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Research on the Digital Innovation and Inheritance Path of Southwest Lu Drum and Blow Music under the Background of Informatization

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Abstract

In this paper, we build a web crawler through the Scrapy framework to obtain the digitized data of Luxinan Drum and Blow music according to the demand, and construct the feature word vector and corpus of Luxinan Drum and Blow music by using the word2vec model. Using the three operations of pre-emphasis, frame-splitting and windowing, the digitized music of Lunan drums and dulcimers is digitized, and the Fourier transform of Lunan drums and dulcimers is used to obtain the cepstral coefficients of the Mel frequency, the fundamental frequency and the resonance peaks. The research object is selected, the questionnaire about the research of digital inheritance of the south Lu drum and blow music under the background of informationization is designed, and according to the initial data obtained for the research and analysis, the statistical analysis method is used to carry out the empirical analysis of the digital inheritance of the south Lu drum and blow music under the background of informationization. The results show that from the perspective of the inheritance value dimension of the Southwest Lu drum and blow music corpus, its mean and standard deviation are 2.11 and 0.958, respectively, indicating that many young people are increasingly concerned about the digital inheritance of the Southwest Lu drum and blow music. This study focuses on the analysis of the dilemma of inheritance and innovation in the new period and puts forward some feasible, innovative development paths to help this excellent national intangible cultural heritage to be inherited and developed.

Keywords: Scrapy crawler; word2vec model; Frequency cepstrum coefficient; Fundamental frequency; Resonance peak; Southwest Lu drum and wind music.

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1 Introduction

Confucius put forward the concept of “rising from Poetry, establishing from Rites, and becoming from Music” more than 2,000 years ago, and then there is the concept of “writing to explain the way of the world, singing to sing”, which all indicate that music has an important role in social indoctrination. Since ancient times, the people of Southwest Lu have been advocating “benevolence, righteousness, propriety, wisdom and faith”, and the drum and bassoon music of Southwest Lu is the ceremonial music inherited along with the Confucian culture, which is indispensable to the daily life of the local people and the important ceremonies, and it has the strict rules of ceremonial music and rich cultural connotations. Drum and Blow Music of Southwest Lu is the most recognizable and authentic segment of Shandong Drum and Blow Music [1].

Drum and bassoon music in Southwest Shandong is not optimistic despite the continuous advancement of modernization. On the one hand, the continuous fusion and exchange between the traditional national culture and foreign cultural elements make the traditional music culture, such as drum and blow music in Southwest Lu face a severe development situation [2]. On the other hand, the rapid wave of economic development has made young drumming artists unwilling to hold onto drumming music that can only support their families. Most importantly, from the beginning of the 21st century, since the “change of customs”, the funeral rituals on which the drum-and-bugle music of southwestern Shandong depends have been greatly simplified, and the drum-and-bugle music, which has been inherited for more than 2,000 years, has lost its sound, which is tantamount to adding insult to injury to the inheritance and development of the drum-and-bugle music of southwestern Shandong [3]. The inheritance and development of Southwest Lu Drum and Blow Music in the new era have been severely limited by many objective conditions. Some scholars also advocate the use of modern new media technology to promote drum and blow music and commercial performances. With the progress of science and technology, you can use a lot of video technology to promote drum and blow music as well as to collect information about drum and blow music, such as film and television works with more music related to drum and blow music, but also in the variety show to strengthen the drum and blow music publicity, etc. [4].

Traditional culture is the essence of a nation left behind in the process of continuous development in the long river of history; intangible cultural heritage is one of the important parts of the transmission of culture; a nation wants to live on and on, can not forget their own fundamentals, so the inheritance of traditional culture and innovation work is of great significance in the times. Literature [5] elaborates that since the advent of sound recording, musicians and sound artists have attempted to incorporate traditional elements into their work with the aim of preserving them; after all, traditional music is at risk of being neglected and forgotten. The purpose of this research is to determine if there are contemporary artistic practices that can maintain the characteristics of traditional repertoire while still reaching a wide and diverse audience of performers. Literature [6] addresses the issue of heritage transformation of historic districts, taking Quanzhou West Street as an example of a district with rich cultural resources but serious commercialization of the neighborhood, drawing on the experience of Japan’s street reconstruction, adopting a government-led residential reconstruction model, and updating the traditional shopping street with a coordinated fusion of tradition and beauty. Literature [7] examines and analyzes the plan layout and spatial structure of Yunnan Dai traditional houses and materials and finds that they all contain the concepts of architectural physics, ecology, and sustainable development, but there are also backward elements, and the initiative will combine the traditional cultural house concepts with modern ecological technology, and design the Dai houses where advanced technological concepts and the essence of traditional culture coexist, which is in line with the goal of the ecological concept of sustainable development, and also has a positive impact on the inheritance of traditional culture. The influence of cultural inheritance is positive as well. Literature [8] attempts to extract a single element from traditional Chinese cultural patterns for existing

