2j} represent the sample standard deviation of the score value of the type j appraisal indicator of the type II appraisee, and then, the corresponding sample variances are shown in the following formula:

$$\begin{aligned} S_{11}^2 &= \frac{1}{s-1}\sum_{i=1}^{a}\left(a_{i1} - X'_{11}\right)^2, \\ S_{12}^2 &= \frac{1}{s-1}\sum_{i=1}^{s}\left(a_{i2} - X'_{12}\right)^2, \\ S_{21}^2 &= \frac{1}{p-s-1}\sum_{i=s+1}^{p}\left(a_{i1} - X'_{21}\right)^2, \\ S_{22}^2 &= \frac{1}{p-s-1}\sum_{i=s+1}^{p}\left(a_{i2} - X'_{22}\right)^2. \end{aligned} \tag{4}$$

Therefore, when the confidence level is $1-\alpha$, the two unilateral upper confidence limits of the basic workload x_1 of the first type of assessment indicator are $\overline{X}_{11}+t_\alpha(s-1)(S_{11}/\sqrt{s}), \overline{X}_{21}+t_\alpha(p-s-1)(S_{21}/\sqrt{p-s})$, respectively. In order to allow as many assessment objects as possible to participate in the performance distribution, this paper takes $\min\{\overline{X}_{11}+t_\alpha(s-1)(S_{11}/\sqrt{s}), \overline{X}_{21}+t_\alpha(p-s-1)(S_{21}/\sqrt{p-s})\}$ as the upper bound of the basic workload x_1. Similarly, it can be obtained that the upper bound of the basic workload x_2 of type 2 assessment indicator is shown in the following equation:

$$\min\left\{\overline{X}_{12}+t_\alpha(s-1)\frac{S_{12}}{\sqrt{s}}, \overline{X}_{22}+t_\alpha(p-s-1)\frac{S_{22}}{\sqrt{p-s}}\right\}. \tag{5}$$

3.3. Satisfaction Function. This section mainly proposes the satisfaction function to describe the satisfaction of the appraisee with the distribution scheme and then proves the continuity of the satisfaction function on the estimation interval of the variable [14]. Note $Y_i=\sum_{j=1}^{2} y_{ij}, Y'=\sum_{i=1}^{p} y_{i1}, Y''=\sum_{i=1}^{p} y_{i2}, i=1,2,\cdots,p$ for the i-th appraisee, it is obvious that the most favorable distribution proportion and the most unfavorable distribution proportion can be expressed as the following formula, respectively:

$$\begin{aligned} U_i &= \max_{\lambda_1,\lambda_2,x_1,x_2} \frac{Y_i}{Y'+Y''}, \\ L_i &= \min_{\lambda_1,\lambda_2,x_1,x_2} \frac{Y_i}{Y'+Y^n}. \end{aligned} \tag{6}$$

Since the satisfaction of the appraisees should increase with the increase of the distribution proportion $\overline{Y_i}=(Y_i/Y'+Y'')$, and the greater the distribution proportion, the more difficult it will be to improve the satisfaction of the appraisees, this paper proposes the following satisfaction function (7):

$$f_i(\overline{Y_i})=\left(\frac{\overline{Y_i}-L_i}{U_i-L_i}\right)^{1/2}. \tag{7}$$

Obviously, when $\overline{Y_i}=U_i$, the satisfaction of the i-th appraisee is 1; that is, the allocation proportion is the most favorable for the i-th appraisee; when $\overline{Y_i}=L_i$, the satisfaction of the i-th appraisee is 0; that is, the allocation proportion is the most unfavorable to the i-th appraisee [15]. According to the satisfaction function constructed in this paper, if the performance allocation proportion of the i-th appraisee is closer to U_i, that is, the higher the allocation proportion is, the higher the value of the satisfaction function is. On the contrary, the value of the satisfaction function will be lower. On the other hand, as the proportion of appraisees increases, appraisees will have higher expectations of themselves. Therefore, it will become more difficult to further improve the satisfaction of appraisees. The satisfaction function proposed in this paper satisfies $f''<0$, which just expresses this meaning. Therefore, the satisfaction function proposed in this paper reflects the satisfaction of the appraisees with the performance distribution scheme to a certain extent. The continuity of the satisfaction function on the estimation interval of the variable is proved as shown in the following equation:

$$\begin{aligned} m_j &= \mathrm{m}\{a_{1j}, a_{2j}, \cdots, a_{sj}\}, \\ m_j' &= \mathrm{m}\{a_{s+1,j}, a_{s+2,j}, \cdots, a_{pj}\}, \\ M_j &= \mathrm{m}\{a_{1j}, a_{2j}, \cdots, a_{sj}\}, \\ M_j' &= \mathrm{m}\{a_{s+1,j}, a_{s+2,j}, \cdots, a_{pj}\}. \end{aligned} \tag{8}$$

