

Application of Short Video Semantic Understanding Technology Based on Big Data Analysis in Education Management

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ABSTRACT

With the emergence of short video and the development of mobile internet, short video software, such as TikTok and Kwai, has emerged. Based on the semantic understanding technology of teaching short videos, a teaching management platform was built to push healthy and positive short video for students' content in a targeted way. Taking the 21st grade students majoring in Chinese in Guizhou Normal University as an example, the authors discuss the effect of teaching management platform on college students. In this process, the following conclusions are drawn: (1) Among college students, the viewing rate of short videos has exceeded 95%, and short videos have become an indispensable entertainment for most college students. (2) Through short video semantic understanding technology and short video screening program, excellent short video can be effectively pushed to students. (3) The actual effect shows that the short video teaching management platform can effectively improve the values of the cultural level of students.

KEYWORDS

Big Data, Education Management, Key Frame Positive Energy, Semantic Understanding Technology, Short Video

INTRODUCTION

Nowadays, short videos are presented in a new form of "music + video + social" and attract the attention and participation of many college students. Short video is a new form of video content created with the help of new media platforms. Each video takes only seconds to watch, meeting the needs of people's fast-paced lives. Users can enjoy audio-visual experiences and obtain refined content in their fragmented time. In the new media era, short videos are undoubtedly another way to share culture (Chen et al., 2020). Short videos are easy to make on a mobile phone without professional equipment, attracting many filmmakers to participate (Dai et al., 2021). In addition, viewing short

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videos is simple; users simply open the app to see rich and diverse content. In addition, short videos allow users to interact and communicate. Therefore, short videos, mobile live broadcasts, and other content affect people's information lives (Abbas & Ojha, 2019; Lynch et al., 2022). In the context of education management, short videos can be used to educate students and establish healthy values (Schneider et al., 2020).

Many scholars have studied and explored the application of short video technology in education (Weber et al., 2018; Sharma et al., 2021). Qiu et al. (2017) proposed a deep spatiotemporal full convolution network architecture (DST-FCN), which trains pixels and voxels in an end-to-end manner, providing an effective means for short video analysis. Qin et al. (2020) adopted a three-layer semantic recognition method based on keyframe extraction, which has a high recognition accuracy based on specific data sets and effectively recognizes the semantics of roles and behaviors in video. An algorithm combining keyframe extraction and video scene semantic recognition has improved the recognition accuracy and effect of video character semantics (Suresha et al., 2020). Drawing on short video podcasts, Kay et al. (2012) and Nie et al. (2019) provided a set of short audio-visual videos that focused on how to solve specific program problems in the field of mathematics, covering five key areas (functional operations, equation solving, linear functions, exponential and logarithmic functions, and trigonometric functions). They found that some college students improved their calculus skills by using these short videos. Chen et al. (2021) analyzed the content of more than 800 TikTok short videos and explored how they can promote students' patriotism as part of online education. Based on the production of short videos, Liu (2021) designed a fuzzy evaluation system for the quality of physical education teaching, formulated a comprehensive evaluation table and calculation formula for physical education teaching, and quantitatively evaluated social science and humanities courses. Ricciotti (2017) developed a teacher training toolkit based on short videos and conducted a comparative experiment to explore the advantages of the toolkit in cultivating students' practical operation abilities. Expósito (2020) applied short videos to academic areas that lagged behind in terms of using multimedia teaching technology, proving the effectiveness of video teaching.

The above research shows that the continuous development of short video semantic understanding technology is required to promote the current short video trend and support learning management. Without short video semantic understanding technology in the face of massive video data, it is impossible to judge the practical significance of short videos, which thus cannot be applied to learning management. Based on the characteristics of existing short videos, we can improve students' cognitive direction through targeted screening of short videos to facilitate the education and management of college students. By analyzing the characteristics of short teaching videos, this paper designs a short video semantic analysis system framework and establishes a short video education management platform to select healthy, positive-energy short video content. The platform can improve teaching quality and stimulate students' interest in learning. Short videos can convey knowledge and skills visually and intuitively, which helps increase students' interest and engagement in learning.

This paper focuses on content innovation. Compared with traditional new media, such as QQ, WeChat, and Weibo, short videos can quickly become popular among college students and stimulate youth participation. The study summarizes the significant features of short videos that make them different from previous communication media, such as their concise content, rich resources, personalized pushing, and two-way interaction. It analyzes how they influence college students by combining these characteristics. On this basis, we explore the current application of short videos among college students through empirical research, incorporating the advantages and positive aspects of short videos, exploring basic principles and specific measures, and providing recommendations for promoting the innovative development of college education in the new era, starting from the educational objects and subjects.

DEVELOPMENT STATUS OF SHORT VIDEOS

Concept and Characteristics of Short Videos

With the widespread popularity of short video platforms such as TikTok and Kwai, the number of users and the utilization rate of short videos continue to increase yearly. A short video refers to a video clip with a duration of 1–20 minutes that is recorded and played using various video terminals. Short video teaching involves the use of short video resources for teaching and learning.

The advantages of short video teaching include teacher sharing, online teaching, student mobility, and timely learning. Short video teaching not only has the characteristics of short videos but also has educational characteristics. Short video teaching uses a particular kind of video for the purpose of education. The characteristics of short videos, which combine sound and images, allow them to be used to spread knowledge anytime and anywhere. Knowledge that students find boring or difficult to understand can become more graphic and understandable through short videos. Short videos are short, concise, vivid, and repeatable. In a traditional classroom, teachers can explain a knowledge point using words, pictures, PowerPoint slides, and other teaching resources; however, more abstract and complex concepts can be difficult to explain using only words or pictures. The short video can also play a role in integrating theory with practice, such as when the effect of a demonstration experiment is poor. Short video teaching has become an indispensable auxiliary method in the classroom due to its short format and use of intuitive images. It has brought significant changes to teachers' approaches and students' learning habits.

Compared with other formats, short videos can present information through real-life situations. Students can capture a large amount of information quickly, which helps them form their own views. Short videos are also easier to remember, encode, save, and connect with existing knowledge. Moreover, short video teaching is more conducive to students' understanding and memory, and structured and fragmented teaching videos are conducive to focusing learners' attention, thus improving the learning effect. Through the advantages of short videos, schools can deeply educate and enlighten students, shape their cognitive abilities and values, and lead students to make efforts toward personal development.