architectural design, which balances spatial coherence and heterogeneity while also highlighting the uniqueness of culture. It is an attempt to combine technology with traditional culture and art to provide cultural symbols for digital technology, which is conducive to the study of traditional pattern reproduction and also brings new ideas and unique vitality to architectural design. Literature [9] analyzes the intangible cultural heritage elements in the innovative design of apparel using interactive evolutionary computation. It can reduce the visual fatigue brought about by user reference ratings and improve the quality of evaluation, and the actual tracking survey of customer feedback found that the incorporation of intangible cultural heritage elements into apparel design can improve customer satisfaction. Literature [10] combines previous literature and information to describe the significance and impact of the traditional Chinese folk textile repair of the concept of thrift and frugality practiced and promoted in today's society and the prospects for the development of this technology in today's society. The inheritance and innovation of the famous sword textile repair technology are analyzed through the exploration of the intelligent creation mode of material technology integrated design and pre-protection preventive repair textile.

In this paper, we first analyze the structure of URLs to determine the pattern between related URLs, and then obtain the digitized data of Luxinan Drum and Blow music according to the demand after splicing and combining the URLs of the specified pages by writing logic codes. Secondly, the CBOW model and Skip-gram model in the word2vec model are used to construct the feature word vector and corpus of Lusinan drum and blow music, and the number of music segments contained in the Lusinan drum and blow music corpus is listed. Then, the audio signals were obtained by Fourier transforming the fragments of Lunan Drum and Blow music, and then each audio signal was preprocessed to obtain the three features of Mel frequency cepstrum coefficient, fundamental frequency and resonance peak. Finally, from the perspective of inheritance and protection of intangible cultural heritage, we determine the research object, design and distribute questionnaires to obtain the initial data of the digital inheritance research of Lunan Drum and Blow Music and use the statistical analysis software to research and analyze the digital inheritance of Lunan Drum and Blow Music under the background of informationization, with a view to providing some references for the inheritance and development of Lunan Drum and Blow Music.

2 Research on the Digital Inheritance of Southwest Lu Drum and Blow Music

2.1 Research on the corpus of Southwest Lu drumming music

2.1.1 Scrapy Crawler-Based Digital Data Acquisition for Lusitanian Drumming Music

Python's highly integrated and flexible programming language design has made Scrapy the most mainstream web crawler framework. Through the Scrapy framework, it is possible to quickly build a web crawler. Based on this framework, the crawler has strong scalability and robustness. Therefore, this paper is based on Scrapy framework to design the web crawler for digitized data of Lusignan drumming music, as shown in Fig. 1, and the problems and main work in the design are as follows:

First of all, by analyzing the structure of the URL, determine the law between the relevant URLs; by writing logic code, the URLs of the specified page are spliced and combined, and then added to the URL library for queuing, waiting for crawling. The digitized data for Luxi South Drumming Music on demand is obtained by parsing the results of the crawled page.

In the process of crawler execution, there will be interruption problems, mainly due to URL loss or redirection; you can get the corresponding specific problems through the content of the returned response. Based on these problems, this paper designs the error analysis module; for the 404 problem

that its page does not exist, you can choose to skip this page when the crawler requests. By setting the meta attribute in the Request API, the redirection problem can be solved using the Scrapy framework solution.