Theorem 1. *If $\alpha \geqslant 0.05, s \geqslant 6, p-s \geqslant 6$, and the index scores of various appraisees meet the following formula:*

$$\frac{\left|m_j-\overline{X}_{1j}\right|}{\left|M_j-\overline{X}_{1j}\right|} \leqslant 1, \frac{\left|m_j'-\overline{X}_{2j}\right|}{\left|M_j'-\overline{X}_{2j}\right|} \leqslant 1, j=1,2. \tag{9}$$

Then, the following conclusion is true:

(i) At least one appraisee's type 1 appraisal indicator score is greater than the upper bound of the basic workload x_1

(ii) ẟere is at least one appraisee whose score of category 2 appraisal index is greater than the upper limit of basic workload x_2

Only Case (I) and similar Case (II) can be proved. If $\overline{X}_{11}+t_\alpha(s-1)(S_{11}/\sqrt{s}) \leqslant \overline{X}_{21}+t_\alpha(p-s-1)(S_{21}/\sqrt{p-s})$, the estimation interval of variable x_1 is $[0, \overline{X}_{11}+t_\alpha(s-1)(S_{11}/\sqrt{s})]$. Issue certificate $M_1>\overline{X}_{11}+t_\alpha(s-1)(S_{11}/\sqrt{s})$. If $M_1 \leqslant \overline{X}_{11}+t_\alpha(s-1)(S_{11}/\sqrt{s})$, it can be known from the condition that $(a_{i1}-\overline{X}_{11})^2 \leqslant \mathrm{m}\{(m_1-\overline{X}_{11})^2, (M_1-\overline{X}_{11})^2\}=(M_1-\overline{X}_{11})^2 (1 \leqslant i \leqslant s)$ and then:$\leqslant (t_\alpha(s-1))^2((a_{11}-\overline{X}_{11})^2+\cdots+(a_{s1}-\overline{X}_{11})^2/(M_1-\overline{X}_{11})^2) \leqslant (t_\alpha(s-1))^2((M_1-\overline{X}_{11})^2+\cdots+(M_1-\overline{X}_{11})^2/(M_1-\overline{X}_{11})^2)=s(t_\alpha(s-1))^2$, so $(s-1) \leqslant (t_\alpha(s-1))^2$. When $\alpha \geqslant 0.05$ and $s \geqslant 6$, $(s-1)>(t_\alpha(s-1))^2$, which leads to contradiction. If $\overline{X}_{11}+t_\alpha(s-1)(S_{11}/\sqrt{s})>\overline{X}_{21}+t_\alpha(p-s-1)(S_{21}/\sqrt{p-s})$, the estimation interval of variable x_1 is $[0, \overline{X}_{21}+t_\alpha(p-s-1)(S_{21}/\sqrt{p-s})]$, which proves that $M_1'>\overline{X}_{21}+t_\alpha(p-s-1)(S_{21}/\sqrt{p-s})$. If $M_1' \leqslant \overline{X}_{21}+t_\alpha(p-s-1)(S_{21}/\sqrt{p-s})$, $(a_{i1}-\overline{X}_{21})^2 \leqslant \mathrm{m}\{(m_1'-\overline{X}_{21})^2, (M_1'-\overline{X}_{21})^2\}=(M_1'-\overline{X}_{21})^2$ $(s+1 \leqslant i \leqslant p$ can be known from the conditions.

4. Results and Discussion

This section mainly uses the multiobjective optimization model established above to study the optimal performance allocation of higher school teachers. Taking a secondary unit of a university as an example, 86 teachers were assessed from two aspects of teaching and scientific research. Table 1 shows the scores of teaching assessment indicators and scientific research assessment indicators of 86 teachers [16, 17].

Table 1: Scores of teaching assessment indicators and scientific research assessment indicators.

