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Research Article

Voice Anomaly Detection and Music Website Teaching Design for 5G Internet of Things

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Information technology has brought tremendous changes to many industries. 5G and Internet of Things technology have also driven the development of the music industry. Network communication has replaced the traditional method and has become a brand-new method of music communication. An online music instructional teaching website based on Internet of Things is designed, the basic functions of the website are introduced, and a voice anomaly detection system was designed from the landing test, search function test, song display, administrator maintenance, and management of songs. The basic functions of the website were tested in four aspects. According to the needs of music websites, a voice anomaly detection system is designed. The system includes two aspects, namely, an abnormal sound classification system and a microphone array abnormal sound detection system; two music rhythm algorithms are proposed, based on international music detection. The music data of the wrong retrieval platform was tested on two different music algorithms, and it was found that the two different detection methods have different results for different types of music, and the Bossa-Brazil music type has the highest error rate. In order to detect the accuracy of the detection of the abnormal voice system, a comparison experiment of three different voice detection systems was set up under the condition of no noise and noise, to test their experimental accuracy. The music teaching system designed in this paper has the highest accuracy, which can meet most of the requirements and improve the efficiency of music detection. In the design of music teaching, because the music website has rich functions and various products, it improves the effect of online teaching and the efficiency of teaching design. Instructional design is applied to online learning to improve the dissemination of music and art, and high-quality pronunciation is also one of the important contents.

1. Introduction

With the development of the Internet, people cannot leave the Internet for a long time, and there are more and more young people who love music. They enjoy sharing their favorite music with others and sharing their feelings and thoughts about music. Now, if most music websites want to use a complete cloud service, they need to download the client, and due to copyright competition, more manufacturers spend money to buy copyright and ignore some cloud services, as well as updating the front-end layout, and traditional pages have almost similar application functions. The single-page application function of VUE is inherently weak, which leads to many unfavorable factors such as inconvenient use, cumbersome operation, and long loading time for many online music websites. In order to avoid this problem, the online music system came into being.

Based on the above background, the article proposes a national music website construction plan, which has played a certain role in accelerating the development of informationized music business. There are diversified forms of websites, one of which is through software development, through which we can develop very interesting websites. The music anomaly detection method proposed in [1] can quickly identify music anomaly signals. Literature [2] established Beatme online music communication media to connect relevant music-related devices to the cloud system. It realizes the hierarchical management of users and has new significance for the development of personalized music online network. Literature [3] introduces the design and implementation of music website. The online music sharing website is a functional website that can meet many of our requirements and provide us with basic listening services. Literature [4] introduces the development of ASP programming technology to establish and maintain a back-end database. Literature [5] designed and developed an online music website system based on PHP + MySQL programming language. The system has not only basic functions such as online listening and music downloading, but also functions such as message delivery, music on demand, and other functions, which can meet the needs of most people. Literature [6] explains how to use PHP and MySQL programming to create a music group website. Generally, there will be multiple pages, each with different functions. This article assignment explains the detailed website development steps. Literature [7] discusses the method of playing WMA music files online based on ASP technology and Access database and analyzes the key technologies in detail. Literature [8] proposed a grade analysis method to detect abnormal signals in music. Literature [9] proposed a new hybrid method to determine abnormal data based on GARCH, *K*-means, neural network, and other anomaly detection methods. Literature [10] proposed a hierarchical framework to automate the task of emotion detection in original music data. The emotions expressed by each music signal are different, and everyone has a different understanding of music. The layered framework proposed in the article can extract music intensity, timbre, and rhythm, which can help us better understand music signals. Literature [11] describes an audio-based video indexing method that can detect music and voice independently. Literature [12] focuses on the artist or source detection component, and we show that it can correctly classify 91% of the small song collection and 70% of the artist space in the larger song collection. The pitch and scale information of music is very important for music classification and retrieval, but we have done very little work on the key detection of music. Literature [13] proposed a method of extracting pitch contour features from audio signals. More than 80 music works were tested in the experiment, and the test success rate was as high as 90%. Literature [14] proposed a system and method to use music features extracted from music to detect music emotions within the framework of hierarchical emotion detection. Literature [15] proposed a method for detecting music in a speech signal with multiple frames. This method can effectively distinguish whether the sound signal is noise or music. The method is to extract frames from the music signal and then define a parameter of the noise signal, and then you can distinguish the type of music.

Under the influence of today's music trend, the music industry has gradually begun to climax, because music has always been inseparable from people, and if you want more people to see interesting music works, an online music website is essential. The Internet of Things is an efficient information platform from which people can find a lot of value, which makes it easier for more and more people to appreciate music online and at the same time improves the sharing of resources on the Internet [16]. We are in an intelligent information system [17]. The convenience of the network has brought a lot of convenience to our lives [18]. Using the network to share resources is fast and efficient, and it can also shorten the distance between people. How to use the convenience of the Internet to design an online music sharing website is a question we have to think about. The article uses Internet technology to design a network sharing music website, which has many convenient functions, and designs a music anomaly detection system based on the website, which can effectively detect abnormal signals in music at a high speed. The Internet of Things technology realizes the intelligent collection, processing, and analysis of music signals through the real-time transmission of information between wired/wireless networks, which has the advantages of comprehensive perception, reliable transmission, convenience, and rapidity. A music feature recognition model based on the Internet of Things (IOT) technology is designed to realize the perception, transmission, and recognition of music signals. In that physical perception layout of the system, sound sensors are arranged at different positions to collect original music signals, and a TMS320VC5402 digital signal processor is adopted to carry out music signal analysis and process. And the music feature analysis module in the application layer acquires the maximum similarity between the test template and the reference template by adopting a dynamic time warping algorithm, realizes music signal feature identification, and identifies music feature content corresponding to a music form and a music emotion according to an identification result. The experimental results show that the model runs stably and can collect high-quality music information.

