Research Article

Construction of Primary and Secondary School Teachers' Competency Model Based on Improved Machine Learning Algorithm

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In order to quantitatively evaluate the competence of primary and secondary school teachers, a competency model of primary and secondary school teachers based on an improved machine learning algorithm is proposed. The fitting parameter analysis model of primary and secondary school teachers' competency is constructed, and the fitting benefit degree parameter of primary and secondary school teachers' competency is extracted based on the analysis results of reliability index parameters. The improved machine learning algorithm is used to carry out quantitative analysis and characteristic element analysis in the process of primary and secondary school teachers' competency evaluation and determine the competency elements of the model. According to the machine learning model, the competency elements are conceptualized and classified, and the theoretical parameter analysis model of online teaching competency of primary and secondary school teachers is constructed to realize the assessment and quantitative analysis of primary and secondary school teachers' competency. Factor analysis and reliability tests were performed using the KMO test and Bartlett test. The empirical simulation analysis results show that the reliability and accuracy of the evaluation of primary and secondary school teachers' competence by this method are good, and the level of credibility is high.

1. Introduction

In recent years, when studying teachers' competence, domestic scholars often divide the teaching stages of teachers from different perspectives, such as kindergarten teachers, primary and secondary school teachers, and college teachers, or according to the division of disciplines, study art teachers, and physical education teachers. Later, with the advancement of digital teaching, some scholars gradually began to study teacher competency based on digital learning, such as teacher competency for maker education, WeChat promoting teacher competency, and teacher digital competency [1]. On the basis of competency, other studies have matched the relationship between competency and teachers' performance, the relationship between competency and teachers' teaching happiness, and so on. However, in the process of reading the literature, it is found that no scholars have specifically studied the online teaching competence of

primary and secondary school teachers. The reason may be that primary and secondary school teachers and students in China spend less time on online learning. Under traditional classroom teaching, online teaching may only exist on weekends or holidays to answer questions. However, under the "COVID-19 epidemic" environment, teachers and students in primary and secondary schools all over the country have participated in online teaching and learning, which is an opportunity to study the online teaching of primary and secondary school teachers [2]. With the continuous expansion of research areas, we should gradually break through the relatively lacking content in research in the later period. In recent years, with the continuous development of educational informatization, various regions have also launched many training to improve teachers' informatization ability, and held many teaching informatization competitions, such as Liaoning Province's "Educational Informatization Competition" and "Primary and Secondary

School Microcourse Quality Competition." All kinds of training and courses are aimed at improving teachers' informatization level, which provide a good foundation for online teaching. However, there is little training dedicated to "online teaching." According to the feedback from teachers in the interview, the front-line teaching is very busy, and teachers cannot watch videos for a long time to learn. This requires the education system to know the difficulties and problems existing in the online teaching process of teachers, what help they need to get, and to carry out targeted guidance and training. I hope to provide better training methods and help teachers improve their online teaching competence. Studying the competency model of primary and secondary school teachers is of great significance in improving the teaching quality of primary and secondary school teachers [3].

Under the premise of the rapid development of online teaching, this research is based on the full online education of teachers and students in primary and secondary schools in the epidemic situation, and solves the practical problems and needs to be encountered in the development and use of online teaching. It has certain theoretical and practical significance to carry out the "online teaching competency model construction and empirical research of primary and secondary school teachers." On the basis of summing up and drawing lessons from predecessors' competency elements and building competency models, this article uses the interview method and "onion model" to study the structure of competency, which expands the research field of domestic competency. Combining with the practical needs of primary and secondary school teachers, studying the elements of primary and secondary school teachers' competency in different dimensions enriches the theory of teachers' competency and innovates the competency of online teaching [4]. After determining the elements and structure of primary and secondary school teachers' online teaching competency, it has practical significance to educational administrative departments, educational administrators, and teachers who participate in online teaching. For the administrative department of education, it can provide a basis for teacher recruitment and training. For educational administrators, the online teaching competency model can provide a measurement basis for teachers' assessment, evaluation, and post-assignment. For teachers themselves, they can define their daily development goals and promote the development of teachers and the traditional education industry. While improving teachers' quality, it directly affects the level of "education" and improves students' learning quality.

In recent years research, when domestic scholars study teachers' competence, they often start from different perspectives of teachers' competence and make great efforts in the teaching stage, such as Qiu and Xiao teachers. Later, with the advancement of digital teaching [5], or according to the division of disciplines, teachers of fine arts disciplines and physical education disciplines will be studied. In the later period, with the advancement of digital teaching and the continuous expansion of research areas, we should gradually break through the relatively scarce content of research in the later period. The teacher's competency is not a single