The application of short videos in education also faces several challenges. First of all, the production of short videos requires professional skills and tools. For some teachers and students, this may involve a steep learning curve. Secondly, the content quality of short videos must also be guaranteed, paying attention to the accuracy and legitimacy of the information and its role in guiding students.

Short Video Viewing Among Students

The content of short videos affects students' learning and various aspects of their lives. To study the impact of short videos on student groups, we must pay attention to the number of short video platform users and analyze their characteristics. For example, students need to understand their current usage of short videos.

This paper uses a questionnaire to collect relevant data on the current situation of students' use of short videos. The survey lasted for two months, during which we distributed 550 questionnaires, of which 545 were returned and 539 were valid. Table 1 shows the composition of the respondents. As seen in the table, the sample is divided into four grades, from freshmen to seniors. Each grade comprises about 25% of the sample, indicating that a similar proportion of students in each grade took part in the survey. The number of male students is 281, and the number of female students is 258; the proportion of male and female students is also close to 50%.

Based on the collected data, Figure 1 displays the proportion of students using and watching short videos. Among the 539 students surveyed, 531 students have short video software on their mobile phones, and all reported watching short videos in the last week, accounting for 98.7%. Only eight students have no short video software on their phones and reported not seeing a short video

Table 1. Statistics of respondents

Grade Gender	Freshman	Sophomore	Junior	Senior	Total
Male	69	59	74	79	281
Female	59	61	70	68	258
Rate	23.7%	22.3%	26.7%	27.3%	100%

within a week, accounting for only 1.3% of the sample. In addition, the eight students who had not used short videos explained that they had recently been busy for various reasons, such as taking the postgraduate entrance examination, rather than never using short videos. This shows that short videos are widely used by college students.

Figure 2 shows the results of a statistical analysis of the usage of short video apps. As seen in the figure, TikTok has the highest usage rate, with a total of 417 students using it, followed by Kwai, with 298 people using it. The overall usage also indicates that each student uses more than one app to watch short videos. Many popular short video apps have emerged on the market, indicating that this type of platform is experiencing a rapid development stage and that many apps can develop and survive simultaneously.

Figure 3 displays the survey statistics on the time students watch short videos daily. Approximately 21% of students watch short videos for more than 3 hours every day, 13% of students watch short videos for 2–3 hours, 37% of students watch short videos for 1–2 hours, and only 29% of students watch short videos for less than 1 hour. These results show that short videos occupy a large amount of students' time, as 71% of college students watch short videos for more than 1 hour per day. Thus, short videos have become an indispensable form of audio-visual content in many students' lives. Due to this excessive time investment, students need to watch fewer short videos in an attempt to reduce their addiction to videos.

Our analysis of the questionnaire data indicates that more than 95% of college students watch short videos. At present, the short video industry is booming, and a large number of short video platforms have emerged, such as TikTok, Kwai, and Vision (Garcia-Garcia et al., 2018). On the other hand, students spend significant time watching short videos every day, consuming much of their learning time. In sum, short videos have profoundly affected students' learning and lives. From the perspective of students' use of short videos, it is feasible to integrate short videos into students'