Serial number	Teaching	Scientific research	Serial number	Teaching	Scientific research	Serial number	Teaching	Scientific research	Serial number	Teaching	Scientific research
1	2338	435	23	1540	431	45	1972	308	66	841	1332
2	1037	480	24	2989	256	46	1551	471	67	952	1761
3	2578	373	25	2438	441	47	2258	265	68	530	1175
4	2063	264	26	1865	300	48	2328	449	69	770	1753
5	1733	203	27	1985	250	49	984	1879	70	766	1060
6	2044	241	28	2012	332	50	588	1991	71	594	1534
7	2291	245	29	1494	247	51	844	1655	72	546	1856
8	2851	253	30	2616	239	52	673	1930	73	843	1374
9	1615	330	31	1253	411	53	560	1446	74	728	1955
10	2904	378	32	1984	350	54	971	1538	75	808	1624
11	1212	245	33	2536	296	55	501	1886	76	952	1706
12	2114	421	34	2443	345	56	650	1592	77	553	1312
13	2487	421	35	1819	249	57	892	1185	78	585	1352
14	1638	352	36	1545	234	58	766	1335	79	587	1366
15	1773	481	37	2099	399	59	994	1951	80	658	1067
16	2630	306	38	1736	222	60	898	1137	81	511	1448
17	1556	352	39	2178	440	61	969	1552	82	814	1244
18	2563	388	40	1626	201	62	938	1151	83	943	1774
19	1615	328	41	1702	418	63	701	1884	84	639	1559
20	1528	399	42	1698	351	64	597	1210	85	693	1168
21	2221	263	43	2018	212	65	596	1874	86	634	1231
22	1675	330	44	1943	373	--	--	--	--	--	--

According to the data in Table 1, the assessment objects are divided into two types: teaching type and scientific research type, in which the teaching type teacher $s = 48$. Obviously, the data in Table 1 meet the conditions of Theorem 1. It is calculated that when the confidence level is 0.95, the estimation intervals of basic workload B of teaching assessment indicators and basic workload C of scientific research assessment indicators are $[0, 356.91]$, $[0, 790.72]$. Take $u_1 = u_2 = 0.1, l_1 = l_2 = 10$. To simplify the calculation, let $d = 1$, then equation (10) is as follows:

$$\begin{aligned} g_k(\xi, x_1, x_2) = f_k(\overline{Y_k}) &= \sqrt{\frac{1}{U_k - L_k} \frac{\mu_{k1}\lambda_1 (a_{k1} - x_1)^2 + \mu_{k2}\lambda_2 (a_{k2} - x_2)^2}{\sum\limits_{i=1} \lambda_1 (a_{i1} - x_1)^2 + \sum_{i=1}^{p} \mu_{i2}\lambda_2 (a_{i2} - x_2)^2} \frac{L_k}{U_k - L_k}} \\ &= \sqrt{\frac{1}{U_k - L_k} \frac{\mu_{k1}\xi (a_{k1} - x_1)^2 + \mu_{k2} (a_{k2} - x_2)^2}{\sum_{i=1}^{p} \mu_{i1}\xi (a_{i1} - x_1)^2 + \sum_{i=1}^{p} \mu_{i2} (a_{i2} - x_2)^2} \frac{L_k}{U_k - L_k}}. \end{aligned} \tag{10}$$

Where $\xi \in [0.01, 100]$, then $(MOP)_2$ can turn into $(MOP)_3$ $\min_{\xi, x_1,}$ $x_2 \sum_{1 \leqslant i \neq j \leqslant p} (g_i(\xi, x_1, x_2) - g_j$ $(\xi, x_1, x_2))^2 \min_{\xi, x_1, x_2} - \sum_{i=1} g_i(\xi, x_1, x_2)$s.t. $\xi \in [0.01, 100]$, $x_1 \in [0, 356.91]$, $x_2 \in [0, 790.72]$. Obviously, $(MOP)_2$ and (MOP$_3$ are equivalent. The genetic algorithm is used to program (MOP$_3$, and its weak Pareto front is obtained, as shown in Figure 2.

Because the genetic algorithm is used to calculate $(MOP)_3$ in this paper, the weak Pareto solution obtained is some discrete points. The points on the left part of the Figure are dense and the points on the right part are sparse [18, 19]. In this paper, five groups of weak Pareto efficient solutions (see Table 2) are randomly selected, and the corresponding distribution proportion and satisfaction curve are shown in Figure 3 and Figure 4.