2. Technical Descriptions

2.1. Website Functional Design. We must first take into account the aesthetic views of the general public and pay attention to color matching on the front page to highlight the style and characteristics of our website. The front-end web page design is mainly oriented to ordinary users. You can use this web page to realize online music playback, download songs, and inquire about music, and users can register and leave their personal information and views on the web page. And the website has the function of listening to the name of the song. When some users do not remember the name of the song, they can search for the lyrics in the song or play it. The website has an intelligent recognition function. The website also has a message board function, where users can leave messages and comments on favorite songs; they can also make relevant suggestions to the website.

The website manager enters his account and password to log in successfully, and then he can enter the background management page. You can change the track page by changing any of the words such as "song name" to change the track information; in the deleted song page, you only need to enter the track number to remove any messages about this song. On the homepage of a music website, people can view various functions available on the website, such as searching for music tracks, querying artist information, querying music albums, leaving messages for music of interest, and even querying popular song charts. The administrator can check netizens' messages, delete some bad comments, and accumulate their opinions.

2.2. Abnormal Sound Detection System. The purpose of the system is to accurately detect the type of abnormal sound. The algorithm mainly extracts the sound signal and then builds a model of the sound signal. The model can not only detect whether there is abnormal sound but also determine what kind of abnormal sound. But the model also requires a lot of sound to model. Because the sound signal characteristics are different, the classification method of the model is also different. According to the sound characteristics, it can be divided into frames and wholes. Frame classification is to detect whether there is abnormal sound in each audio. The flowchart of the algorithm is shown in Figure 1.

In Figure 1, according to "model matching," the sound is classified mainly according to the characteristics of the sound signal, and if the characteristics of the sound are met, the classification method is performed. If the match is not successful, it indicates that there is an abnormal sound, further processing the abnormal sound.

Generally, the matching algorithm is statistical method, clustering method, and anomaly detection method.

The microphone array uses multiple microphones. The advantage is that it can locate the sound position and then judge whether the localized sound is an abnormal sound based on the air pressure information such as the video. The flowchart of the algorithm is shown in Figure 2.

In Figure 2, the abnormal sound is determined, and the detection is performed based on "abnormal sound" to determine whether or not the sound is abnormal. If not, it may be the pressure information such as video.

3. Method Description

3.1. Music Style Recognition

3.1.1. Separation Algorithm. Music signals usually consist of harmonic sound components and impact sound components, which have different characteristics [19]. According to the difference between the impact sound and the harmonic sound in the frequency spectrum, we can separate the original spectrum W_{fJ} into the impact spectrum P_{fJ} and the harmonic spectrum, defined as follows:

$$W_{fJ} = P_{fJ} + H_{fJ}. \tag{1}$$

$P_{fJ} > 0, H_{fJ} > 0$. Formula (2) can realize the separation of impact sound and harmonic sound [20]:

$$\begin{aligned} Q\left(H^t, P^t, U^t, V^t\right) = \frac{1}{\sigma_H{}^2} \sum_{fJ} \left\{ \left(H^t_{f,t-1} - U^t_{f,t}\right)^2 - \left(H^t_{f,t} - U^t_{f,t}\right)^2 \right\} \\ + \frac{1}{\sigma_p{}^2} \sum_{fJ} \left\{ \left(P^t_{f,t-1} - V^t_{f,t}\right)^2 - \left(P^t_{f,t} - V^t_{f,t}\right)^2 \right\}. \end{aligned} \tag{2}$$

Find the minimum value and update the formula to get

$$\begin{aligned} H^{t+1}_{f,J} &= H^t_{fJ} + \Delta^t, \\ P^{t+1}_{f,J} &= P^t_{fJ} + \Delta^t, \end{aligned} \tag{3}$$

where

$$\begin{aligned} \Delta^t &= \frac{\alpha}{4}\left(H^t_{f\,J-1} - 2H^t_{f\,t+1} + H^t_{f\,t+1}\right) \\ &\quad - \frac{1-\alpha}{4}\left(P^t_{f\,J-1} - 2P^t_{f\,t+1} + P^t_{f\,t+1}\right), \\ \alpha &= \frac{\sigma_\gamma^2}{\sigma_H^2 + \sigma_\gamma^2}. \end{aligned} \tag{4}$$

3.1.2. Network Structure. Classification and recognition through functions: the activation function used is

$$X^q_l = \max\left\{0, \sum_{X^p \in M_q} X^p_{l-1} \otimes k^{pq}_l + b^q_l\right\}. \tag{5}$$

The formula of the pooling layer is

$$X^q_l = \text{down}\left(X^p_{l-1}\right). \tag{6}$$

In backpropagation, the gradient of the convolutional layer is calculated as follows:

$$\begin{cases} y_l = \omega_l x_l + b_l, \\ x_l = f\left(y_{l-1}\right), \\ \Delta y_l = f^t\left(y_t\right) \Delta x_{l+1}. \end{cases} \tag{7}$$

The update rule for ω_l is derived from the following:

$$\begin{cases} \mu^{t+1}_l = \alpha \cdot \mu^t_l - \lambda \cdot \eta \cdot \omega^t_l - \eta \cdot \langle \frac{\partial L}{\partial \omega} | \omega \rangle_{ly}, \\ \omega^{t+1}_l = \omega^t_l + \mu^{t+1}_l. \end{cases} \tag{8}$$

The regression formula is as follows:

$$p_l = \frac{\exp\left(X^j_8\right)}{\sum_{i=1}^m \exp\left(X^i_8\right)}. \tag{9}$$