Figure 1. Proportion of students watching short videos

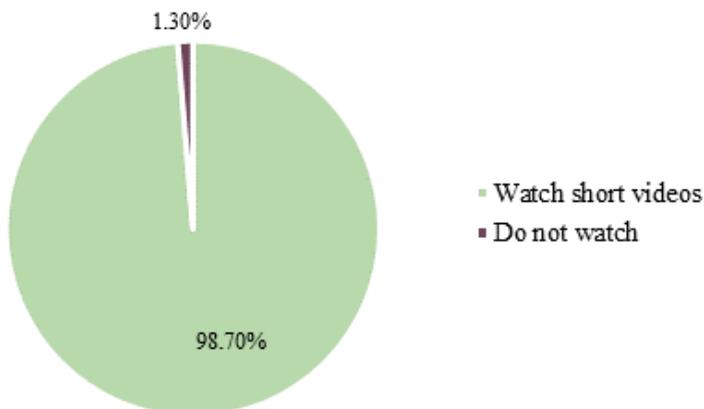


Figure 2. Number of users of short video apps

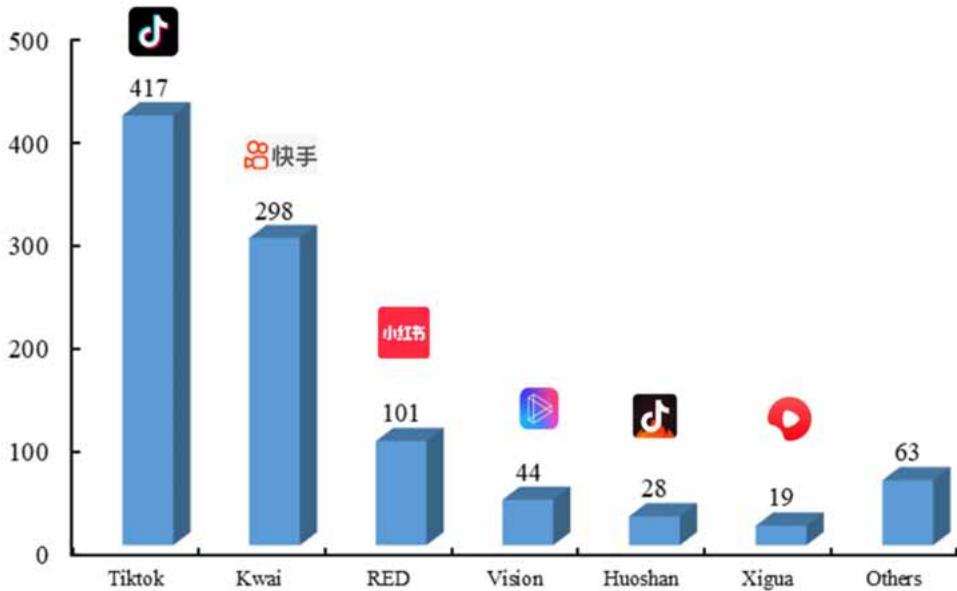
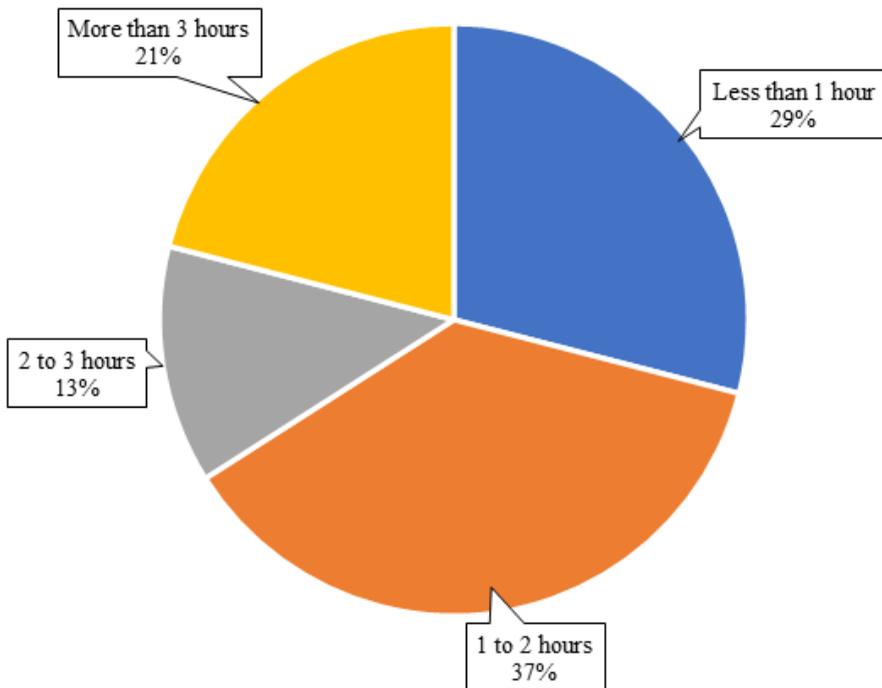


Figure 3. Time consumed by students watching short videos daily



education and learning management, which is a demand of students themselves and an inevitable requirement in short video development.

In studying the impact of short videos on college students, 46.9% of students think that short videos can expand their horizons and promote learning, while 25.7% think they can control their use and that they have no effect on learning. A few students always want to watch videos, which affects the quality and efficiency of their studying; even when they watch it, they cannot control it. It affects their sleep, and they do not have the energy to listen to the lecture the next day. This accounts for a relatively small percentage of students, which shows that college students think that short videos have a more positive influence than a negative influence. The university students were optimistic about the role of short videos in practical learning and the possibility of their implementation.

As shown in Table 2, some college students are addicted to short videos, and in response to this situation, we propose management measures that strengthen value guidance. To enhance the value of cognitive education for students, educators should focus on the phenomena of silly fun, infantilism, and pan-entertainment in short video culture, cultivating students' critical thinking based on scientific evaluation and analysis of undesirable phenomena in short videos, letting students remove the misconception of cognitive bias, and preventing college students from losing themselves in the pan-entertainment of short videos.

When watching a video, the stimulation activates the brain's reward pathway. Neurons within the reward pathway release large amounts of dopamine, allowing the brain to associate a specific behavior with pleasure and creating a desire to perform the behavior again. This is why students are addicted to short videos.

APPLICATION OF SHORT VIDEOS IN EDUCATIONAL MANAGEMENT

Short Video Semantic Understanding Technology

Short video semantic understanding technology is the basis of short video applications. To apply short videos to learning management, we must first clarify the practical significance of short video communication. Short video semantic understanding involves fields such as computer vision, natural language processing, and knowledge mapping, and is a comprehensive cross-research direction (Masruddin, 2018). Many methods exist for video understanding; among these, information extraction (Wang et al., 2022) and semantic analysis (Tang et al., 2021) of video data from the semantic level are effective methods for video understanding tasks.

Keyframe Extraction

Referring to the idea of image analysis and the characteristics of short teaching videos, this paper adopts the following keyframe extraction method:

First, we sequentially calculate the distance between two adjacent frames in a short video shot:

$$D_m(i, j) = H_m(i, j) - H_{m-1}(i, j) \tag{1}$$

Table 2. Statistics of investigation

Options	Number of People	Proportion
Broaden horizons	253	46.9%
No effect on study	139	25.7%
Affects the quality and efficiency of learning	89	16.5%
Uncontrollable, interferes with listening	58	10.7%

where $D_m(i, j)$ is the (i, j) pixel moving distance of the m frame, $H_m(i, j)$ is the (i, j) pixel position of the m frame, $H_{m-1}(i, j)$ is the (i, j) pixel position of the $m-1$ frame.

Then, we obtain the pixel retention probability of adjacent frame intervals:

$$P = \frac{N_r}{N_t} \quad (2)$$

In the above formula, N_t is the total number of pixels, N_r represents the number of pixels shared between adjacent frames, and its expression is:

$$N_r = \sum_{i=1}^{N_t} Cof \quad (3)$$

where Cof is the pixel residue coefficient:

$$Cof = \begin{cases} 1 & H_{i,j} = H_{l,k} \\ 0 & H_{i,j} \neq H_{l,k} \end{cases} \quad (4)$$

We calculate the keyframe movement parameter T

$$T = \frac{P}{N_t - 1} \sum_{i=1}^{N-1} i D_i \quad (5)$$

Then, we determine the coefficient R

$$R = (0.6 \sim 0.8) \sqrt{N_t} \quad (6)$$

The judgment result can be given according to the moving parameter T and the keyframe decision coefficient R. When $T > R$, the previous frame is the keyframe. If $T \leq R$, the previous frame is not the keyframe. If the keyframe condition is met between two frames, only the last frame will be selected. The keyframes extracted using this method can avoid the limitation of selecting only one keyframe for each shot in the image analysis method, and multiple keyframes can be selected according to the actual situation. This method is simple, flexible, and accurate. In addition, the threshold can be dynamically adjusted according to the actual situation of the lens.

Keyframe Analysis

To analyze the video content according to the keyframes, we can use the artificial intelligence neural network to identify the content, analyze the theme of the content and the general idea reflected by the video, and lay the foundation for the video push.