It can be seen from Figures 3 and4 that although different Pareto solutions correspond to the performance distribution proportion of the appraisees and the satisfaction of the appraisees, there is only a small gap [20]. Therefore, when making decisions, the decision-maker only needs to select a group of weak Pareto solutions arbitrarily to obtain a performance allocation scheme based on the highest possible total satisfaction of the appraisees and the most balanced satisfaction of the appraisees [21, 22]. The weak Pareto fronts at different confidence levels are given below, as shown in Figure 5.

It can be seen from Figure 5 that the change trend of weak Pareto front under five different confidence levels is basically the same; that is, different confidence levels have little impact on the results [23–25]. Aiming at the

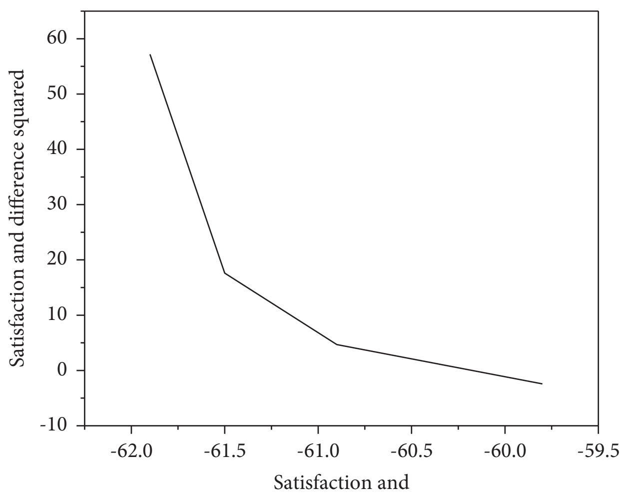

Figure 2: Frontier of weak Pareto solution.

Table 2: Five groups of weak Pareto efficient solutions and related parameters.

	Satisfaction and	Sum of squares of satisfaction difference	£	$x1$	$x2$
Group 1	60.05	3.41	0.50	169.50	351.46
Group 2	61.14	13.62	0.50	23.36	126.44
Group 3	61.48	20.26	0.49	16.97	13.64
Group 4	61.64	30.05	0.56	15.49	3.72
Group 5	61.66	32.39	0.58	15.45	3.66

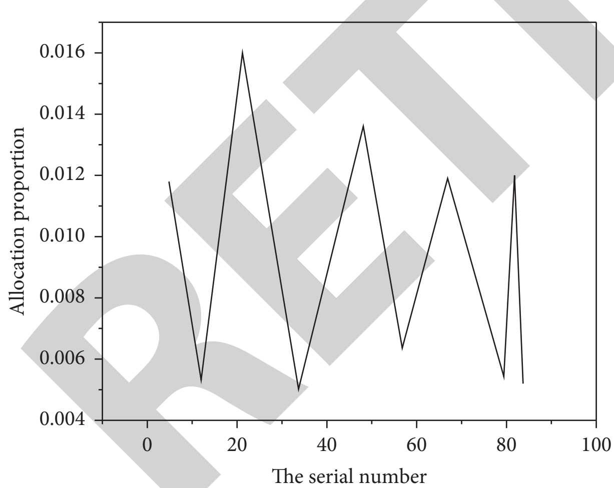

Figure 3: Distribution proportion curve corresponding to 5 groups of weak Pareto efficient solutions.

aggregation problem of evaluation scores in performance evaluation, this paper establishes a new multiobjective optimization model and uses genetic algorithm to solve the model. The numerical results show that the method used in this paper has obvious advantages.

This paper mainly uses the multiobjective optimization method to study the distribution of optimal performance. On the basis of considering individual differences, by

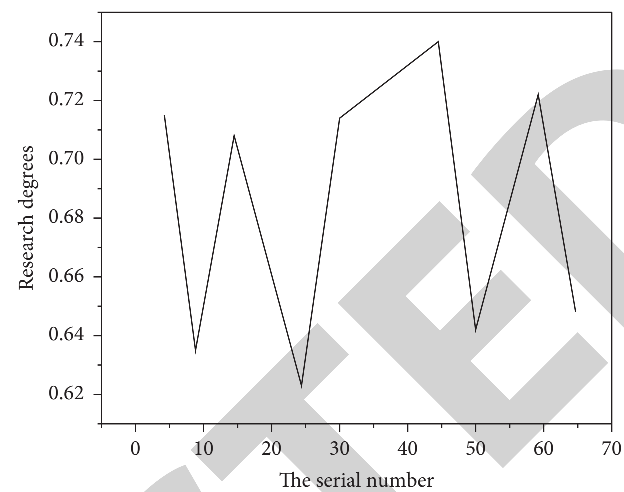

Figure 4: Satisfaction curve corresponding to 5 groups of weak Pareto efficient solutions.