The loss function is defined as

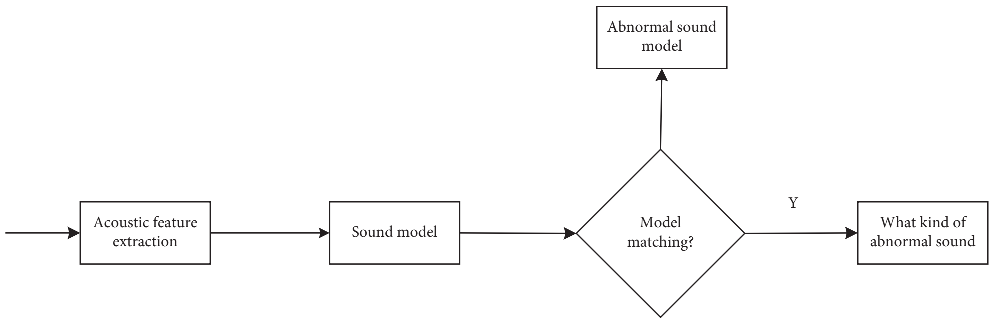

FIGURE 1: Abnormal sound detection model.

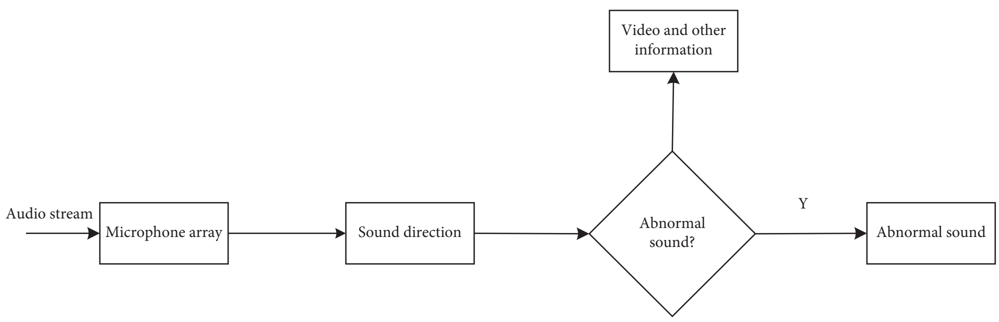

FIGURE 2: Flowchart of abnormal sound detection of microphone array.

$$L = -\sum_{j=1}^{m} h_j \log p_j. \quad (10)$$

3.2. Implementation of Abnormal Sound Detection Algorithm

3.2.1. MFCC (Mel-Scale Frequency Cepstral Coefficients) Sound Extraction. The sound extraction flowchart is shown in Figure 3.

The extracted sound signal is transformed into a digital signal, and the flow of the high frequency part of the sound is increased by preemphasis [21]; the expression is

$$w[n] = \begin{cases} 0.54 - 0.46 \cos\left(\frac{2\pi n}{L}\right), & 0 \le n \le L-1, \\ 0, & \text{other}. \end{cases} \quad (11)$$

Analyze the signal to get the frequency spectrum, according to the relationship:

$$\text{mel}(f) = 1127 \ln\left(1 + \frac{f}{700}\right). \quad (12)$$

Convert it to

$$\Delta\text{mel} = \frac{\text{mel}(fb\_w) - \text{mel}(fb\_w)}{\text{filterNum} + 1}. \quad (13)$$

The center frequency can be calculated; then,

$$f_k = \frac{2\pi}{N} * k * \frac{\text{samplefrep}}{2\pi} = \frac{\text{samplefrep}}{N} * k = \Delta f * k,$$
$$k = \frac{f_k}{\Delta f}. \quad (14)$$

The corresponding frequency can be calculated, and the energy of the response frequency is

$$\text{Emel}(i) = \sum_{k_{i-1}}^{k_{i+1}} \left(a_k * X[K]\right)^2. \quad (15)$$

a_k changes according to the change of the slope, namely,

$$\text{⅄} f_{i-1}\ to\ f_{i+1}, a_k = \frac{k - k_i}{k_{i+1} - k_i}\ f_{i-1} \text{to} f_i, a_k = \frac{k - k_{i-1}}{k_i - k_{i-1}},$$
$$f_i \text{ times}, a_k = 1, \quad (16)$$
$$\text{⅄} f_{i-1} \text{ to} f_{i+1}, a_k = \frac{k - k_i}{k_{i+1} - k_i}.$$

The output logarithmic energy is changed by discrete cosine to obtain the MFCC coefficient [22]:

$$C(n) = \sum_{m=0}^{N-1} s(m) \cos\left(\frac{\pi n (m - 0.5)}{M}\right) n = 1, 2, \cdots, L,$$
$$d(t) = \frac{c(t+1) - c(t-1)}{2}. \quad (17)$$

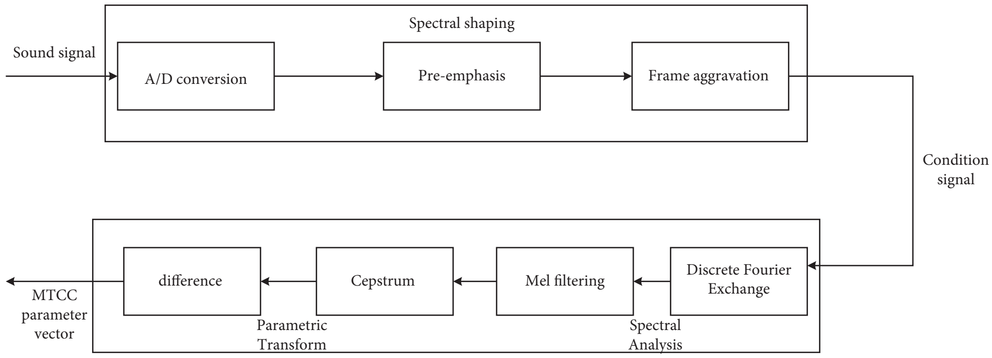

Figure 3: Sound extraction flowchart.