structure, but a multidimensional fear, which develops friendship, continuity, planning and organizing ability, certain working standards, quick response ability, eight-border creation, control and innovation, sexual learning, technical or professional knowledge, counseling, decision-making, learner-centered, quality concern, and quality concern. These 15 factors play a vital role in implementing successful online teaching behavior. By comparing the characteristics of "teacher competency" at the level of state institutions, it can be seen that the United States pays more attention to the mutual respect of excellent managers when proposing the competency of teaching managers, and the characteristics of "teacher competency" proposed by relevant institutions in Britain and Australia are more universal and applicable to most teachers, and these characteristics of teacher competency include general abilities. The starting point and content presentation of these two competencies play a complementary role. This is also Spencer's "excellent performance" and "effective performance" in the ability research, which is very popular among scholars in the later research of teachers' competency characteristics. In reference [6], a comprehensive evaluation of clinical teacher competency was carried out on 80 newly appointed young teachers in May 2019, and an indicator system was constructed. However, the convergence of this method for competency evaluation of primary and secondary school teachers was not good. In reference [7], principal component analysis, nonnegative matrix decomposition, local linear embedding method, and uniform manifold approximation and projection method are used to reduce the dimension, respectively. After extracting the key features, regression is carried out in polynomial model and random response surface model. Finally, simulation modeling analysis is carried out on the dataset of peat soil and electrical system. However, there are some problems with this method, such as poor convergence and large ambiguity.

In view of the above problems, this article proposes a competency model for primary and secondary school teachers based on improved machine learning algorithms. According to the principle of machine learning, the competency elements are conceptualized and classified, and the theoretical parameter analysis model of online teaching competency of primary and secondary school teachers is constructed to realize the assessment and quantitative analysis of primary and secondary school teachers' competency. Factor analysis and reliability tests were performed using KMO test and Bartlett test. Finally, the empirical analysis is carried out, and the validity conclusion is drawn.

2. Theoretical Analysis and Parameter Model Construction

2.1. Theoretical Analysis of Primary and Secondary School Teachers' Competency Model. On the basis of the previous literature review, it is found that there is no unified cognition and perfect system model for online teaching competency of primary and secondary school teachers in the research field of teacher competency. Therefore, based on the existing research on competency theory and methods, according to

the relevant theories and methods of competency, the online teaching competency model of primary and secondary school teachers is theoretically constructed [8]. Especially during the "COVID-19 epidemic" in 2020, primary and secondary school teachers all over the country successfully completed the "suspension of classes and nonstop study," and all teachers realized the challenges brought by online teaching to teachers themselves, which gave me a great premise and practical support to study the competency model of online teaching for primary and secondary school teachers.

According to the concept of applying the grounded theory and the online teaching competence of primary and secondary school teachers, the extracted competency elements are analyzed and summarized from the bottom up to determine the competency elements. Then, according to the above theoretical standards, the onion model is used to conceptualize and classify the competency elements, and build a theoretical model of online teaching competency for primary and secondary school teachers. The specific process is shown in Figure 1.

In Figure 1, first, build the competency factor extraction model. The first step is to search the relevant literature. As there is no specific related research in CNKI based on the keyword "online teaching competence of primary and secondary school teachers," I take online teaching of primary and secondary school teachers as the research point. First of all, 37 documents, 5 online teaching abilities, and 53 information-based teaching abilities in primary and secondary schools were searched by using "primary and secondary school teachers' competence" as the keywords [9]. According to the guiding needs of grounded theory in this study, 24 of them were selected as the basic basis for this study to preliminarily summarize teachers' competence, forming the first-level code of grounded theory. Online teaching for primary and secondary school teachers is a teacher at first, therefore, in the process of reading and searching literature, we should first consult the abilities that a primary and secondary school teacher should have. Second, the difference between online teaching and ordinary classroom lies in one more medium. Or teachers give video lectures through WeChat, Tencent, and other software with video functions, or give feedback on homework through online learning spaces and learning platforms, which means that teachers should use information technology in online teaching. Therefore, combining the teachers' information technology application ability advocated by the state at this stage with the particularity of online teaching teachers' competency in the process of determining, we have made targeted integration in the process of literary analysis.

2.2. Primary and Secondary School Teacher Competency Model Parameters.
According to the sample standard, 10 excellent teachers are selected in a city to form an excellent performance group, and 10 ordinary teachers form an ordinary performance group. Excellent group teachers must meet one of the following three conditions: they have won the honors of excellent teachers, special teachers, model teachers, and backbone teachers at or above the municipal level; in the past 5 years, they have won the education and teaching award above the municipal level; excellent on-the-job teachers with teaching performance appraisal in recent 5 years. Ordinary teachers in the group randomly choose other teachers in the school where the excellent teachers are located [10]. Build a big data information flow model of primary and secondary school teachers' competency model distribution, use cloud computing and big data analysis methods to schedule the information flow of primary and secondary school teachers' competency model, build a resource information flow model [11–13], and combine big data mining and feature parameter fusion methods to get the cluster headset of primary and secondary school teachers' competency model distribution as follows:

$$E = \{e_1, e_2, e_3 ... e_M\}. \tag{1}$$

Here, M is the number of cluster components of primary and secondary school teachers' competence, and $e_1, e_2, e_3 ... e_M$ represent the characteristics of primary and secondary school teachers' competence elements.

