Construction of Online Tutoring Platform for College Students' Mental Health Education Based on FFmpeg Technology

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Abstract. This paper takes college students' mental health education as the research object, makes full use of the key characteristics of streaming media technology, network information technology and computer application technology, and builds a Web-based online tutoring platform for college students' mental health education. The whole platform belongs to B/S architecture, the client interactive page is built by Bootstrap framework, and the Web Server is developed and deployed by CodeIgniter framework. The core function of the platform is composed of streaming media technology framework, that is, FFmpeg is used as the streaming client to collect, encode and compress audio and video files, and RTMP transmission protocol and Nginx-RTMP streaming media server are used to pull audio and video files to the playback end to complete decoding and playback. The platform aims to provide online psychological counseling to college students in the form of live online to make up for the deficiency of current mental health education courses, which not only effectively improves the effectiveness of mental health education in colleges and universities, but also provides a reference for the informatization transformation and upgrading of college education mode.

Keywords: FFmpeg technology · College students' mental health · Online tutoring · Streaming media technology · computer application

1 Introduction

At present, the mental health situation of contemporary college students is grim, with frequent problems such as anxiety, depression, self-harm and even suicide, which bring a series of serious influences on their daily study, work, life and social life, and even affect their families, campuses and society [1].

At present, the mental health education in colleges and universities is still in the primary stage. Although related courses are offered, the results are not as good as expected, and it is often a mere formality. [2] Firstly, the coverage of mental health courses is small, and the focus of courses is only at the initial stage of enrollment, with little subsequent influence. Second, the traditional classroom teaching form is single, relying only on teaching materials and lacking pertinence. Third, there is a shortage of teachers, lack of professional psychological counseling and tutors, and the conventional talk and chat

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effect stays on the surface. [3] In view of this, this paper holds that colleges and universities should earnestly practice the educational concept of "three-round education", persist in innovation-driven, and actively take advantage of the application advantages of streaming media technology, network information technology and computer application technology to build a Web-based online tutoring platform for college students' mental health education. Enrich the forms of mental health education with brand-new network and information means, increase the channels of mental health services, and promote the high-quality development of mental health education in colleges and universities.

2 Development Process

First of all, the realization of online live broadcast mainly involves three parts: push streaming client, streaming server and pull streaming client. [4] Among them, the user of the push streaming client is a teacher, and its main content is to complete the collection, preprocessing, coding and packaging of audio and video digital signals with the help of FFmpeg technology. Before the teacher starts broadcasting, open FFmpeg software, complete the detection and configuration of microphones, cameras and other devices, and enable the corresponding push streaming settings. After receiving the audio and video digital signals, the MPEG software will convert the audio collected by the microphone and the video digital signals collected by the camera into streams according to AAC audio compression coding algorithm and H.264 video compression coding algorithm respectively, and package them in MPEG2-TS and FLV formats respectively. [5] After that, according to the server key under the RTMP communication protocol, the packaged audio and video files are sent to the streaming media server to complete the push streaming operation. As shown in Fig. 1, the push streaming function implementation code is shown.

Secondly, for the construction of streaming media server, the underlying operating system chooses Linux CentOS 7.8 server, which is implemented by Nginx's extended live broadcast function module Nginx-Rtmp-Module. With the help of JWplayer framework, the platform embeds the Flash player into the front-end interactive interface, and completes the settings of functions such as "play", "pause" and "sound adjustment", so as to facilitate the independent control of client users [6].

```
// ffmpeg -re -i tnhaoxc.flv -c copy -f flv rtmp://192.168.0.104/live
// ffmpeg -i rtmp://192.168.0.104/live -c copy tnlinyrx.flv
bool push_stream= false;
    char *ofmt_name = NULL;
    if (strstr(out_filename, "rtmp://") != NULL) {
        push_stream= true;
        ofmt_name = "flv";   }
    else if (strstr(out_filename, "udp://") != NULL) {
        push_stream= true;
        ofmt_name = "mpegts";   }
```