3.2.2. Algorithm Implementation. The general flowchart of sound detection is shown in Figure 4.

The abnormal sound model is trained by extracting the abnormal sound MFCC feature vector [23]; the sound is a continuous signal, which is a multidimensional distribution function:

$$\hat{b}_j(v)\sum_{k=1}^{m}\bar{c}_{jk}\left(\frac{1}{(2\pi)^{L/2}\left|\sum_{JK}\right|^{1/2}}\right.\cdot\exp\left.\left(-\frac{1}{2}\left(v-\bar{\mu}_{jk}\right)^{t}\sum JK|^{-1}\left(v-\bar{\mu}_{jk}\right)\right)\right). \tag{18}$$

Initialize first

$$\alpha_1(j)=\alpha_0 b_j(o_1) 1\leq j\leq N. \tag{19}$$

Recursion is as follows:

$$\alpha_t(j)=\sum_{i=1}^{N}\alpha_{t-1}(i)\alpha_{ij}b_j(o_t) 1\leq j\leq N, 1\leq t\leq T. \tag{20}$$

Termination is as follows:

$$p(0|0|\lambda)=\alpha_T(q_F)=\sum_{i=1}^{N}\alpha_T(i)\alpha_{iF}, \tag{21}$$

where

$$p(0|\lambda)=\alpha_T(N)=\beta_T(1)=\sum_{j=1}^{N}\alpha_t(j)\beta_t(j). \tag{22}$$

Through this algorithm, the parameters of the abnormal sound can be calculated [24].

3.2.3. Music Classification and Detection Model under Noisy Environment. When the music sound contains noise, the change curve of the music signal will change to a certain extent. The music signal in the complex noise is

$$y(n)=s(n)-\mathrm{at}(n). \tag{23}$$

Noise will cause a certain change in the curve of the music, and the system cannot accurately identify the music signal, so the influence of noise on the music signal should be eliminated. In this paper, the soft threshold wavelet transform is selected to remove the music signal noise [25]; suppose a music signal with noise before and after the removal curve is shown in Figure 5.

Music Classification and Detection Feature Extraction. When music information changes, there are many features of music classification and detection [26]; the specific calculation formula is as follows:

$$sp=\frac{\sum_{i=1}^{N}\left(f_i-\bar{f}_i\right)^2 p(f_i)}{\sum_{n=1}^{N}p(f_i)}. \tag{24}$$

The formula for calculating the short-term energy spectrum characteristics of music is as follows:

$$ff=\frac{\sum_{I=1}^{N}\left(f_i-\bar{f}_i\right)^2 p(f_i)}{sp^3\sum_{n=1}^{N}p(f_i)}. \tag{25}$$

(2) BP Neural Network Algorithm. The number of music short-term energy spectrum features is the number of nodes in the input layer of the BP neural network. The input and output of the neural network are, respectively [27],

$$S_j=\sum_{i=1}^{m}w_{i\,j}x(i)-\theta_j,$$
$$b_j=\frac{1}{\left(1+\exp\left(\sum_{i=1}^{m}w_{ij}x_i-\theta_j\right)\right)},\quad j=1,2,\cdots,p. \tag{26}$$

According to the same principle, the input and output formulas of the output layer can be obtained [28]:

$$L=\sum_{j=1}^{n}w_{jk}b_j-\theta_k, x_{i+1}=\frac{1}{\left(1+\exp\left(\sum_{k=1}^{p}w_{kj}b_j-\theta_k\right)\right)}. \tag{27}$$

4. Website Function Design

We can search for songs based on the album name and song name, leave a message to favorite singers, communicate with netizens, and view the song pop charts of the month, which are the specific functions of the website.

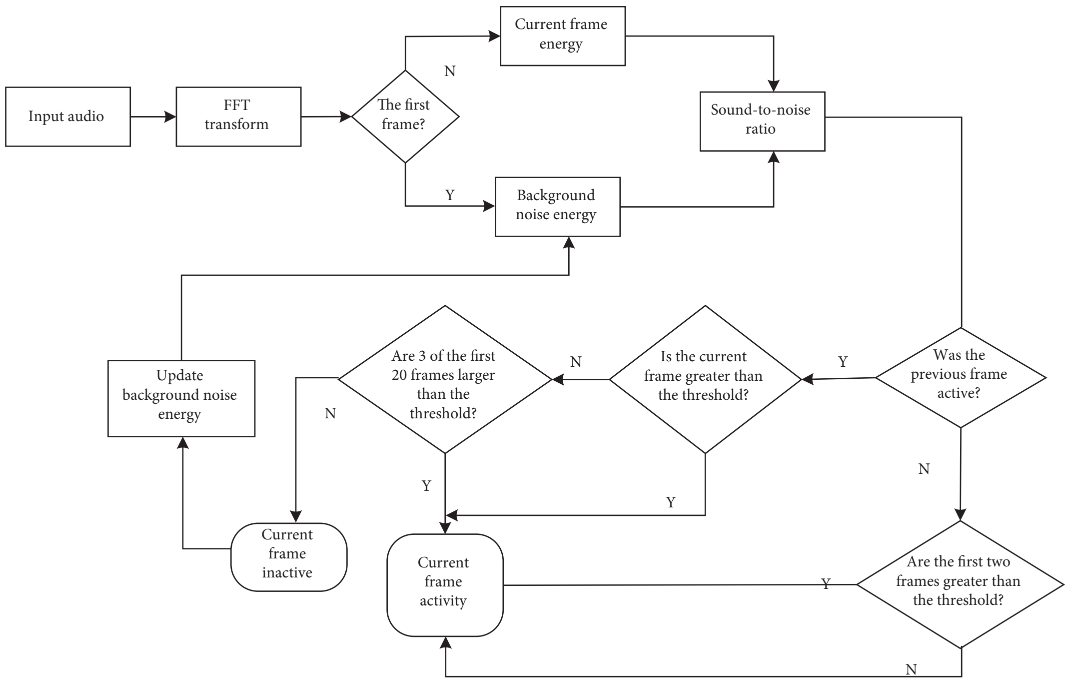

Figure 4: Sound detection flowchart.