Online scheduling of primary and secondary school teachers' competency parameters, in the directed edge set E, the element distribution set of primary and secondary school teachers' competency is constructed as follows:

$$V = \{v_1, v_2, v_3 ... v_N\}. \tag{2}$$

Here, N is the number of nodes of key events of primary and secondary school teachers' competency, $v_1, v_2, v_3 ... v_N$ represent multidimensional hierarchical parameters of competency characteristics. The information features of primary and secondary school teachers' competency evaluation are recorded as follows:

$$D = d_m(t) = \sum_{k=1}^{K(m)} p(t - \tau_{mk}), m = \{1, 2, \cdots N\}\}. \tag{3}$$

Here, $d_m(t)$ is the characteristic parameter of basic knowledge of educational theory, τ_{mk} is the characteristic parameter of professional discipline knowledge, $p(t - \tau_{mk})$ is the parameter of online teaching innovation ability, and SF is the parameter of professional development intention. According to the statistics of 20 teachers interviewed by the recorder, the characteristic components of primary and secondary school teachers' competency model distribution are as follows:

$$P = \{p_1, p_2, \cdots p_m\}, m \in N. \tag{4}$$

Here, $p_1, p_2, \cdots p_m$ is a dynamic evaluation parameter of primary and secondary school teachers' competency [14]. After screening, 28 competency elements are retained, and multidimensional parameters such as online discussion ability, adaptability of online teaching means, online teaching enthusiasm, and online teaching investment are extracted. The distribution of competency elements evaluation parameters is given in Table1.

According to the parameter analysis in Table 1, the basic elements of competency are: basic knowledge of educational theory; professional knowledge; online teaching innovation
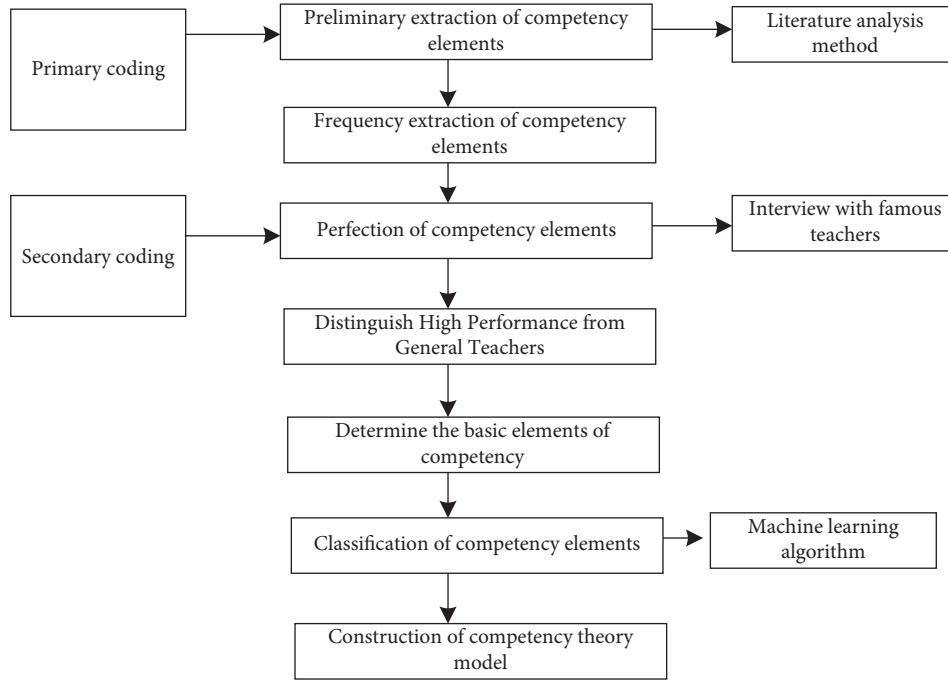
FIGURE 1: Implementation process of the online teaching competency theory model for primary and secondary school teachers.

ability; informatization ability; multimedia resource selection and application ability; online teaching classroom design ability; online teaching interaction ability; proficient in online teaching software operation; online teaching evaluation feedback ability; online classroom organization ability; the ability to integrate online teaching with disciplines; online reflection ability after class; team cooperation ability; communication skills; time management ability; strain capacity; emotional management ability; have love and patience; affinity, tolerance, and humor; respect students; empathy ability; democratic fair consciousness; sense of responsibility; professional development intention; forward thinking; lifelong learning ability; self-learning ability; emotional awareness; professional sense of accomplishment; online seminar ability; adaptability of online teaching means; online teaching enthusiasm; online teaching investment; unique online teaching style; and concentration. Thus, the explanatory variables of the competency model of primary and secondary school teachers are given in Table 2.

According to various influencing factors in Table 2, different sampling sample numbers, similarity, and fitness are set in the design model.

