



Application of Artificial Intelligence Technology in Curriculum Evaluation System of Primary and Middle Schools

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Abstract. How to evaluate the quality of primary and secondary school curriculum objectively and quantitatively is a difficult task. Intelligent teaching is to implement online teaching through network platform. Teachers and students through the wisdom of classroom, the completion of teaching and learning, mainly reflected in teachers, students and the media, the three roles of synchronous implementation of teaching and learning scene. This paper proposes to take the Internet as the main body, the intelligent information processing as the technical support, and use classroom video evaluation to analyze students' behavior in the classroom, using teachers' speech recognition and speech emotion recognition to analyze teaching content and teaching methods, combining curriculum software and high frequency vocabulary, to build an intelligent and comprehensive curriculum evaluation system for primary and secondary schools, finish the synchronous classroom of teacher end and student end, so that artificial intelligence technology can be used effectively.

Keywords: Artificial Intelligence · Intelligent Teaching · Course Evaluation

1 Introduction

In the new era, the development of Internet and media has greatly enriched the educational contents of students, widened the teaching channels and accelerated the dissemination of information. At the same time, Internet + has also promoted the innovation of traditional teaching methods, contents and models. How to improve the quality of primary and secondary school curriculum, increase students interest in learning, and enhance the effectiveness of teaching and learning, has been a continuous exploration of primary and secondary school curriculum. The innovative development of artificial intelligence (AI) technology has enabled the continuous application of new technologies and new products in the curriculum of primary and secondary schools, enriching the teaching contents, there are more and more on-line teaching and real-time evaluation based on mobile intelligent terminal. How to use artificial intelligence technology to help evaluate teaching quality and analyze students' cognitive level and reaction to teaching content intelligently, is the main objective of this article.

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2 The Problems Existing in the Traditional Curriculum Quality Evaluation of Primary and Secondary Schools

Under the background of Education Information Network globalization, on the one hand, the evaluation of primary and secondary school curriculum level is obtained through the assessment of primary and secondary school teachers, on the other hand, it is obtained through the horizontal comparison of the whole performance level of the class led by primary and secondary school teachers. For a long time, there are many problems in how to accurately evaluate the quality of primary and secondary school curriculum and how to compare the teaching situation. In order to improve the teaching quality, we must objectively evaluate the reading and analysis ability of teachers in different knowledge points, as well as the learning effect and learning interest of students through a series of quantitative indexes, but so far there is no effective way.

3 Primary and Secondary School Curriculum Evaluation System

The curriculum evaluation system in primary and middle schools refers to the research, statistics, analysis and review of teaching objectives, teaching organization, teaching activities, teaching styles, teaching styles and teaching achievements in accordance with educational laws, as well as through the teaching information feedback effective standardized teaching to promote the continuous consolidation and improvement of teaching management system. In fact, the application of artificial intelligence in the course quality evaluation of primary and middle schools is mainly to collect, statistic, analyze, evaluate, feedback and revise the information of all kinds of activities in the course of teaching, artificial intelligence is used to supervise the teaching quality under the guidance of teaching leaders, and to provide educational consulting service for teachers and students in primary and middle schools [3] (Fig. 1).

This learning method has its advantages and disadvantages: most of the existing supervised learning methods can not be used for real-time knowledge accumulation,

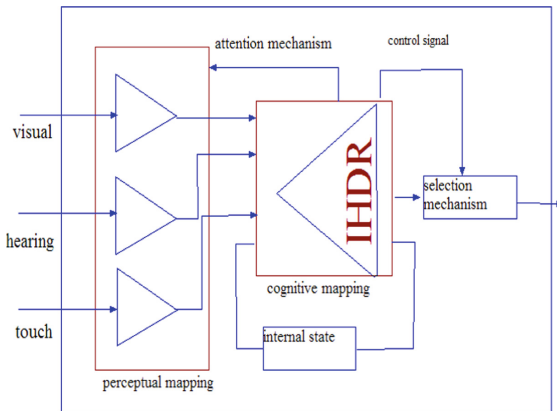


Fig. 1. ihdr intelligent technology models

that is, when a new training sample appears, it needs to be re-learned, this shortcoming makes supervised learning methods difficult to work in non-specific tasks and environments; unsupervised learning methods can also be applied to the classification and identification of data, but in contrast to supervised learning, the recognition efficiency is low; reinforcement learning is also a supervised method, but it does not give the corresponding output variable quantitatively in the training, but with qualitative reward or punishment, it is that the computer gradually finds an optimal input-output mapping relationship through constant trial and error, and the reinforcement learning method is widely used in many specific tasks where the output variables can not be given explicitly, such as intelligent system movement training, sound simulation and so on [2].