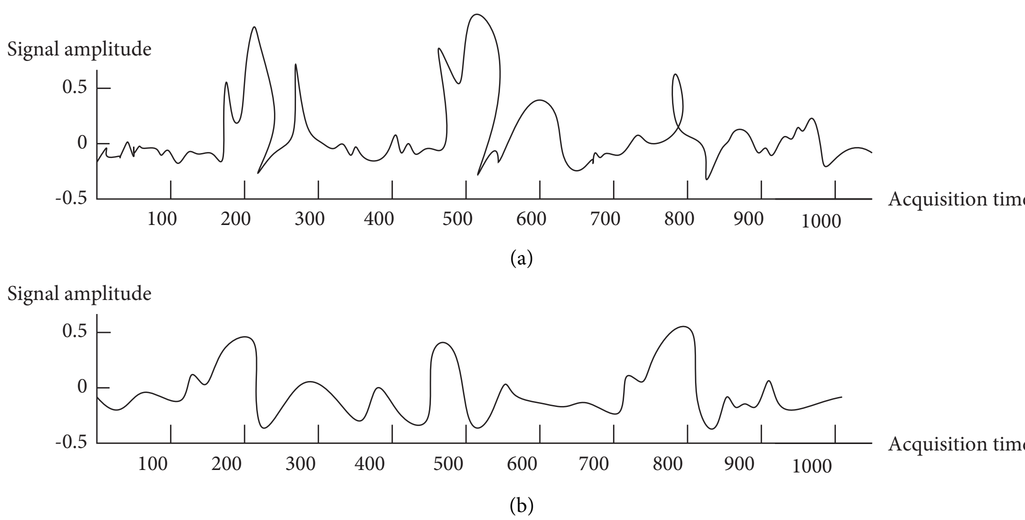

Figure 5: Noise effect removal test. (a) Music signal with noise. (b) Music signal to remove noise.

4.1. Website Testing

4.1.1. Login Test. We tested the login function of the website, and the specific conditions are shown in Table 1.

4.1.2. Search Function. We conducted a search function test on the website, and the specific conditions are shown in Table 2.

4.1.3. Song Display. We tested the management function of the website, and the test results are shown in Table 3 [25].

4.1.4. The Administrator Maintains and Manages Songs. The management function of the website was tested, as shown in Table 4.

4.2. Research on Music Rhythm Detection Algorithm. It mainly introduces a music rhythm algorithm: error concealment. Error concealment can slow down the degradation of audio quality in the compression process. The traditional method includes the function of noise suppression, but the traditional method detaches the smooth music signal to work. In order to solve this problem, we use template matching algorithm to detect music rhythm. The

Table 1: Login and registration test cases.

Serial number	Test input	Execution precondition	Expected output
1	Enter the administrator account and password in the login area, and click login.	The user has opened the homepage of the website; the account and password are entered correctly.	The page jumps to the background maintenance and management page.
2	Enter the normal user account and password in the login area, and click to log in.	The user has opened the homepage of the website. The account and password are entered correctly.	The page jumps to the front page and shows that the user has logged in.
3	Enter the wrong user account and password in the login area, click to log in.	The user has opened the homepage of the site. The account and password are entered incorrectly.	The page jumps to the front page and prompts “incorrect account and password.”
4	Click the register button.	The user has opened the homepage of the site.	The page jumps to the registration page.
5	Fill in the user ID on the registration page.	User has entered the registration homepage.	The page prompts “does the user name already exist?”
6	Fill in the user e-mail of the registration page.	Fill in the user ID.	The page prompts “is the e-mail format correct?”
7	Fill in the password of the registration page.	User has entered the registration homepage.	The page prompts “the two passwords are not the same.”
8	Click add.	Fill in e-mail.	The page prompts “added successfully.”

Table 2: Search function test case.

Serial number	Test input	Execution precondition	Expected output
1	Enter the full name of the song in the search area.	The user has opened the homepage of the website. Tick the search type as the song title. The song exists on the site.	Jump to the search page and display song information.
2	Enter part of the song name in the search area.	The user has opened the homepage of the website. Tick the search type as the song title. The song exists on the site.	Jump to the search page and display song information.
3	Enter the artist’s full name in the search area.	The user has opened the homepage of the website. Check the search type as singer. The song exists on the site.	Jump to the search page and display the corresponding song information of the singer.
4	Enter part of the singer’s name in the search area.	The user has opened the homepage of the website. Check the search type as singer. The song exists on the site.	Jump to the search page and display the corresponding song information of the singer.
5	Enter the full name of the album in the search area.	The user has opened the homepage of the website. Check the search type as album. The song exists on the site.	Jump to the search page and display the corresponding song information of the album.
6	Enter part of the album name in the search area.	The user has opened the homepage of the website. Check the search type as album. The song exists on the site.	Jump to the search page and display the corresponding song information of the album.
7	Enter songs, artists, and albums that do not exist in the search area.	The user has opened the homepage of the website. Check the search type as album. The song or artist does not exist on the website.	Jump to the search page, and display “no related files found.”

Table 3: Song display test case.

Serial number	Test input	Execution precondition	Expected output
1	Click on the music charts.	The user has opened the homepage of the site.	Display music ranking information, sorted in descending order of total visits.
2	Click on the singer rankings.	The user has opened the homepage of the site.	Show singer ranking information, sorted in descending order of total visits.
3	Click on the album chart.	The user has opened the homepage of the site.	Display album ranking information, sorted in descending order of total visits.
4	Click on the song name of the music chart.	The user has opened the homepage of the site.	Jump to the song play page and play this song.
5	Click the music chart song download button.	The user has opened the homepage of the site.	Pop up the download prompt box.
6	Click on my favorites.	The user has opened the homepage of the site. User logged in.	Show the user's favorite songs.
7	Click on my favorites.	The user has opened the homepage of the site. User is not logged in.	"You have not logged in yet. Please log in first!"