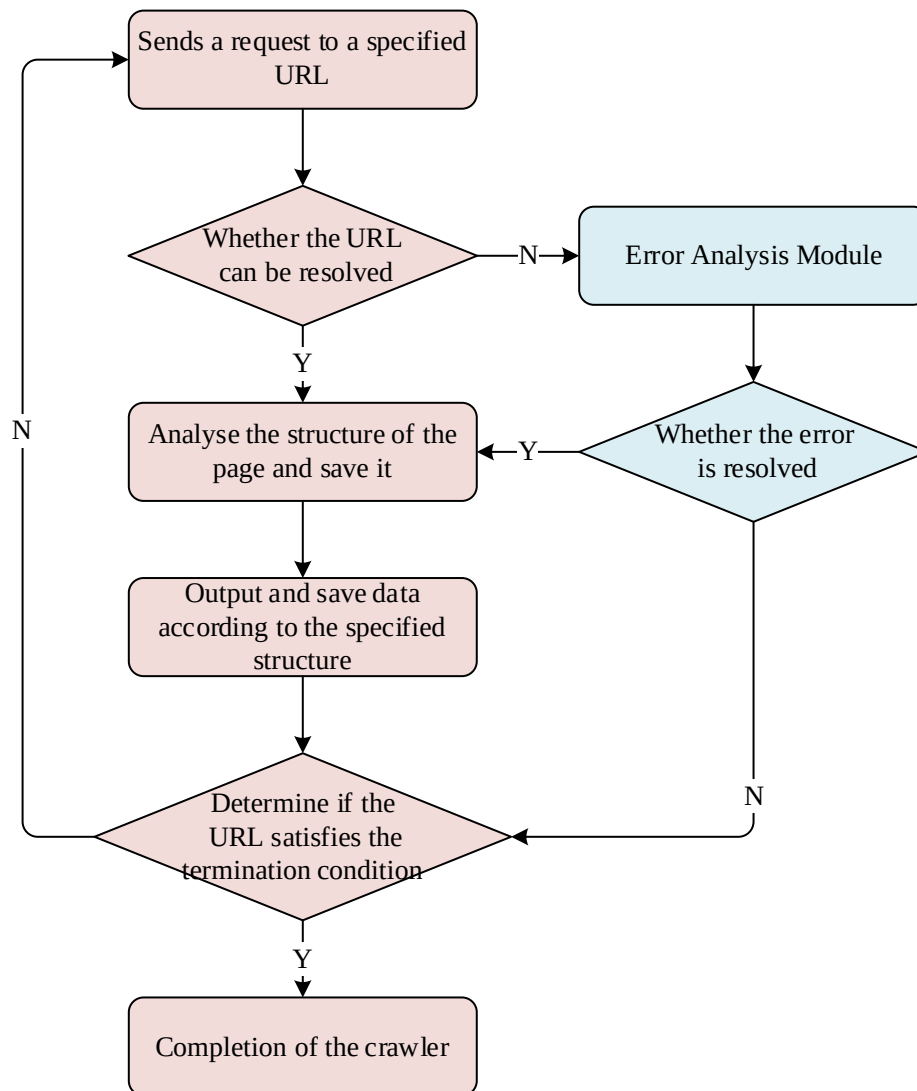


Figure 1. Lu southwest promotes the digital data acquisition process

2.1.2 Word2vec-based feature word vector construction for Southwest Lu drumming music

There are two models in word2vec, CBOW model and Skip-gram model, CBOW and Skip-gram model structure is shown in Figure 2, in which CBOW model is calculated by a certain number of words before and after the location of the word $W(t)$ to get the probability of the occurrence of the current word. Calculating skip-gram involves using the current word to predict the probability of occurrence of words before and after it, which is the opposite of CBOW. The model undergoes training using both Hierarchical Softmax and Negative Sampling training methods.