First, the keyframe is converted into a numerical matrix in the form of a picture. According to the input data X_i , the output Y_i is calculated using the learned neural network. The expression is:

$$Y_i = X_i W_1 W_2 = \sum_{j=1}^n x_j w_{j1} \sum_{j=1}^n x_j w_{j2} \quad (7)$$

where X_i is the data matrix formed by the i^{th} keyframe, x_j is the j^{th} element of the data matrix, n is the number of elements of the data matrix, W_1 is the weight vector of the first implicit function layer, w_{j1} is the j^{th} element of the weight vector of the first implicit function layer, W_2 is the weight vector of the second implicit function layer, and w_{j2} is the j^{th} element of the weight vector of the second implicit function layer.

To evaluate the calculation results of the neural network and avoid making incorrect judgments on keyframes and thus affecting the prediction of the entire video, it is necessary to establish a quantitative evaluation of the loss function. Based on the video content predicted by keyframes, a regression loss function is defined:

$$MSE(y_i, y'_i) = \frac{1}{n} \sum_{i=1}^n (y_i - y'_i)^2 \quad (8)$$

In the above formula, y_i is the correct result described in the i^{th} keyframe and y'_i is the prediction result of the i^{th} keyframe.

To enhance the accuracy of the calculation, it is necessary to learn in time according to the feedback calculation results. In this process, the learning rate should be:

$$R_L^{\text{new}} = R_L^{\text{base}} R_L^{\text{decay}} S_{\text{decay}}^{s_{\text{new}}} \quad (9)$$

In the above formula, R_L^{new} is the learning rate, R_L^{base} is the set learning rate, R_L^{decay} is the learning decay rate, and s_{new} is the number of training rounds among

$$R_L^{\text{decay}} = \frac{y_i - y'_i}{S_{\text{decay}}} \quad (10)$$

$$S_{\text{decay}} = S_{y'} \rightarrow S_{y'+ref} \quad (11)$$

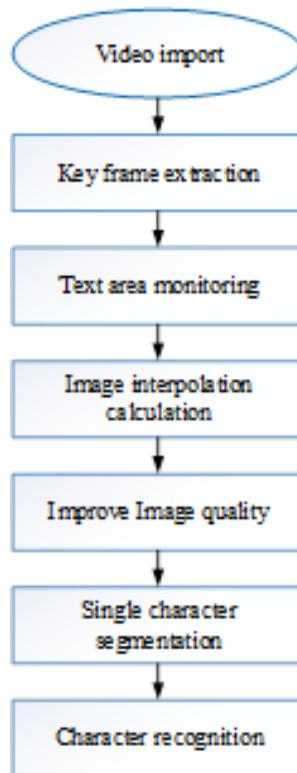
where $S_{y'}$ represents the calculated value of the calculation step y'_i , and $S_{y'+ref}$ represents the calculated value of the calculation step $y' + ref$.

Next, we determine whether the keyframe learning is completed by judging the learning rate and whether the learning effect meets the conditions in combination with the loss function. Finally, we determine whether the prediction result is consistent with the actual situation.

Title Text Extraction and Analysis

The basic process of extracting text from video images is shown in Figure 4. Text field detection divides the image into a text area and a background area to improve the image quality of the text area and reduce the interference of background noise on text extraction (Al Nuaimi et al., 2015). Character segmentation is used to divide the text area into a series of single characters. Character recognition

Figure 4. Basic flow chart of text extraction



uses advanced print recognition technology to recognize characters. Whether the text region detection can be performed correctly has a significant impact on the results of the image text extraction.

Taking the short video of image promotion in China's Shandong Province as an example, the text recognition process is described as shown in Figure 5. The steps are as follows: First, keyframe extraction technology is used to extract the keyframes in the video, as shown in Figure 5(a). Second, interpolation is used to calculate the quality of the keyframe picture to get a higher-definition picture, as shown in Figure 5(b). Third, the text in the image is recognized through the picture, as shown in Figures 5(c) and 5(d). Common text detection methods include edge-based methods, texture-based methods, and region connectivity-based methods. Finally, the content of the text in the video is determined to provide a basis for further understanding the content conveyed by the video.

The common text detection methods are as follows:

1) Method based on edge feature

Text comprises a series of strokes, and the contrast between the strokes and the background images is generally high because a low contrast between text and background seriously interferes with text recognition. The edge of the text area has a high pixel density. The method based on edge features uses the edge as the distinction between the text and background areas. This method involves first obtaining a gradient image from the original image by edge detection (such as the Roberts operator or Canny operator), then filtering the image edge to reduce noise interference, then using the smoothing operator and other methods to connect the edges to obtain text blocks, and finally using heuristic rules such as connected component analysis to filter the non-text areas in the previous step

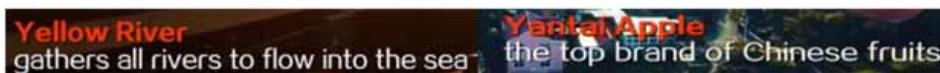
Figure 5. Example of short video text extraction



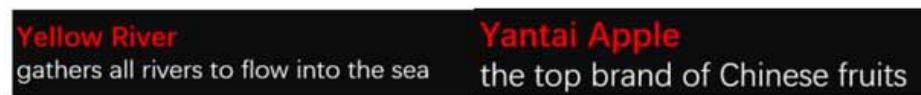
(a) Extracted keyframes



(b) Keyframes after improving image quality



(c) Text area recognition



(d) Text extraction

to achieve the final result. After smoothing and removing the noise interference, the candidate text area is generated by clustering. Finally, geometric analysis methods such as aspect ratio are used to obtain the text area that meets the conditions. This method achieves good results.

2) Method based on texture feature

Texture features describe the spatial color distribution and light intensity distribution of an image or a small area within it. Texture differences exist between the strokes that make up the text and the background area of the image. The method based on texture features involves defining and extracting the image texture features that can be used to distinguish the text area and the background area and to extract the text area through texture classification. A text extraction method suitable for texture features is to first design an appropriate sliding window and corresponding step size, scan the image globally to obtain texture features, classify the text areas in the image, and then further refine the text areas to be determined to get the final results.