Table 4: Test cases for administrator maintenance and management functions.

Serial number	Test input	Execution precondition	Expected output
1	Click music to add.	The administrator has logged in the website back-end.	Jump to the music adding page.
2	Click the browse button on the music add page.	The administrator has logged in the website back-end. The administrator has entered the music adding page.	Choose to add a file. Box pops up.
3	Click the add button on the music add page.	The administrator has logged in the website back-end. The administrator has entered the music adding page. There is missed or incorrectly filled in information.	The prompt is displayed on the page, and the prompt is correct.
4	Click music edit.	The administrator has logged in the website back-end.	Jump to the music modification page.
5	Click the delete button on the music modification page.	The administrator has logged in the website back-end. The administrator has entered the music modification page.	A prompt box "whether to delete the record" pops up, click OK, and return to the front page. The song will be deleted from the music list.
6	Click the edit button for music edit.	The administrator has logged in the website back-end. The administrator has entered the music modification page.	Jump to the music modification page. The song information displayed on the page is correct.
7	Click artist to edit.	The administrator has logged in the website back-end.	Jump to the page modified by the singer.
8	Click the edit button modified by the singer.	The administrator has logged in the website back-end. The administrator has entered the artist modification page.	Jump to the artist modification page. The artist information displayed on the page is correct.
9	Click to log out.	The administrator has logged in the website back-end.	Exit the background management and return to the homepage of the website.

Table 5: Experimental result table.

Estimation method	Number of songs	Strong accuracy (%)	Weak accuracy (%)	Error rate (%)
Error concealment	427	59.95	84.07	15.93
Template matching	463	55.29	77.53	22.46

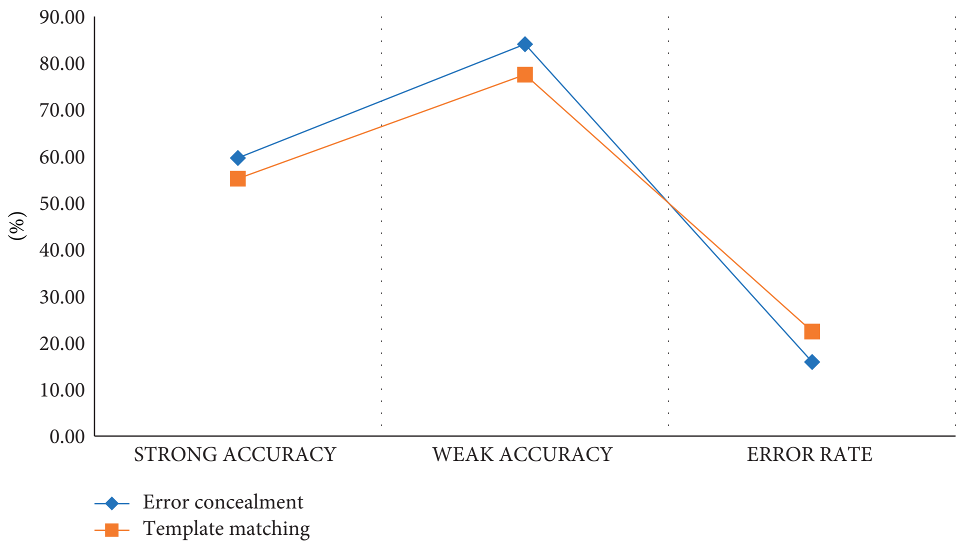

FIGURE 6: Result trend graph.

TABLE 6: Experimental results of error concealment method.

Number of songs	Song type	Strong accuracy (%)	Weak accuracy (%)	Error rate (%)
186	Pop	63.98	88.17	11.83
120	Rock	70.00	90.84	9.16
28	Jazz	46.42	74.99	25.00
35	Bossa-Brazil	25.71	62.85	37.14
43	Soul	55.48	74.41	25.58
15	Funky	53.33	73.34	26.66

TABLE 7: Template matching method experiment results.

Number of songs	Song type	Strong accuracy (%)	Weak accuracy (%)	Error rate (%)
198	Pop	60.10	82.83	17.17
137	Rock	61.31	79.57	20.43
31	Jazz	41.93	67.75	32.25
37	Bossa-Brazil	24.31	40.56	59.44
43	Soul	53.48	74.42	25.58
17	Funky	47.05	64.71	35.29

experiment involves a variety of music forms such as rock, jazz, and pop music. We analyze the two estimation methods of error concealment method and template matching method, and the experimental results are shown in Table 5 and Figure 6.

We conducted experiments on the training data of the International Music Retrieval and Evaluation Competition. The experimental results are shown in Tables 6 and 7.

From Figures 7 and 8, we can see that the two different detection methods have different results for different types of music, and the Bossa-Brazil music type has the highest error rate.

4.3. *Test Model Performance Comparison*

4.3.1. Test Platform. In order to detect the effect of voice abnormality detection under normal and noisy conditions, on the same test platform, the music detection model without noise removal neural network and the KNN music detection model with noise removal were selected, and the corresponding algorithms are proposed. The performances of the voice anomaly detection model are compared and analyzed. The selected test platform settings are shown in Table 8.

4.3.2. Analysis of Detection Accuracy. The experiment selected 5 different music type numbers and divided them into two categories with noise and without noise, as shown in Table 9.

We used the voice anomaly detection model, neural network music detection model, and KNN music detection model designed in the article to detect the music data in the table. The experimental results are shown in Figures 9 and 10.