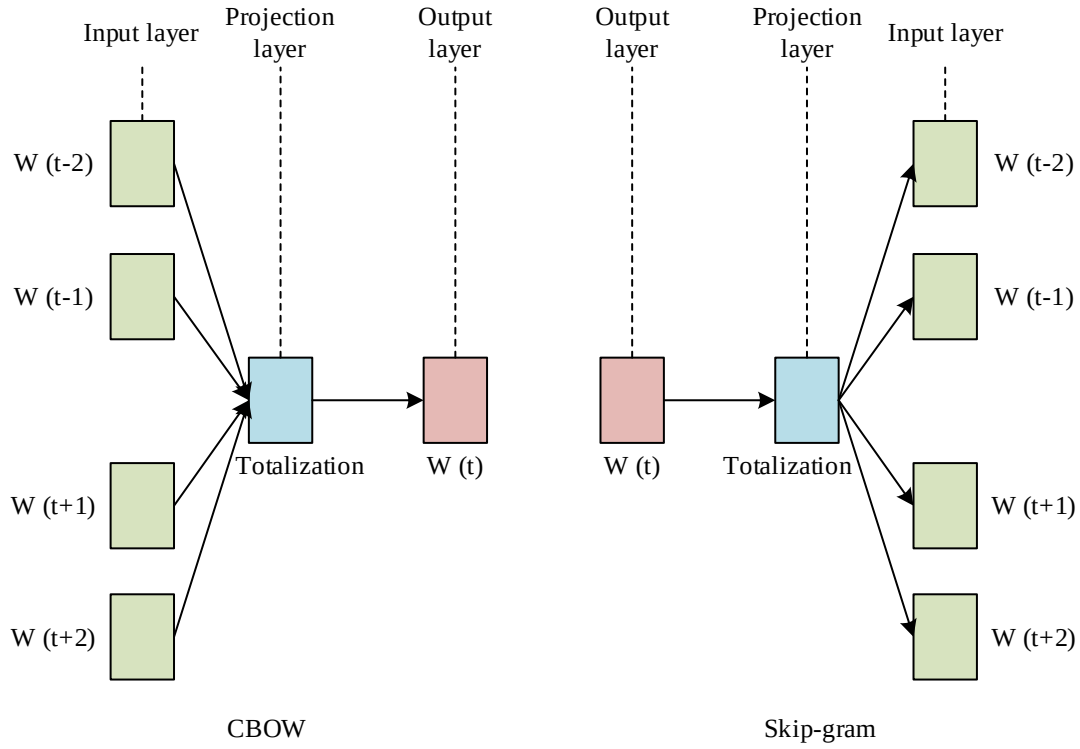


Figure 2. CBOW and Skip-gram model structure

The difference between the CBOW model and the NNLM model is that CBOW removes the nonlinear hidden layer, which reduces the time consumption, and all words share the projection layer, i.e., it obtains the result that all words are mapped to the same position. The CBOW model considers that in the context of the current word, all the words have the same degree of influence on the current word and does not take into account the order in which they appear in the text and the distance between them in the text and the current word, so it is also called the bag of words model in continuous space. The CBOW model considers that all words have the same influence on the current word in the context of the current word, without considering the order in which they appear in the text and the distance between them in the text and the current word, so it is also known as the bag-of-words model in continuous space. The probability of occurrence of the current word is calculated by calculating the context within a certain range of the current word, and the training complexity is illustrated below.

$$Q = N * D + D * |V| \quad (1)$$

In Eq. Q is the complexity of training, N is the length of the window above and below the input layer, D is the dimension of the projection layer, and $|V|$ is the size of the training corpus.

From the structure of the CBOW model, it can be seen that the operation of the process from the input layer to the hidden layer is essentially a cumulative summation of the word vectors in the context.

The training process for the Skip-gram model is opposite to that of the CBOW model, which trains to obtain context information by analyzing the current word. Therefore, when the Skip-gram model is trained, its input is the current word, followed by a continuous projection layer, through which the log-linear classifier is calculated to get the probability of other words before and after the current word.

The target word range setting will affect the complexity of training. Through the experiment is not difficult to find that the complexity of training will increase with the target word detection range expansion; at the same time, the training accuracy will also be improved. Specifically in the text similarity experiment, the size of the distance between other words and the current word is inversely proportional to the correlation between them, and the complexity of training is also inversely proportional to the distance, which the formula can express:

$$Q = N * D + N * D * |V| \quad (2)$$

In the formula N represents the size of the context window of the output layer corpus, and the meaning of each other parameter is the same as that of equation (1). When training a skip-gram model, you need to make the parameter set θ the best in order to maximize the value of T in equation (3):

$$T = \arg \max_{\theta} \prod_{u \in \text{context}(W(t))} p(u | W(t), \theta) \quad (3)$$

According to the results of the study, the differences between CBOW and Skip-gram are reflected in the semantic and grammatical aspects of words, and the results obtained through the CBOW model are usually better in describing the grammatical related information of words, which makes it better in representing the grammatical information of words, and the accuracy of grammatical testing is higher. In contrast, the results of the Skip-gram model are better in terms of semantic differentiation of words, so they can better represent the semantic features of words, and therefore, the semantic computation accuracy of the results of the Skip-gram model is higher.

2.1.3 Constructing a corpus of southwestern Lu drumming music

After crawling the Luxinan Drum and Blow Music and constructing the Luxinan Drum and Blow Music word vectors through web crawlers, the audio information collected is not comprehensive and contains many wrong audio. The corpus library of Luxinan drumming music was built using the manual collection method. By means of online audio search, tape transcription, video audio extraction, and word division processing, a total of 592 pieces of Lunanese drum and blow music from 65 music items were collected by taking the provinces and localities that declared the music items as the major categories, and the music items as the minor categories, and the Lunanese drum and blow music corpus was established.