3. Model Optimization Design

3.1. Mining Association Rules. Teacher competency model is a collection that reflects the characteristics of a teacher's knowledge and skills [15]. The analysis of the competency model not only includes competency elements but also carries out the dimensional structure and hierarchical analysis of competency elements. After the determination of the content of the competency model in online teaching [16–18], the competency elements are sorted objectively, and finally, the competency model is determined, and the sorting results of competency elements are obtained:

$$h(t) = H \sum_{m=1}^{M} \sum_{k=1}^{K(m)} \alpha_{mk} \delta(t - T_m - \tau_{mk}). \quad (5)$$

Here, H is the dynamic element of basic knowledge of educational theory, α_{mk} is the characteristic quantity of professional accomplishment distribution, T_m is the teaching classroom engagement, and $K(m)$ is the constraint parameter of unique online teaching personal style, and is the dynamic parameter of time management. Under the guidance of grounded theory, this study first collected, analyzed, and integrated the existing online teaching competence of primary and secondary schools according to literature analysis, screened out the competency characteristic elements from the practical sense [19], and added six competency characteristic elements according to the interview text of teachers. From the practical sense, the distributed information flow was recorded as follows:

$$\text{flow}_k = \{n_1, n_2, \cdots, n_q\}, q \in N. \quad (6)$$

Here, q represents the statistical characteristic quantity of primary and secondary school teachers' competence, n_q represents the equilibrium coefficient of primary and secondary school teachers' competence distribution, and N represents the characteristic elements of primary and secondary school teachers' competence. According to the above analysis, 34 competency elements are finally obtained by refining the competency elements [20]. Finally, after getting the general competency elements, the characteristics of competency are classified and summarized, the relationship between each element is found, and the competency model is established. The dimensions, attributes, and other aspects are continuously screened and classified, and they are connected in series to provide the direction for the later application of

TABLE 1: Parameter distribution of competency factor evaluation.

Ability elements	Frequency	Frequency ratio
Basic knowledge of educational theory	416	22.474
Professional knowledge	410	12.307
Knowledge integration ability	431	6.266
Online teaching innovation ability	416	0.540
Informatization teaching ability	409	32.118
Multimedia resource selection and application ability	405	35.853
Online teaching classroom design ability	418	8.783
Online teaching interaction ability	408	33.753
Proficient in online teaching software operation.	415	10.522
Online teaching evaluation feedback ability	430	20.356
Online classroom organization ability	419	33.216
Online teaching and discipline integration ability	430	28.487
Ability to reflect after class in online teaching.	1	36.941
Team cooperation ability	408	11.556
Communication skills	38	11.175
Time management ability	40	27.790

theory and practice. Finally, based on the prototype of "Onion Model," combined with literature analysis and interview results, a complete online teaching competency model of primary and secondary school teachers is constructed [21], and the statistical information model is as follows:

$$S_i = \left\{ (\overline{n}_1, \overline{n}_i) = \arg\min_{\substack{\widehat{n}_1 = 0, 1, \cdots, \gamma_1 - 1 \\ \widehat{n}_i = 0, 1, \cdots, \gamma_i - 1}} \left| \widehat{n}_i M_i + \widetilde{r}_i - \widehat{n}_1 M_1 - \widetilde{r}_1 \right| \right\}. \tag{7}$$

Here, $S_{i,1}$ represents the priority attribute, $\widehat{n}_i$ is the inner motivation parameter, M_i is the correlation parameter of knowledge and skills, M_1 is the characteristic quantity of the connection between each element, $\widetilde{r}_1$ is the characteristic moment, $\widetilde{r}_i$ is the outermost dynamic parameter, machine learning is carried out on the online teaching competence of primary and secondary school teachers, and the frequency characteristic parameter of online teaching competence of primary and secondary school teachers:

$$S_{i,1} \longrightarrow \{ \overline{n}_1 : (\overline{n}_1, \overline{n}_i) \in S_i \}. \tag{8}$$

Here, $\overline{n}_1$ is the similarity and S_i is the fuzzy domain. By analyzing the characteristics of primary and secondary school teachers' teaching competence, the statistical characteristic quantity is obtained, which is expressed as

$$\widetilde{A}_1 = (G_1^* G_1 + G_2^* G_2)A_1 + G_1^* M_2 + G_2 M_2^*,$$
$$\widetilde{A}_2 = (G_1^* G_1 + G_2^* G_2)A_1 - G_1 M_2^* + G_2^* M_1. \tag{9}$$

Here, G_1 and G_2 are directed graph models, A_1 is the contribution of teamwork, and $\frac{1}{M}$ is the element of exploratory factor analysis competency. The online competency theoretical model of primary and secondary school teachers is expressed as. Self-adaptive distribution of information flow of primary and secondary school teachers' competency model [22, 23], and the transfer probability of the associated rule items of primary and secondary school teachers' competency is $p_{ij}(k) = p\{A_{k+1}^j / A_k^i\} \geq 0$, then

$$p_{ij}(k) = p\left\{ \frac{A_{k+1}^j}{A_k^i} \right\}. \tag{10}$$

Here, when $i \in I$, $j \notin I$, A_{k+1}^j is the dimensions of competency elements, and A_k^i is the model parameter of primary and secondary school teachers' online teaching competency, the dynamic parameters of primary and secondary school teachers are obtained by using the adaptive link configuration method [24], and the distribution factors of each competency trait are given in Table 3.