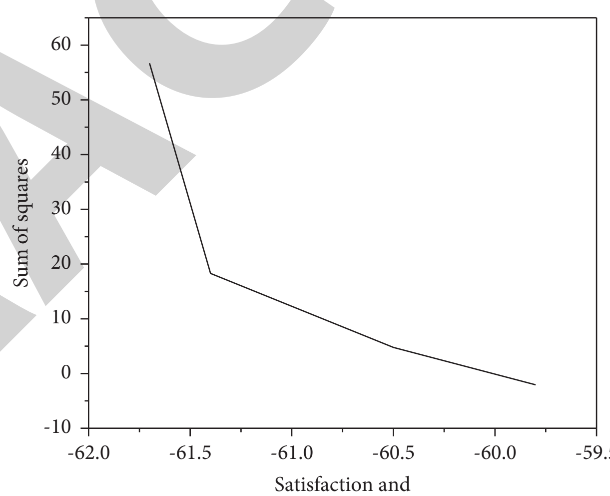

Figure 5: Pareto frontiers solved under different confidence levels.

introducing the score conversion function and the satisfaction function, the maximization and satisfaction of the total satisfaction of all assessment objects are established. A multiobjective optimization model with the goal of balancing as much as possible proves the existence of weak effective solutions of the model and studies its application in teacher performance distribution in high schools.

5. Conclusion

This paper presents a multiobjective optimization model for the optimal performance allocation of university teachers. Taking the scientific research and mathematical work completed by the examinees as the assessment indicators, this paper studies the optimal performance allocation of university teachers by using the multiobjective optimization model, and carries out numerical experiments by using genetic algorithm. This paper mainly uses multiobjective optimization method to study the allocation of optimal performance. On the basis of considering individual differences, by introducing score transformation function and satisfaction function, a multiobjective optimization model is established with the goal of maximizing the total satisfaction of all assessment objects and balancing the satisfaction as much as possible. Then, the existence of a weak efficient solution of the model is proved, and its application in the performance distribution of university teachers is studied.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] O. Kozmenko, "The contribution of liberal education in the successful person`s training in the United States (on the example of the English major)," *Educological Discourse*, vol. 4, no. 4, pp. 195–213, 2020.

[2] K. U. Amaefule and F. C. Obioha, "Performance and nutrient utilization of broiler starters fed diets containing raw, boiled or dehulled pigeon pea seeds," *Nigerian Journal of Animal Production*, vol. 28, no. 1, pp. 31–39, 2021.

[3] W. Hong, Z. Xu, W. Liu, L. Wu, and X. Pu, "Queuing theory-based optimization research on the multi-objective transportation problem of fourth party logistics," *Proceedings of the Institution of Mechanical Engineers - Part B: Journal of Engineering Manufacture*, vol. 235, no. 8, pp. 1327–1337, 2021.

[4] W. J. Ryu and S. Y. Shin, "Performance evaluation of a power allocation algorithm based on dynamic blocklength estimation for urllc in the multicarrier downlink noma systems," *Turkish Journal of Electrical Engineering and Computer Sciences*, vol. 29, no. 1, pp. 310–320, 2021.

[5] D. Peng, G. Tan, K. Fang, L. Chen, P. K. Agyeman, and Y. Zhang, "Multiobjective optimization of an off-road vehicle suspension parameter through a genetic algorithm based on the particle swarm optimization," *Mathematical Problems in Engineering*, vol. 2021, no. 9, pp. 1–14, 2021.

[6] W. W. Yao, J. P. Liang, W. Q. Tan et al., "Association analysis between extracurricular physical activity and dyslipidemia among primary, middle and high school students in guangzhou," *Zhonghua Xinxueguanbing Zazhi*, vol. 49, no. 7, pp. 708–713, 2021.

[7] C. Nyamutata, "The ideological construction of western isis-associated females," *Journal of Language and Politics*, vol. 19, no. 5, pp. 766–785, 2020.

[8] A. Diab, J. Pais, S. Chen et al., "High, intermediate and low temperature performance appraisal of elastomeric and plastomeric asphalt binders and mixes," *Journal of Elastomers and Plastics*, vol. 54, no. 2, pp. 225–246, 2022.