According to the results in Figures 9 and 10, the detection accuracy of the KNN model and the neural network model is low, and there are many requirements

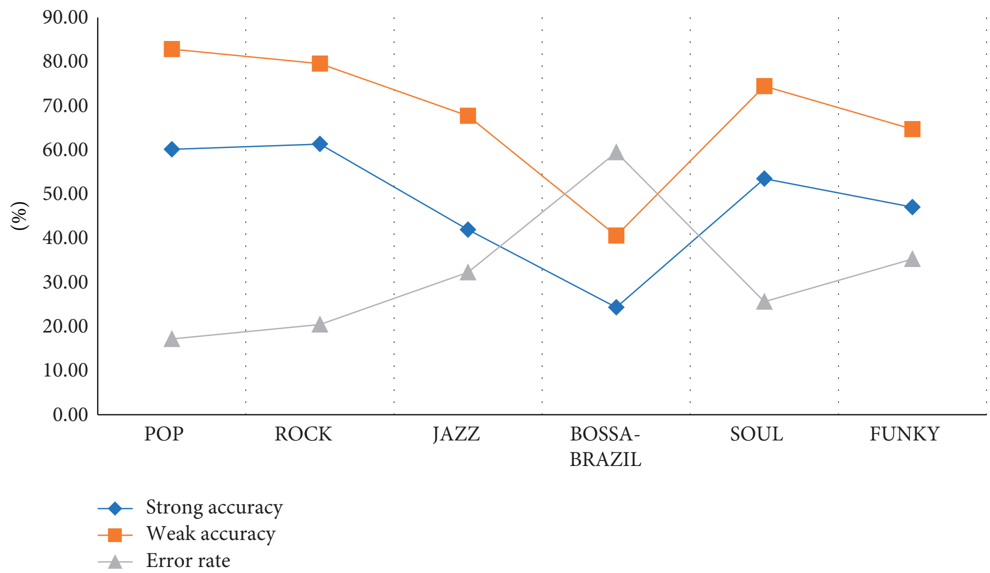

Figure 7: Trend of error concealment method.

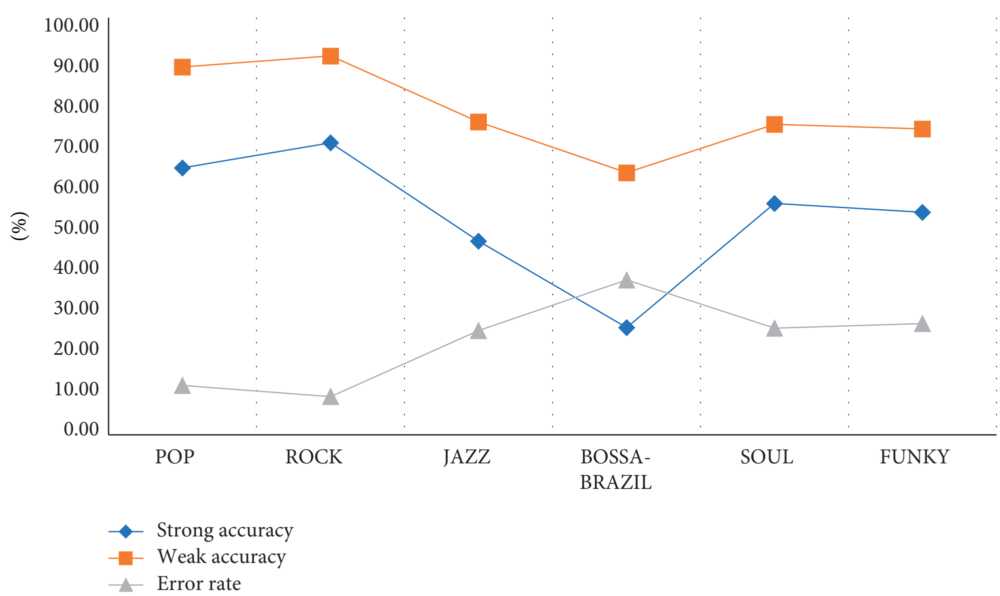

Figure 8: Trend chart of template matching method.

Table 8: Testing platform design.

Platform parameters	Parameter
CPU type	Intel
CPU frequency	2.86 GHz
Memory type and size	DDR 3400 16 GB
Hard disk type and size	Solid state, 320 GB
Programming tools	VC++6.0

Table 9: Music classification and detection object table.

Music type number	Noise	No noise
1	10	30
2	10	30
3	20	40
4	10	40
5	20	50

for the types of music signals. In the case of no noise, the detection accuracy of the KNN model can only reach 86%. In the case of noise, the detection accuracy will show a lower situation, and the detection accuracy of the neural network model under the condition of noise is higher, which can explain the certain noise recognition function of the neural network system. The detection accuracy of the model proposed in this article can be maintained above 90% in the absence of noise and can reach above 85% in the presence of noise, which is the one with the highest detection accuracy among the three different

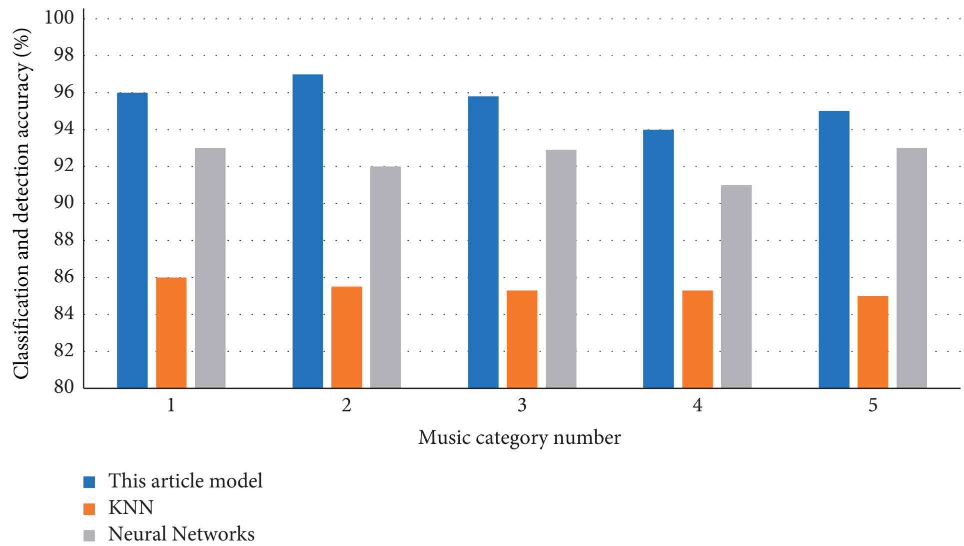

Figure 9: Comparison of boring music classification and detection accuracy.