2.2 Feature Extraction of Southwest Lucian Drumming Music

2.2.1 Pre-processing

The original waveform of southwestern drum-and-bugle music ‘One Flower’ is displayed in Figure 3. In this paper, when digitizing South-West Lucian drum-and-bugle music, the processing process mainly includes three aspects: pre-emphasis, frame-splitting, and window-adding operations on the clips. After Ruxinan drum music lyrics are processed, it is common to pre-emphasize them. In the high-frequency stage of the Rusyn drum and bassoon music, the energy loss brought by the lip and mouth radiation is gathered, so it leads to the backup attenuation of the high-frequency signal in order to improve the high-frequency resolution of the Rusyn drum and bassoon music, it can be realized by adding a filter, and the low-frequency part can be retained at the same time. The formula used to express the filter is:

$$H(z) = 1 - \mu z^{-1} \quad (4)$$

Where the value of μ is generally close to 1. In this paper, it takes the value of 0.94. The corresponding time-domain difference equation is expressed as:

$$y(n) = x(n) - \mu * x(n-1) \quad (5)$$

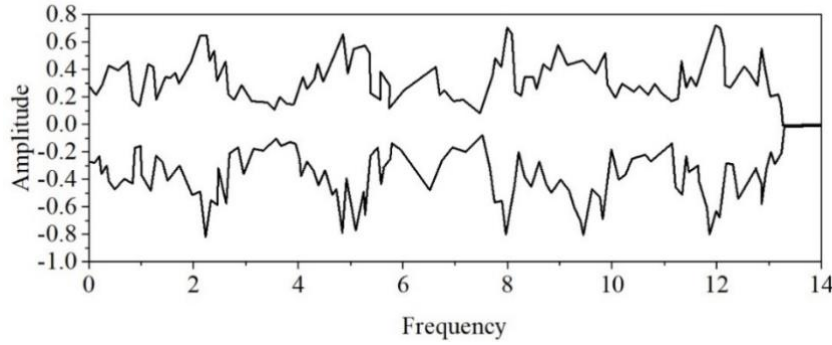


Figure 3. The original waveform of a fragment of the music “a flower” in the southwest of lu

Figure 4 shows the waveform after pre-emphasis; the pre-emphasis process is in the frequency domain multiplied by a coefficient that is the pre-emphasis factor; the factor is positively correlated with the frequency, so the amplitude of the high-frequency part of the amplitude will be enhanced. Pre-emphasis can greatly smoothen the frequency of the audio signal, thus reducing the attenuation of the high-frequency part. Because of the short time variation brought about by the unpredictability of the movement of the sound generator, the audio signal itself is not smooth, but because the rate of change of its movement state is very slow compared to the rate of sound vibration, the audio signal can be regarded as a smooth signal for a relatively short period. For a duration between 10ms to 30ms, the parameters of the spectral characteristics of the speech spectrum and some other physical characteristics generally remain unchanged. Inspired by this, before the music feature extraction, the music samples can be segmented to get multiple short samples then these short samples can be regarded as smooth, which will be called a frame; in this paper, when the music clip is divided into frames, each frame is about 46ms long.

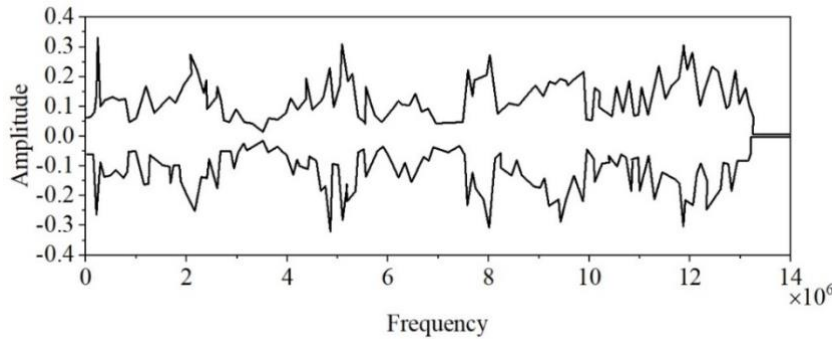


Figure 4. Pre-aggravated waveform

Figure 5 shows the waveform of the music clip after framing when the frames are continuous with each other, there may exist the information between the frames can not be processed, resulting in the loss of information, so in order to avoid this situation and to ensure a smooth transition between the two frame signals, the introduction of frameshifting in framing is to ensure that the superposition of the signals between the neighboring frames in the process of framing, and the general frameshifting