In the evaluation of teaching quality, artificial intelligence can enhance the automation of information collection, processing, analysis and feedback of various systems, and provide scientific and fair evaluation, it is an important part of primary and secondary school curriculum quality assurance, and has good promotion and research value.

3.1 Model Algorithm of Artificial Intelligence in Primary and Middle School Curriculum Quality Evaluation

Artificial Intelligence (AI) technology is mainly applied to supervised learning in course quality evaluation. One of the Achilles'heel of reinforcement learning is that it can put intelligent systems at risk. Compared with the previous reinforcement learning methods, the main representative is the Q-Learning algorithm.

3.1.1 Algorithmic Thinking

$Q(s, a)$ is the expectation that an action a ($a \in A$) can get a profit when the action a (s, a) is taken in an S state at a certain time, the environment rewards R based on the agent's actions, so the idea is to build a Q -table of states and actions to store Q values, then, according to the Q value, the actions that can get the maximum benefit are selected. As shown in Table 1.

3.1.2 Formula Derivation

The main advantage of Qlearning is that it can do off-line learning by using time difference TD (combining Monte Carlo with dynamic programming), and Bellman equation can be used to solve the optimal strategy for Markoff process.

Table 1. q-table data

Q-Table	a1	a2
S1	$q(s1, a1)$	$q(s1, a2)$
s2	$q(s2, a1)$	$q(s2, a2)$
S3	$q(s3, a1)$	$q(s3, a2)$

For example, a GridWorld game starts at the beginning and ends at the end. Agents, environments, rewards, and actions can abstract a problem into a Markoff decision-making process. We are a state s_t in each grid, $\pi(a|S)$ takes the action a strategy in the S state. $P(s'|s, a)$ can also be written as the probability of choosing an action a in S to switch to the next state s . $R(s'|s, a)$ is the reward for taking the a move to s' in the S state. Our goal is clearly to find a strategy that maximizes the reward for reaching the finish line.

An MDP is defined by:

- Set of states S
- Set of states S
- Set of actions A
- Set of actions A
- Transition function $P(s' | s, a)$
- Transition function $p(s' | s, a)$
- Reward function $R(s, a, s')$
- Reward function $r(s, a, s')$
- Start state S_0
- Start State S_0
- Discount factory
- Discount factory
- Horizon H

By Horizon H .

So the goal is to figure out the expectation of the strategy with the greatest cumulative reward:

$$\max_{\pi} E \left[\sum_{t=0}^H \gamma^t R(S_t, A_t, S_{t+1}) | \pi \right] \tag{1}$$

Goal:

Bellman equation.

By solving the optimal decision sequence of Markov decision process through Bellman equation, the state value function $v^*(s)$ can evaluate the quality of the current state. The value of each state is determined not only by the current state, but also by the later state, so the state value function $v(s)$ of the current S can be obtained by calculating the expectation of the cumulative reward of the state. The Bellman equation is as follows:

$$V_{\pi}(s) = E(U_t | S_t = s) \tag{2}$$

$$V_x(s) = E_x[R_{t+1} + \gamma [R_{t+2} + \gamma [\dots]] | S_t = s] \tag{3}$$

$$V_s(s) = E_x[R_{t+1} + \gamma R_{t+2} + \gamma V(s') | S_t = s] \tag{4}$$

The optimal expected value can be expressed by $V^*(s)$, and the optimal function can be known:

$$V^*(s) = \max_{\pi} E \left[\sum_{t=0}^H \gamma^t R(S_t, A_t, S_{t+1}) | \pi, s_0 = s \right] \tag{5}$$

The optimal value action function opens with the following expectation:

$$Q(s, a) \leftarrow Q(s, a) + \alpha[\gamma + \gamma \max_{a'} Q(s', a') - Q(s, a)] \quad (6)$$

The Bellman equation is actually the transformation relation of value action function:

$$V_{\pi}(s) = \sum_{a \in A} \pi(a|s) q_{\pi}(s, a) \quad (7)$$

$$q_{\pi}(s, a) = R_s^a + \gamma \sum_{s' \in S} P_{ss'}^a V_{\pi}(s') \quad (8)$$

$$V_{\pi}(s) = \sum_{a' \in A} \pi(a'|s) \left[R_s^{a'} + \gamma \sum_{s' \in S} P_{ss'}^{a'} V_{\pi}(s') \right] \quad (9)$$

$$Q^*(s, a) \leftarrow \sum_{s'} P(s'|s, a) (R(s, a, s') + \gamma \max_{a'} Q^*(s', a')) \quad (10)$$

3.1.3 Update Formulas

Q value can be calculated according to the above derivation, so with Q value we can learn, that is Q-table update process, where. In order to study the rate of decay, the time difference method was used to update the decay coefficient.

$$\begin{aligned} Q_{k+1}^*(s, a) &\leftarrow \sum P(s'|s, a) (R(s, a, s') + \gamma \max_{a'} Q_k^*(s', a')) \\ K &= 100 \end{aligned} \quad (11)$$

The above formula is the updated formula of Q-learning, according to the next State S, choose the largest Q value times the decay ya plus the real return value is the most Q reality, and Q (s, a) from the past is the Q estimate [1].