Given the distribution objective function f of primary and secondary school teachers' competency model, self-adaptive optimization is carried out in the solution space, $U \in R^n$, and a point is found in A, so that the distribution association rules of primary and secondary school teachers' competency model satisfy

$$0 \leq p_{k+1} \leq p_k - \sum_{i \notin I} \sum_{j \in I} p_i(k)p_{ij}(k) \leq p_k \leq 1. \tag{11}$$

Here, p_k is the basic dynamic parameter of the survey object, $p_i(k)$ is the correlation distribution coefficient, and $p_{ij}(k)$ is the joint index. According to the mining results of association rules, data clustering analysis is carried out [25] and machine learning algorithm is adopted to analyze the dynamic characteristics of competency traits.

3.2. Statistical Model and Autonomous Learning Optimization. By using literature analysis and interview with famous teachers, the primary coding and secondary coding of the competency elements are carried out. By using the characteristic parameter analysis of the whole factor process, the conceptual classification of the competency elements is carried out according to the machine learning model, and the analytical model of the theoretical parameters of the online teaching competency of primary and secondary school teachers is constructed to realize the evaluation and quantitative analysis of the competency of primary and secondary school teachers [26]. When

TABLE 2: Explanatory variables of primary and secondary school teachers' competency model.

Ability elements	Sample number	Similarity	Fitness
Online classroom organization ability	4197	1.234	0.332
Ability to integrate online teaching with disciplines	4289	0.992	0.333
Reflection ability of online teaching after class	4326	0.393	0.388
Team cooperation ability	4322	0.784	0.369
Communication skills	4250	1.220	0.375
Time management ability	4291	1.028	0.386
Strain capacity	4333	1.049	0.326
Emotional management ability	4174	0.438	0.386
With benevolence	4266	0.714	0.345
Patient	4308	0.626	0.349
Affinity	4316	0.490	0.392
Tolerate	4333	0.297	0.331
Humorous	4126	0.068	0.364
Respect students	4304	0.977	0.355
Empathy ability	4167	0.801	0.325
Consciousness of democracy and fairness	4059	0.534	0.362
Conscientiousness	4076	1.144	0.346
Professional development intention	4053	0.735	0.342
Forward thinking	4272	0.200	0.367
Lifelong learning ability	4232	0.699	0.349
Self-learning ability	4172	0.722	0.380
Emotional awareness	4131	1.244	0.386
Professional accomplishment	4057	0.011	0.372
Online seminar ability	4104	0.275	0.352
Adaptability of online teaching means	4269	0.401	0.395
Online teaching enthusiasm	4105	0.098	0.334
Online teaching investment	4233	0.102	0.401
Unique online teaching style	4135	0.100	0.348
Concentration	4063	0.100	0.324

$\lim_{n \longrightarrow \infty} X_n = X^*$, the reference model of the competency model of primary and secondary school teachers is

$$\min_{\beta} \| \mathbf{Y}(i) - \mathbf{X}(i)\boldsymbol{\beta} \| = \min_{\beta} \| \mathbf{Y}(i+1) - \mathbf{X}(i+1)\boldsymbol{\beta} \|. \quad (12)$$

Here, the rank of $\mathbf{X}_{ij}$ is r_{ij}, $r_{ij} \le m$, $\mathbf{U}_{i1}'$ is the exploratory factor analysis parameter, $\mathbf{Y}_{i1},\ldots, \mathbf{Y}_{ip(i)}$ are the competency expression parameter, β is the trust parameter, and the transmission control function of the competency model of primary and secondary school teachers is expressed as

$$u_i = \frac{1}{N} \sum_{i=1}^{N} u_i = \frac{1}{MN} \sum_{m=1}^{M} \sum_{i=1}^{N} x_{mi}. \quad (13)$$

Here, u_i is the descriptive parameter of teaching competency, x_{mi} is the dynamic distribution value of teaching competency, M is the embedded dimension, N is the sampling point, and the semantic ontology information feature quantity of primary and secondary school teachers' competency model is extracted to realize the quantitative evaluation of primary and secondary school teachers' competency model. The implementation process of the improved algorithm is shown in Figure 2.

According to the algorithm flow shown in Figure 2, the evaluation of primary and secondary school teachers' competency evaluation is optimized.

4. Simulation Analysis

In order to test the application performance of this method in the analysis of primary and secondary school teachers' competency, a simulation experiment is conducted. The experiment is based on Visual C++ simulation software, and the data processing algorithm of primary and secondary school teachers' competency is designed with Matlab 7. The initial values of primary and secondary school teachers' competency parameters are $m = 100$ and $n = 30K$, $m = \{20, 50, 100\}$, and the number of large data packets of primary and secondary school teachers' competency model is 100. The average transmission frequency of dynamic characteristics of primary and secondary school teachers' competence is 1200, the load of primary and secondary school teachers' competence is 200 MBps, the fuzzy cluster center of primary and secondary school teachers' competence is (0.21,0.45), the sampling interval of characteristic sampling is $t_0 = 12s$, and the environmental parameters of dynamic distribution of primary and secondary school teachers' competence are given in Table 4.