3) Method based on connected region

If the color of the text area in the image is the same and has a high contrast with the background, the method based on connected regions can be used to determine the text area. First, this method uses image segmentation or connectivity analysis to extract the same color regions in the image, construct heuristic rules, and filter out the obviously non-text regions in the same color regions to obtain characters. For title text that has a high contrast with the background in the image, the split merge algorithm is used first to segment the original image to obtain the binary image, and then the a priori rule is used to filter the non-text area step by step. This method has a good effect on extracting the title text.

Semantic Understanding

The semantic analysis of specific types of videos is usually used to obtain their unique practical value. News video semantic analysis can classify program content, while sports video semantic analysis can extract highlights. This paper adopts the concept of the semantic unit, that is, a video segment with relatively complete semantics. When users retrieve and browse short videos, the target object should be a semantic unit. Short video content should differ between different semantic units; by contrast, within one semantic unit, the content should relate to a single topic. A complete short video can be divided into multiple semantic units, with each semantic unit representing a particular topic. Then, the image features of the video can be extracted to construct a feature set. Next, the feature set can be clustered, aiming to separate the features with different semantics. Finally, each feature class can be segmented with different semantics by temporal order. Our experiments show that this method can effectively segment various temporal semantic features and mine the information in the video, which has application value. Later research will explore how to generate a complex sentence to describe multiple semantic shots, as shown in Figure 6. Semantic recognition technology is a new technology based on big data and artificial intelligence. The recognition accuracy of technology should focus on laying a good foundation for further technology applications. Semantic understanding is a recently proposed artificial intelligence bionic technology, which plays a particular role in intelligent object recognition. At the same time, in terms of semantic understanding, it remains necessary to improve the characteristics of intelligent bionic universities after learning through big data.

Taking a short tourism video as an example, the specific process of semantic understanding is shown in Figure 7. Firstly, the video's three keyframes are extracted, including scene 1, where the photographer takes a shot on the platform; scene 2, entering the hotel; and scene 3: photos of a scenic spot. Three semantics are obtained from the three scenes: train platform, hotel, and scenery. The video semantics obtained from the comprehensive understanding of the existing three semantics are tourism, travel, and other video tags.

Application of Video Analysis Platform in Education Management

Based on the analysis of the characteristics and semantics of short videos, this paper designs a semantic analysis system framework for short educational videos, which is applied to education and learning management. The framework flow is shown in Figure 8. First, a large number of short videos is inputted, a single short video is selected, and video information is extracted and calculated according to the semantic understanding of keyframes. Secondly, a judgment is made regarding whether the video is healthy, positive, and conducive to education and learning management. If the video is helpful for students' learning management, the short video is pushed to students according to their location or IP address to support their retrieval and browsing operations (Wu et al., 2020). If it is not conducive to education management, the short video is filtered out. Then, new short videos are selected and a new judgment is made.

This paper takes the video "self-study room learning" on TikTok as an example to illustrate the application of video semantic understanding technology in education management, as shown in Figure

Figure 6. Video semantic composition

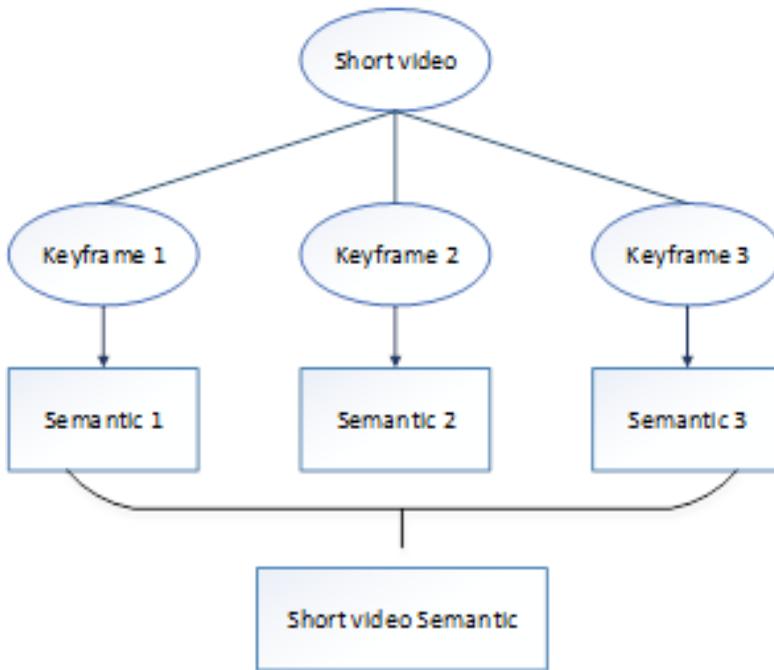
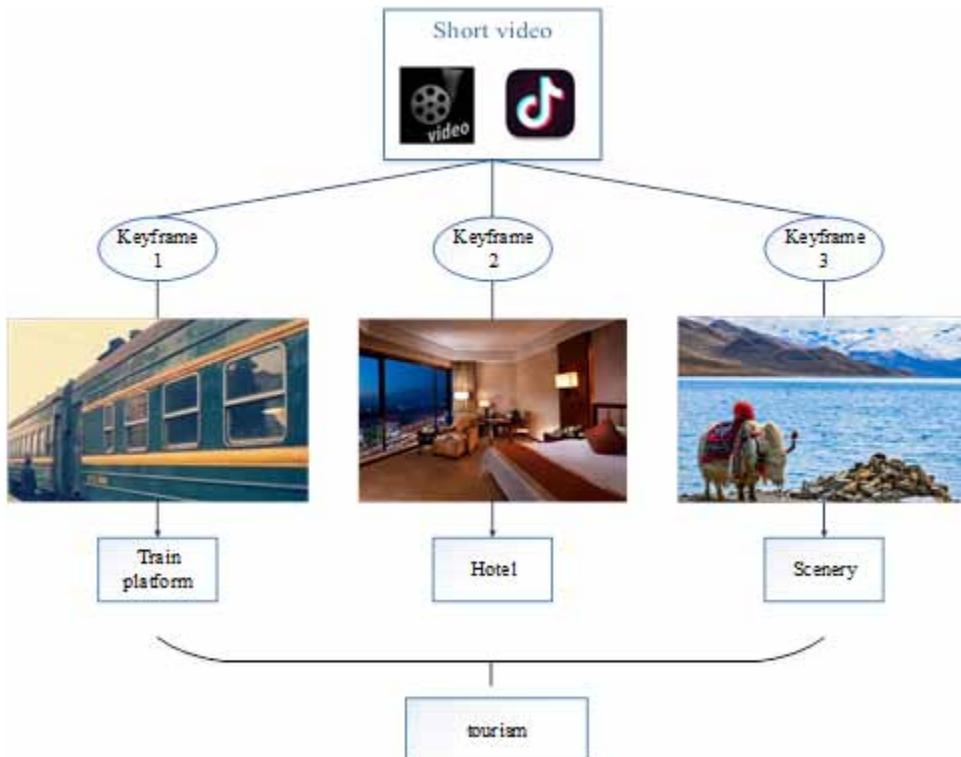