Fig. 1. The push streaming function implementation code

Finally, for the development of Web applications, one part is the design and development of front-end interactive interface based on Bootstrap framework, and the other part is the construction of Web Server based on CodeIgniter framework. The overall development environment is PHP, and the version is 7.0.30. The Web server is Apache 2.4.33, and the database is Mysql 5.7. PHPStorm 2020.1 is selected as the development tool. After importing Bootstrap framework and CodeIgniter framework, MVC creation and single entry file configuration are completed in turn, and finally the corresponding functional modules are selected to realize specific functions. [7] Through the introduction of the above key technical theories, the overall environment of system development, the configuration of related software and tools are determined, and the technical feasibility of the overall project of online tutoring platform for college students' mental health education is also clarified.

3 Function Realization

3.1 Pull Streaming Client

1) Login and Home Page
When users log in for the first time, they will register their accounts and verify their identities according to the system upgrade. After successful login, the system will automatically jump to the homepage interface, which mainly includes Banner dynamic picture news, campus psychological assistance information and centralized display of hot topics.

2) Live Broadcast Course Study
Under this function module, "the platform will constantly update the notice of live courses, which is convenient for students and users to choose their own learning according to their own schedule and actual needs. The content of the course is different from the traditional classroom teaching, and the content setting can ensure innovation and pertinence at the same time, for example, "The Meaning of Life", "A Good State of Mind Leads to a Good State", and "Away from emo!" In addition, the platform also supports the playback function of live courses, which is convenient for students who miss the live broadcast time to learn. The realization of this function needs to reconfigure the data port and file storage location of RTMP protocol service under streaming media server [8].

3) Live Interaction
In the live broadcast course, student users interact with teachers through the function of "barrage contribution" under the viewing interface. At the entrance of the barrage, students can directly input the words they want to express in this text box and send them out in time. The barrage mainly includes the evaluation of the course and teachers, the raising of some questions and the discussion of related topics. The barrage will appear on the teacher's side synchronously. When the teacher sees the barrage, he can answer the questions raised by the students and users in a targeted way, and launch certain mental health education services. [9] In addition, some sensitive psychological problems can

also be sent to teachers through the "private message" function, that is, one-on-one service mode is entered, and professional mental health tutors complete the follow-up records and follow-up.

3.2 Push Streaming Client

In the push streaming client, teacher users have three main functions: course management, course live broadcast and data statistics. After the live broadcast course is over, teachers and users can view the live broadcast and accumulated live broadcast data under data statistics, as shown in Table 1.

In addition, under the data analysis module, the system supports the AHP algorithm model to evaluate the actual utility of the live course of mental health education. The consistency check calculation formula of a single target or element is shown in Formula 1, where λ_{max} represents the weight value and n is the matrix order [10] (Table 2).

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{1}$$

Table 1. Statistical table of live course data

Live number	Live time	Live title	Viewer number (peak)	Per capita viewing time	Barrage number
1	22.03.01	I love me and my heart is healthy.	9416	22.3 min	17766
2	22.03.27	Efficiency and stress	4314	20.3 min	9126
3	22.04.10	Solve contradictions	5153	17.6 min	8437
4	22.04.16	Cooperation against epidemic	10047	26.7 min	23155

Table 2. Actual utility evaluation of live course of mental health education

Target layer	Standard layer	Measures layer	Weighted value	Proper vector	CI value
Effectiveness evaluation	Instructional	Per capita viewing time	C1 = 0.277	0.923	0.017
		Viewer number (peak)	C2 = 0.457	0.981	
	Rreciprocity	Total number of barrage	C3 = 0.291	1.034	
		Total number of private messages	C4 = 0.093	1.021	
	…	…	…		

4 Conclusion

With the aim of promoting the effectiveness of mental health education in colleges and universities, this paper starts with four aspects: course form, course content, coverage and teachers' strength. With the help of the application advantages of streaming media technology, network information technology and computer application technology, it builds an online tutoring platform for college students' mental health education based on Web, and puts forward a set of practical and comprehensive solutions to solve many problems faced by mental health education in colleges and universities.

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