According to the above simulation environment and parameter settings, taking 411 teacher competency literature in the core database of Web of Science (2008–2017) as the research object, the teacher competency model scheduling

TABLE 3: Distribution factors of primary and secondary school teachers' competency traits.

| Ability elements	Morphological component	Correlation dimension
Online classroom organization ability	0.139	396.137
Ability to integrate online teaching with disciplines	0.138	511.357
Reflection ability of online teaching after class	0.132	167.329
Team cooperation ability	0.136	315.086
Communication skills	0.138	503.388
Time management ability	0.130	251.623
Strain capacity	0.135	332.840
Emotional management ability	0.134	158.676
With benevolence	0.139	343.437
Patient	0.133	68.739
Affinity	0.136	497.530
Tolerate	0.139	321.700
Humorous	0.133	6.347
Respect students	0.136	234.277
Empathy ability	0.136	335.865
Consciousness of democracy and fairness	0.137	451.977
Conscientiousness	0.134	226.130
Professional development intention	0.130	503.029
Forward thinking	0.133	326.749
Lifelong learning ability	0.131	132.172
Self-learning ability	0.133	207.449
Emotional awareness	0.133	185.344
Professional accomplishment	0.134	436.587
Online seminar ability	0.132	523.324
Adaptability of online teaching means	0.139	223.224
Online teaching enthusiasm	0.137	43.140
Online teaching investment	0.139	42.922
Unique online teaching style	0.130	41.736
Concentration	0.136	40.329
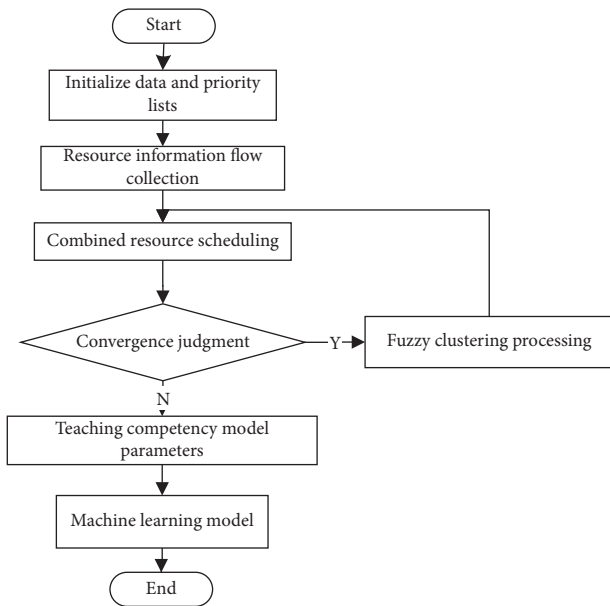
FIGURE 2: Implementation process of algorithm.

and information fusion in primary and secondary schools are carried out, and the assessment of primary and secondary school teachers' competency is obtained. The statistical results of the data are shown in Figure 3.

Taking the big data of Figure 3 as the research object and the test sample set, the model mining and information fusion

of primary and secondary school teachers' competency are carried out under the machine learning model, and the ontology information feature quantity of primary and secondary school teachers' competency is extracted, and the result of the feature extraction of primary and secondary school teachers' competency is shown in Figure 4.

According to the analysis shown in Figure 4, the ability to extract the characteristics of primary and secondary school teachers' competency is better by using this method, with the decibel number of anti-interference suppression reaching 12.4 dB, the ability to suppress redundant information being strong, and the information gain being increased by 12.5%. Based on this, data clustering is carried out, and KMO test and Bartlett test are used to realize factor analysis and reliability test, and the accuracy of primary and secondary school teachers' competency is analyzed. The comparison results are shown in Figure 5.

Figure 5 shows that the correlation coefficient of primary and secondary school teachers' competency assessment is 0.89, which indicates that primary and secondary school teachers' competency assessment has an obvious promotion effect, which is 8.34% higher than the traditional method, and the calculation time is 21.34% lower, with superior performance.

The experimental objects are evaluated by using the model in this article, the model in reference [6], and the model in reference [7], respectively. The efficiency results of the evaluation are given in Table 5.