[9] M. A. H. Bhuiyan, M. Bodrud-Doza, M. A. Rakib, B. B. Saha, and S. M. D. U. Islam, "Appraisal of pollution scenario, sources and public health risk of harmful metals in mine water of barapukuria coal mine industry in Bangladesh," *Environmental Science and Pollution Research*, vol. 28, no. 17, pp. 22105–22122, 2021.

[10] Y. J. Kim and H. Lee, "A study on the motivation and acceptance of 360-degree virtual reality news integrated flow-extended technology acceptance model," *Journal of Media Economics & Culture*, vol. 18, no. 3, pp. 41–70, 2020.

[11] B. Liu, Z. Lv, N. Zhu, and D. Chang, "Research on the evaluation of the dissemination ability of sci-tech periodicals based on hesitant fuzzy linguistic," *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, vol. 28, no. Supp02, pp. 153–167, 2020.

[12] K. Stowers, N. Kasdaglis, M. A. Rupp, O. B. Ne Wt On, J. Y. C. Chen, and M. J. Barnes, "The impact of agent transparency on human performance," *IEEE Transactions on Human-Machine Systems*, vol. 50, no. 3, pp. 245–253, 2020.

[13] P. Maneerat, S. Niwitpong, and S. A. Niwitpong, "Bayesian confidence intervals for variance of delta-lognormal distribution with an application to rainfall dispersion," *Statistics and Its Interface*, vol. 14, no. 3, pp. 229–241, 2021.

[14] M. M. Abd-Elaziz, H. M. El-Bakry, A. A. Elfetouh, and A. Elzeiny, "Enhanced data mining technique to measure satisfaction degree of social media users of xeljanz drug," *ACM Transactions on Knowledge Discovery from Data*, vol. 14, no. 3, pp. 1–13, 2020.

[15] L. Kong, Z. Shi, G. Cai, C. Liu, and C. Xiong, "Phase-locked strategy of photovoltaic connected to distribution network with high proportion electric arc furnace," *IEEE Access*, vol. 8, no. 99, pp. 86012–86023, 2020.

[16] C. A. L. U. Juan Méndez Vergaray Edward Flores and E. Flores, "The impact of covid-19 on the teaching work: from face-to-face to virtual," *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, vol. 12, no. 6, pp. 2125–2131, 2021.

[17] R. V. Ngeles and G. O. Millán, "Ethical positions and presuppositions in the debate about the use of non-human animals in scientific research," *Revista de Bioética y Derecho*, no. 51, pp. 21–42, 2021.

[18] M. Panzeri, P. Ryvlin, P. Staeger, R. Gautschi, and V. Amstutz, "Approche myofasciale dans la prise en charge des céphalées de tension : ce que dit la science," *Revue Medicale Suisse*, vol. 16, no. 687, pp. 600–605, 2020.

[19] J. Yan, J. Dai, W. Pu, S. Zhou, H. Liu, and Z. Bao, "Quality of service constrained-resource allocation scheme for multiple target tracking in radar sensor network," *IEEE Systems Journal*, vol. 15, no. 1, pp. 771–779, 2021.

[20] P. B. Shah, "Interpretation of confidence interval in research," *BMJ*, vol. 31, no. 3, p. 710, 2021.

[21] M. Fan and A. Sharma, "Design and implementation of construction cost prediction model based on svm and lssvm in industries 4.0," *International Journal of Intelligent Computing and Cybernetics*, vol. 14, no. 2, pp. 145–157, 2021.

[22] J. Jayakumar, B. Nagaraj, S. Chacko, and P. Ajay, "Conceptual implementation of artificial intelligent based E-mobility controller in smart city environment," *Wireless Communications and Mobile Computing*, vol. 2021, Article ID 5325116, 8 pages, 2021.

[23] J. Chen, J. Liu, X. Liu, X. Xu, and F. Zhong, "Decomposition of toluene with a combined plasma photolysis (cpp) reactor: influence of uv irradiation and byproduct analysis," *Plasma Chemistry and Plasma Processing*, vol. 41, no. 1, pp. 409–420, 2020.

[24] R. Huang, S. Zhang, W. Zhang, and X. Yang, "Progress of zinc oxide-based nanocomposites in the textile industry," *IET Collaborative Intelligent Manufacturing*, vol. 3, no. 3, pp. 281–289, 2021.

[25] Q. Zhang, "Relay vibration protection simulation experimental platform based on signal reconstruction of MATLAB software," *Nonlinear Engineering*, vol. 10, no. 1, pp. 461–468, 2021.