3.2 The Index Content of Using Artificial Intelligence to Evaluate the Quality of Primary and Middle School Curriculum

3.2.1 Application Analysis of Students' Listening Behavior Based on Artificial Intelligence

In-depth teaching theory of artificial intelligence technology can realize behavior feature recognition. Examples include Boltzmann machines for constructing depth belief networks, Galway's convolutional neural network for extracting higher order features from video images, independent subspace analysis for simulating neural responses, and so on. These new technologies overcome the technical bottlenecks in the field in the past. Based on these new techniques, the process of analyzing students' attentional behavior is as follows: (1) using facial recognition to count the number of students present in the class and the actual number of students needed to attend the class, according to the proportion of face features recognized by continuous video images, the number of student bow, and then the frequency of student bow, according to the number of students bow, (3) the number of students who remain relatively still in a continuous video image with an incomplete face and upper body contour, based on continuous video image recognition, you get the number of students who are currently napping and the student's napping rate. Therefore, the above-mentioned student attendance rate, student head-down rate, abnormal attendance rate and student drowsiness rate are transmitted to the data analysis server for further processing (Fig. 2).

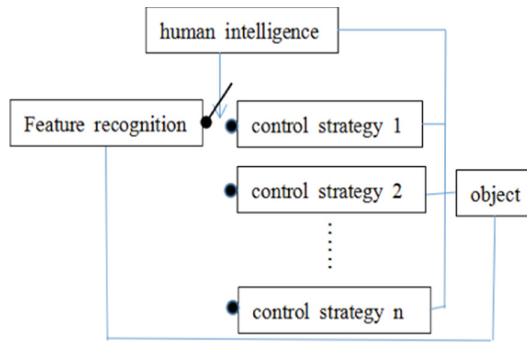


Fig. 2. Working Principle of artificial intelligence technology application schematic diagram

3.2.2 Emotional Analysis of Primary and Middle School Teachers Based on Artificial Intelligence

The curriculum emotion in primary and middle schools undoubtedly plays an important role in guiding and motivating the students' cognition and understanding of the knowledge they have learned. Speech emotion recognition is a technology that has emerged in recent years. Relying on artificial intelligence and big data analysis technology, its application can greatly improve the human-computer interaction ability, such as smart phone customer service, intelligent business terminal, intelligent robots and so on. Among them, the knowledge base of the primary and middle school curriculum stores the relevant knowledge texts of the primary and middle school curriculum, provides the algorithm support through the neural network teaching model for the primary and middle school curriculum analysis, analyzes the content of the primary and middle school curriculum and its affective analysis, and evaluate it.

3.2.3 Evaluation of Curriculum Quality in Primary and Secondary Schools

After TES processing and analysis, information such as students' classroom behavior, teachers' curriculum content and so on were tracked in each class, responsible for statistics of primary and secondary school teachers, number of students in the class, student attendance, student bow frequency, abnormal attendance rate, student drowsiness rate, high frequency vocabulary and professional primary and secondary school teachers described vocabulary, identify emotional characteristics, evaluate the teaching styles of different classes, and evaluate students' interests. According to the teaching content, it can realize automatization and intelligentization, and evaluate the teaching quality and the listening quality of the students. By providing quantitative data indicators for teachers in primary and secondary schools to improve the teaching content, classroom quality and effect can be evaluated objectively, quantitatively and comprehensively to provide a basis for decision-making on teaching content reform [4].

3.3 The Process of Artificial Intelligence in Primary and Middle School Curriculum Quality Evaluation

It is a function of in-depth teaching to study the internal rules and presentation levels of sample data. In the development of artificial intelligence in primary and secondary school curriculum evaluation system, in-depth teaching algorithm of the convolutional neural network model used to evaluate the quality of teaching. The first is to establish an evaluation index system of educational quality. The second is to use the convolutional neural network model to study teaching samples, that is, samples of expert evaluation of teaching quality. After testing the teaching samples, the evaluation model of primary and middle school curriculum quality is established. Finally, the teaching quality is evaluated and analyzed by input samples. Deep learning algorithms based on convolutional neural network are the search for local features in teaching quality assessment data. The aggregation layer reduces the number of input nodes in the next layer by reducing model complexity. This is done by aggregating the output nodes of the convolution layer into a fixed window length. The results of most aggregation layers are the maximum of nodes within a fixed window length, and the data of all aggregation layers are evaluated by teaching quality.