TABLE 4: Parameter setting.

| Ability elements	Joint matching coefficient	Regression analysis value	Variance
Online classroom organization ability	4.238	29.576	0.381
Ability to integrate online teaching with disciplines	4.021	7.967	0.339
Reflection ability of online teaching after class	4.012	20.820	0.344
Team cooperation ability	4.121	2.528	0.363
Communication skills	4.034	17.428	0.401
Time management ability	4.239	28.468	0.367
Strain capacity	4.295	27.863	0.330
Emotional management ability	4.222	4.174	0.391
With benevolence	4.163	20.569	0.353
Patient	4.216	28.386	0.396
Affinity	4.174	12.994	0.353
Tolerate	4.071	18.608	0.384
Humorous	4.333	19.532	0.364
Respect students	4.047	8.106	0.399
Empathy ability	4.275	11.689	0.387
Consciousness of democracy and fairness	4.271	26.232	0.338
Conscientiousness	4.118	13.650	0.334
Professional development intention	4.004	20.537	0.357
Forward thinking	4.006	14.204	0.327
Lifelong learning ability	4.114	12.075	0.385
Self-learning ability	4.177	12.022	0.396
Emotional awareness	4.324	11.418	0.341
Professional accomplishment	4.048	9.521	0.383
Online seminar ability	4.205	0.694	0.404
Adaptability of online teaching means	4.259	32.040	0.361
Online teaching enthusiasm	4.053	2.430	0.378
Online teaching investment	4.025	2.484	0.374
Unique online teaching style	4.299	2.449	0.334
Concentration	4.075	2.598	0.397

(a)

(b)
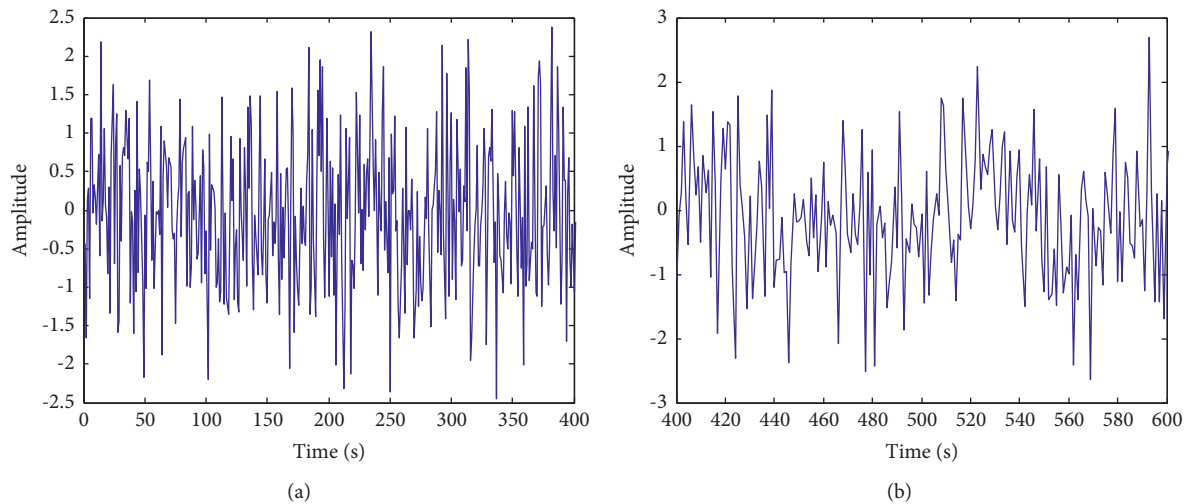
FIGURE 3: Continued.

(c)
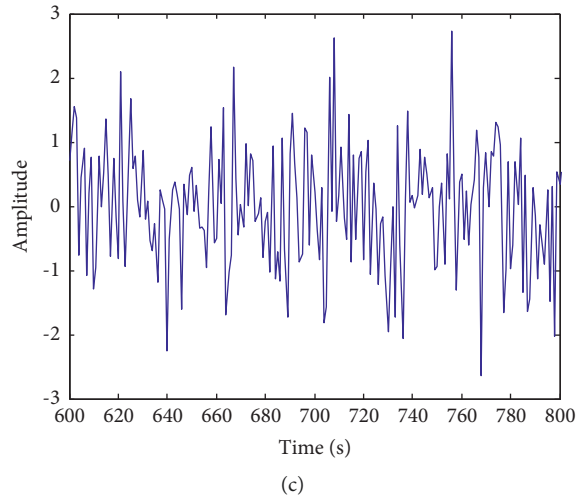
FIGURE 3: Statistical analysis results of primary and secondary school teachers' competency data: (a) sample 1, (b) sample 2, and (c) sample 3.
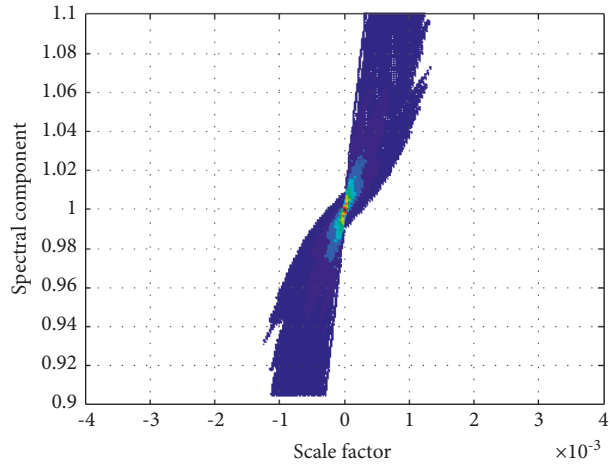