Figure 7. Semantic understanding of short tourism video



9. First, according to the changes in pixel positions in the video, and by identifying the keyframes in the video, three keyframes are analyzed here. Keyframes can be analyzed using two methods: text recognition and picture recognition. In the picture analysis, the pictures show “classroom,” “student,” and “laptop.” At the same time, the characters “study room,” “all night,” and “study hard” were obtained in character recognition. After obtaining the above information, we must judge whether the content has adverse or sensitive words using a thesaurus classification table, and then judge whether it is helpful for education and learning management. If it is helpful, we can push it to students.

The algorithmic recommendation mechanism use a personalized push. On the one hand, short video platforms use user profiles as the basis for analyzing user behavior, content tags, and preference intensity to give users an accurate “profile” and achieve targeted, personalized recommendations. In addition, the short video platform also recommends relevant videos to users based on the content watched by their friends. On the other hand, the short video platform records users’ search records, and when users open the app, it automatically pushes content about the topic. At the same time, as

Figure 8. Short video push platform in education management system

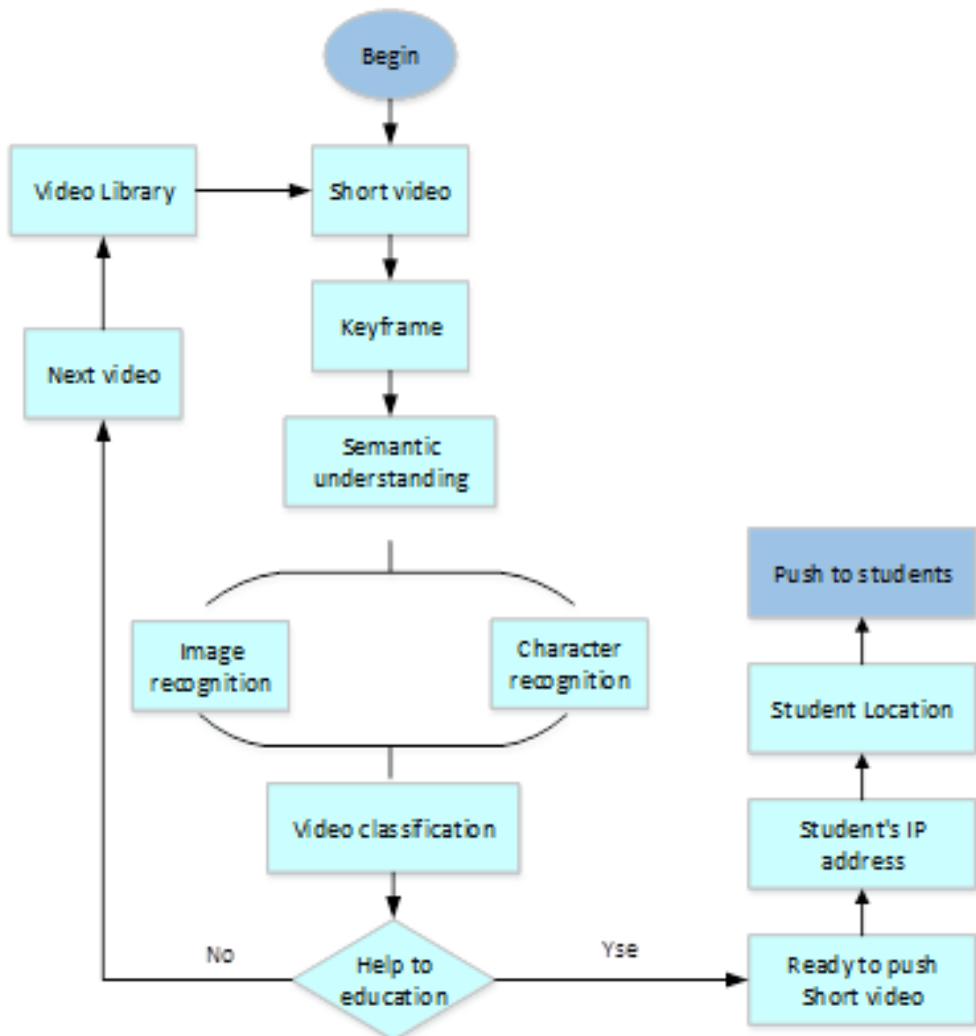
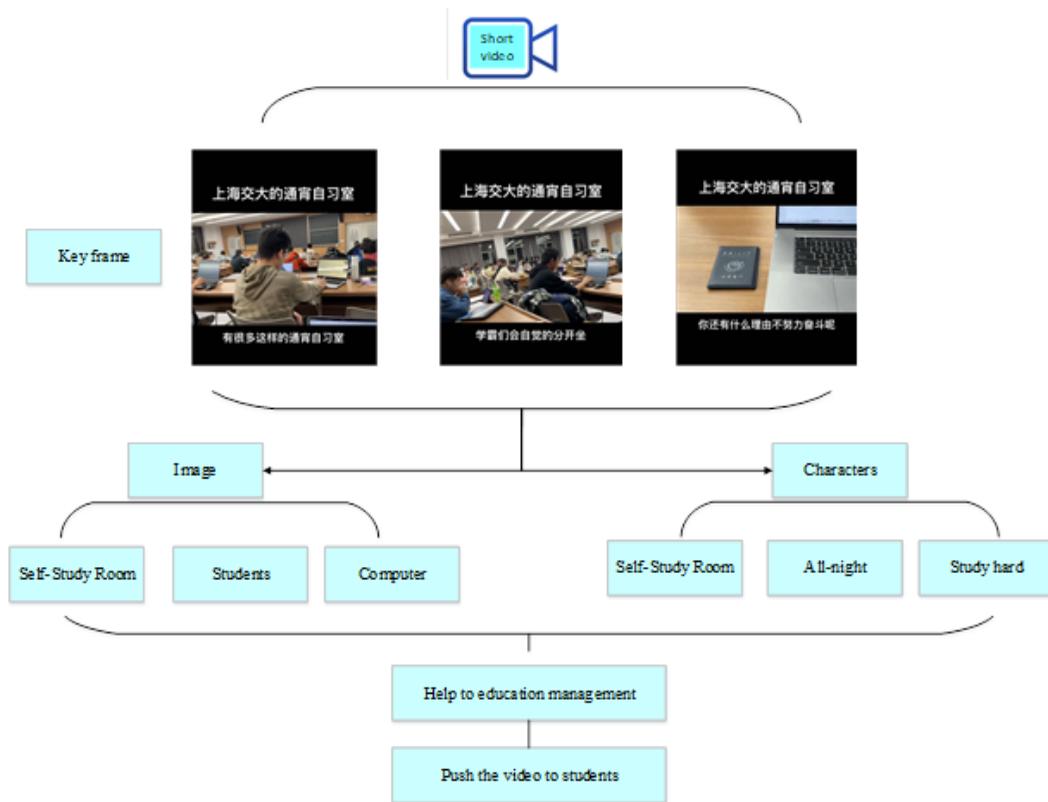