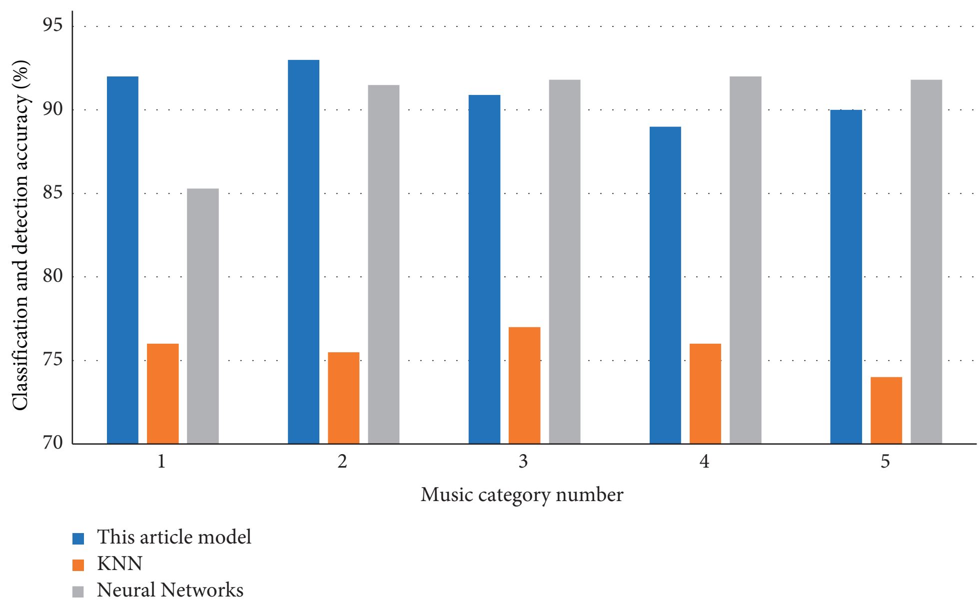

Figure 10: Comparison of dry music classification and detection accuracy.

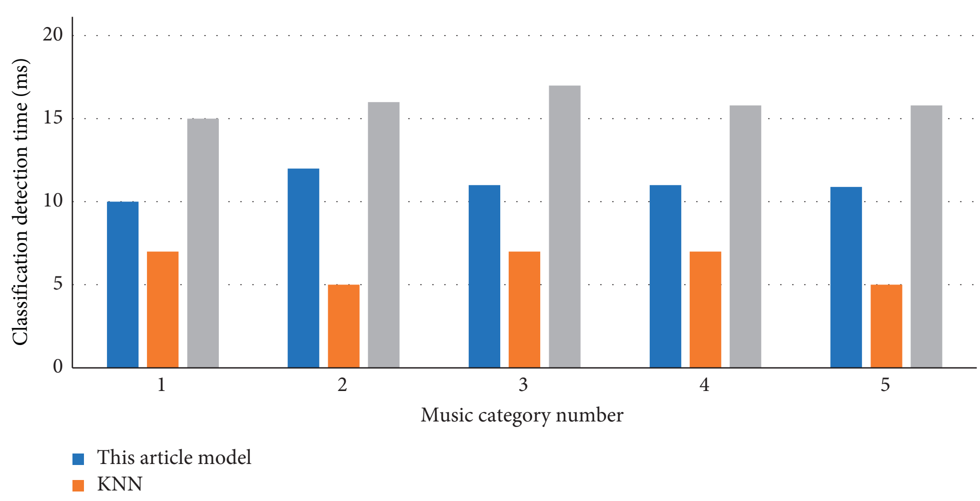

Figure 11: Music detection time comparison.

systems, the types of music detected are relatively more, and the efficiency of music detection is improved.

4.3.3. Analysis of Detection Efficiency. For music in a complex music environment, we have counted the music detection time of three models, and the experimental results are shown in Figure 11.

From Figure 11, we can see that although the KNN music detection model takes the shortest time to check, the KNN music detection model has a low detection accuracy rate and cannot meet the requirements of the system. The detection world of the model designed in this article is lower than that of the neural network detection model. It also shows that the influence of noise on the music signal is detected to a certain extent, and the efficiency of music detection is improved.

5. Conclusion

Based on 5G and Internet of Things technology, this paper also drives the development of music industry. Network communication has replaced the traditional way of communication and become a brand-new way of music communication. The main content of this paper is to design an online music website based on the Internet of Things, introduce the basic functions of the website, and design a voice anomaly detection system from login test, search function test, song display, administrator maintenance, and song management. In order to detect the accuracy of abnormal speech system, the experiment was to set up three different speech detection systems in the condition of noise and noise contrast experiment and test their experimental accuracy. The system designed in this paper has the highest accuracy, which can meet most requirements and improve the efficiency of music detection. The future work will further study the multi-intelligent recommendation algorithm of music websites, use real-time big data technology to analyze the similarity of multiple customers at the same time, and recommend that the customer attributes in different time periods are similar, so as to perform the group calculation of different users.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding this work.

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