FIGURE 4: Results of extracting the distribution characteristics of primary and secondary school teachers' competence.
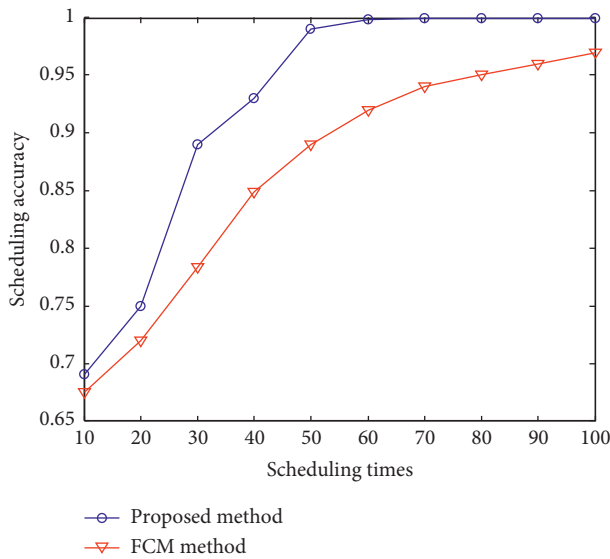

FIGURE 5: Comparison of the accuracy of primary and secondary school teachers' competency assessment.

TABLE 5: Comparison results of evaluation time of three models.

Data volume/GB	Model of this article/s	Wang et al.' [6] model/s	Jia et al.' [7] model/s
10	3.12	6.32	7.24
20	4.98	8.11	9.38
30	5.06	11.69	11.78
40	6.57	15.98	14.29
50	7.36	18.56	18.28
60	8.11	23.46	24.69
70	9.89	28.91	29.17
80	11.24	34.67	33.78
90	13.99	40.15	41.53
100	15.33	50.78	51.57

According to Table 5, it can be seen that with the continuous increase of the amount of data, the risk assessment time of the three models has been improved. The improvement of the evaluation time of the model in this article is significantly lower than that of the other two models, and the overall evaluation time is also significantly lower than the other two models. The average evaluation time of the model in this article is 8.57 s, the average evaluation time of reference [6] model is 23.86 s, and the average evaluation time of reference [7] model is 24.17 s. Experiments show that the evaluation time of the model in this article is less, that is, the evaluation efficiency is high.

5. Conclusions

In this article, a competency model of primary and secondary school teachers based on an improved machine learning algorithm is proposed. Construct a fitting parameter analysis model of primary and secondary school teachers' competence, combine with reliability index parameter analysis, extract fitting benefit parameters of primary and secondary school teachers' competence according to teacher assessment, evaluation, post allocation and other index parameters, adopt difference data analysis method, according to the corresponding characteristic elements that participants should have to complete a certain task and achieve a certain achievement goal. The improved machine learning algorithm is used for quantitative analysis and feature factor analysis in the process of primary and secondary school teachers' competency assessment, and the internal content of primary and secondary school teachers' teaching competency model is determined, that is, the competency factors are encoded at the first level and at the second level by literature analysis and interview with famous teachers, and the competency factors are conceptually classified according to the machine learning model, and the analytical model of online teaching competency theory parameters of primary and secondary school teachers is constructed to realize the competency assessment and quantitative analysis. KMO test and Bartlett test are used to realize factor analysis and reliability test. The results of simulation analysis show that the reliability and accuracy of primary and secondary school teachers' competency assessment by this method are good, and the level of credibility is high.

According to the questionnaire survey and interview, although there are some problems in teachers' online teaching competence, teachers have a positive attitude toward improving their online teaching competence. After the normalization of epidemic teaching, the teaching mode of combining online teaching with offline teaching will be further applied, and it is still very important to develop teachers' online teaching competence. Based on the information and problems obtained from the above surveys and interviews, the following suggestions are put forward for reference: according to the current survey of teachers' competency, it can be seen that teachers' "self-development" awareness is not very strong in teachers' online teaching competency. To improve teachers' online teaching competency, teachers need to improve their subjective awareness of progress, which requires the education management department to summarize and refine the excellent experience and practices in the online teaching process, set up corresponding incentive measures for teachers, set examples, and encourage them from point to area. For example, first, if excellent and effective teaching activity design is widely promoted, excellent teaching activity cases can be selected in schools and teachers can be rewarded according to the situation. Second, to carry out the twinning activities, young teachers and old teachers can help each other. Young teachers help old teachers to improve their information-based teaching ability, and old teachers impart young teachers' teaching experience, which can promote each other's online teaching. School administrators can reward outstanding teachers and apprentices at the end of the semester. Third, encourage teachers to innovate. In the era of rapid development of multimedia, teachers who can innovate online teaching methods should be widely publicized and set a typical example.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

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