Figure 9. Video push process for “self-study room learning”



a channel for information dissemination, it can also push daily trending topics to users so that they receive cutting-edge information quickly.

The artificial intelligence behind short videos sometimes contains errors, and to reduce these errors, short videos come in all forms, and trends evolve. Artificial intelligence models must adapt to and continuously learn from new data to remain relevant and effective. Incremental learning and online learning techniques enable AI systems to update their knowledge and adapt to newly emerging video content.

Regular evaluation and feedback loops are essential to improve the AI model’s understanding of short videos. Iterative improvements based on user feedback and continuous monitoring of model performance help identify weaknesses and further improve the system’s understanding.

APPLICATION

Taking the grade 21 students majoring in Chinese language and literature at Guizhou Normal University as an example, we explore the improvement of the short video screening and pushing system in education management by comparing the students’ positive energy video viewing time and academic performance (Fischer et al., 2020). We investigate the students’ basic learning situation, implement further teaching, and investigate and analyze changes in students’ education values and cultural level before and after using the short video mobile teaching platform. Before the activity, we interviewed teachers at the school to understand the current level of teaching information at Guizhou Normal University and their understanding of mobile teaching platforms, especially the use

of short videos, to prepare them for short video teaching (Agrawal et al., 2011). We then explored the students' basic learning situation, mainly investigating the students' Internet equipment and purpose, how long students watch short videos, the types of attention students give to short videos, the length of time students use short videos to learn; and students' attitudes towards short video teaching (Sun & Scanlon, 2019). Based on the survey, we know that students at the school recognize short video teaching. We further analyzed the survey data and tested the application effect of video analysis system design and education management.

Educational management shows convergence: Students should not only obtain knowledge, strengthen their skills, and increase competency, but also ensure that they have the right values and strong beliefs.

We compared the changes in the grade 21 Chinese language and literature majors of Guizhou Normal University before and after using the short video screening and pushing platform, and the actual effect of the platform in education management from two aspects: the improvement of education values and academic performance. When selecting the research group, we considered the differences between the students. Before using the new platform, the scores of the students in the two groups were close, almost at the same level. After using the new platform in grade 21, corresponding changes occurred.

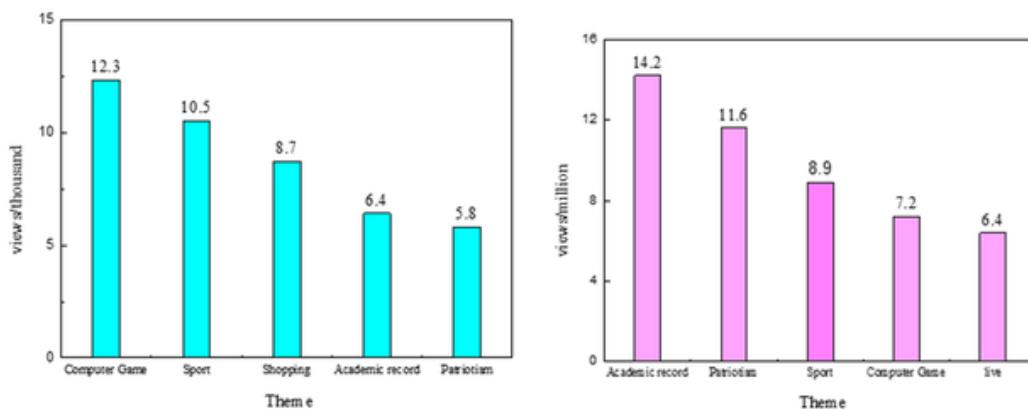
Improvement of Values Education

A statistical comparison of videos watched by students is shown in Figure 10. Compared with the short videos watched in 2021–2022, it can be seen that the most popular theme in 2021 is “computer games,” with 12,300 views. The second is “sports,” with 10,500 views. As a positive word, “academic record,” ranks fourth with 6,400 views. The positive word “patriotic” ranks fifth, with 5,800 views. The number of positive theme videos in 2021 is less than “computer games” and “sports.”

The mainstream media naturally shoulder the responsibility of spreading mainstream values and have good content production and guiding ability. In the integrated media environment, traditional mainstream media should use short videos to deliver content, enhance the identity of mainstream values and guidance of public opinion, and promote the progress of values using short video platforms.

After the students adopted the short video screening and pushing platform, the data from 2022 shows that the “academic record” themed video ranks first, reaching 14,200 views, and the “patriotism” themed video with the same positive energy theme ranks second, with the broadcast volume exceeding

Figure 10. Playback volume of videos with different themes in 2021 (left) and 2022 (right)



10,000. Thus, the use of the platform can effectively improve the number of students playing useful videos.