In-depth teaching algorithm evaluation of teaching quality system architecture is based on B/S model to develop in-depth teaching algorithm of primary and secondary school curriculum evaluation system, users can complete online evaluation in a short time, and convenient system maintenance. User Terminal, application module and database are the three important parts of the system. User terminals include many types of users, such as administrators, primary and secondary school teachers and students. Application Module covers user management, online evaluation, data management, evaluation results query several aspects. The database stores valuable data, such as data on teaching evaluation indicators and data on evaluation topics. The following Fig. 3 are the main modules:

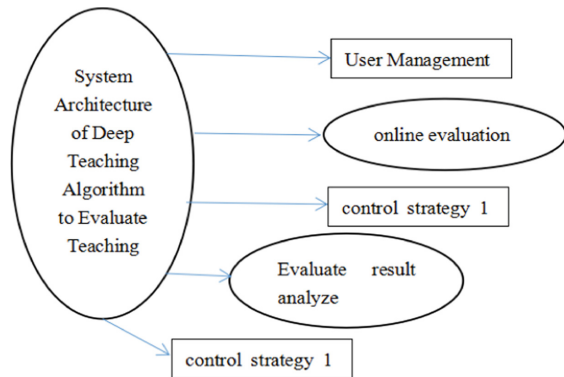


Fig. 3. In-depth teaching algorithm evaluation of teaching quality system framework

3.3.1 User Management

Divided into two aspects of login and security management. Different types of users are included in the system for evaluating the quality of teaching and learning, depending on the entry point of each department. Considering the security of user information, the user terminal includes many kinds of users, such as administrators, teachers and students.

3.3.2 On-Line Evaluation

The opening time of the module authority is usually at the end of the semester or during the special use period, the administrator opens the authority to evaluate the quality of primary and secondary school courses. The online evaluation module has restrictions on the types of users, users have different access to the interface management database, for example, students are only allowed to evaluate the quality of teaching teachers and their own teaching effect. The main body of teaching quality evaluation is students, primary and secondary school teachers and experts.

3.3.3 Data Management

The function of data management block is to maintain relevant data to evaluate teaching quality, the main function is to control two aspects of data: one is to use data sources and manage them; the other is to manage the basic information of teachers and students.

3.3.4 Analysis of the Evaluation Results

Through the analysis of the evaluation results to understand the teaching quality of primary and secondary school teachers, according to the different curriculum grades and different teaching reference materials to analyze the advantages and disadvantages of teaching; Administrators can do more than just these two types of content. It also has the ability to query background data, which provides a basis for primary and secondary school teachers to optimize the quality of teaching [5].

4 Conclusions

Use of artificial intelligence to assess the benefits of curriculum quality in primary and secondary schools. How to evaluate the quality of primary and secondary school curriculum reasonably, objectively and quantitatively has been the focus of the experts and scholars in related fields. This paper proposes an evaluation method of primary and secondary school curriculum quality, which is based on artificial intelligence and takes students' classroom behavior and teachers' emotion as the analysis object. The implementation and application of this method can help primary and secondary school teachers to understand and recognize the knowledge gained in the curriculum. Through the analysis and quantitative statistics of Students' intelligence, it can help primary and secondary school teachers to master the teaching process, then help primary and secondary school teachers improve teaching methods, improve students' ability to listen to lectures. At the same time, it also helps to obtain the quantitative results of the teaching

quality of every class, every course and every primary and secondary school teacher in time [5].

Artificial intelligence can collect information timely, accurately and comprehensively, and improve students' understanding and understanding of evaluation through students' online evaluation of the teaching situation of primary and middle school teachers, create and maintain a relatively relaxed evaluation environment. Only the indicators need to be entered into the computer during the evaluation, thus making the data collected more complete, accurate and timely and minimizing errors. Moreover, it is convenient for students to understand the meaning of the evaluation system. Thanks to the artificial intelligence system, the contents of the evaluation indexes displayed and explained in the online evaluation education are relatively complete and clear, and students can easily understand the contents of the evaluation indexes, in order to avoid the different understanding index of the evaluation, the author analyzes the students' classroom behavior through the classroom evaluation, and combines the teaching materials of primary and middle school teachers to evaluate the teaching results comprehensively.

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