At the same time, we counted the viewing integrity of a single video, as shown in Figure 11. The data indicate that in 2021, students only watched 46.3% of the average positive energy videos. Among the remaining 53.7% of short videos, 22% were be played for more than half the time, and 32% were played for less than half of the time. The statistical results from 2022 show that students watched 75.5% of the positive energy short videos completely, and only 24.5% of the short videos were not completed before going to the next video.

Thus, the video filtering and pushing system can effectively improve students' values. The proportion of positive energy videos watched by students and the video playing integrity have both been improved. Therefore, video semantic understanding technology can provide an effective method for school teaching management.

Academic Performance

We compared the academic achievements of the Chinese language and literature majors in grade 21 with those in grade 20. Figure 12 shows the average scores for six subjects: ancient literature, contemporary literature, politics, history, international relations, and sports. The students in grade 20 studied six subjects because the school had not started to use the short video push platform. Therefore, the videos that students watch daily have not been screened, while the videos the 2021 students watch during daily life have been screened by the video platform. Based on the students' daily IP addresses and mobile phone positioning, the platform pushed videos that are beneficial to their studies. The number of videos related to history, politics, and literature watched by the grade 21 students exceeded those watched by the grade 20 students. The examination results show that the scores of students in grade 21 are generally higher than those of students in grade 20, especially in ancient literature and history, which is clearly related to the pushing of relevant short videos.

Grade 20 had been exposed to the information for a longer period and had acquired the corresponding learning methods earlier, which is one of the reasons for the difference in performance between grades 20 and 21.

Some students believe they have weak self-control and are afraid to use short videos because they do not want to be "poisoned"; these students previously used short video platforms but later decided that short videos were "meaningless, useless and too time-consuming," so they stopped using them.

Figure 11. Playback integrity of positive energy theme video in 2021 (left) and 2022 (right)

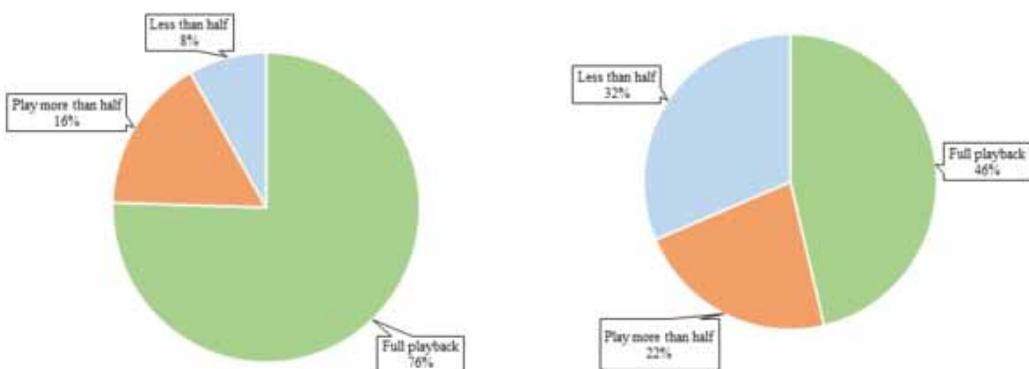
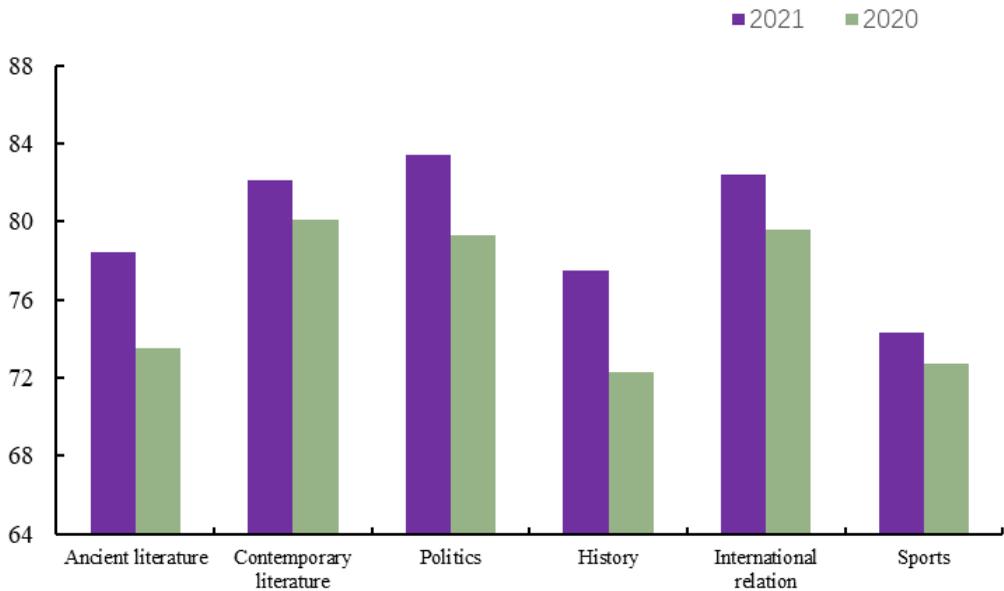


Figure 12. Comparison of academic performance



CONCLUSION

Based on short video semantic understanding technology, this paper established a short video push platform, which provides an effective method for college learning management. Through a questionnaire survey-based investigation of 539 college students, the study explored the practical application effect of the platform. We can now draw the following conclusions:

- (1) The survey results show that more than 95% of students use short video apps, and 71% of college students watch short videos for more than an hour every day. Short videos have become an indispensable part of most college students' daily viewing.
- (2) Through the existing digital processing technology, combined with artificial intelligence bionics, we developed short video semantic understanding technology to filter short videos and direct the filtered videos to college students, thus resulting in a short video learning management platform.
- (3) Based on the results from the grade 21 students majoring in Chinese language and literature in Guizhou Normal University, we verified the effectiveness of our short video learning management platform. The results show that the platform significantly improves the values and academic performance of college students.

DATA AVAILABILITY

The figures and tables used to support the study's findings are included in the article.

COMPETING INTERESTS

The authors declare there are no competing interests.

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