is taken as a value of the length of the frame signals between 0-1/2 The general value of frameshift is between 0-1/2 of the length of the frame signal. The formula for calculating the number of frames in a theoretical Ruxinan drum and bass music clip is:

$$n = \left\lceil \frac{N - N_1}{N_2 - N_1} \right\rceil \quad (6)$$

Where n denotes the calculated frame value, N is the total length of the Rusynan drumming music, N_1 is the size of the frame shift, and N_2 denotes the length of each frame of the Rusynan drumming music. After splitting frames, each frame of the Rusynan drumming music can be processed as a smooth signal for processing. However, after split-needle processing, the signal is often truncated, and then the spectral distortion causes spectral leakage. The truncation function is utilized in truncating the window function. Thus the addition of the window following the split-needle Rusynan drum and bassoon can be understood as:

$$S_{\omega}(n) = S(n) * \omega(n) \quad (7)$$

Where $\omega(n)$ is the window function, and $S_{\omega}(n)$ represents the Rusynan drum and bass music after the frame-splitting process and windowing operation. The side flaps on both sides of the spectrum determine the main performance of the window function. In the windowing of the southwestern drum and bassoon music, the Hamming window is selected, and the corresponding function expression is:

$$\omega(n) = \begin{cases} 0.54 - 0.46 \cos[2\pi n / (N - 1)], & 0 \leq n \leq (N - 1) \\ 0, & \text{other} \end{cases} \quad (8)$$

From the formula, it can be seen that the Heming window is a cosine window; compared with the common rectangular window, its weights can minimize the sidelobe, and its sidelobe decays slower, which can effectively solve the spectral leakage problem that often occurs in the Rusynan drum-and-bugle transformation.

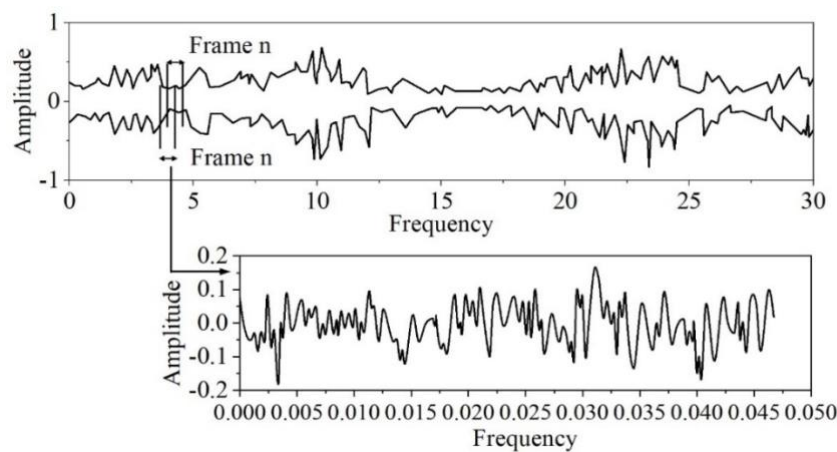


Figure 5. The waveform of the music segment

2.2.2 Mel frequency cepstrum coefficients

To obtain the audio signal, Luxinan Drum and Blow music clips are first digitized, and then each audio signal is preprocessed. Because the Ruxinan drum-drumming music can be done as a smooth signal in a short time range, the signal is generally analyzed by doing the Fourier transform of the sampling points in the audio signal frames so as to obtain the spectrum corresponding to the preprocessed audio frames at each frequency and its energy distribution. The expression is a representation of the process of realizing the time-frequency transformation of the Fourier transform on the audio signal:

$$x(m) = \sum_{n=0}^{N-1} x(n) e^{-j \frac{2\pi m n}{N}}, 0 \leq m \leq N-1 \quad (9)$$

Where N is the number of discrete sample points corresponding to the audio frame used in passing the Fourier transform. The spectrum obtained from each frame of Lusignan drumming is passed through a set of Meier filters with triangular overlapping windows to obtain the corresponding Meier scale of each filter output, and its corresponding logarithmic energy is extracted on each Meier scale by logarithmic operations:

$$S(m) = \ln \left(\sum_{k=0}^{N-1} |x(k)|^2 H_m(k) \right), 0 \leq m \leq M-1 \quad (10)$$

Where $H_m(k)$ is the frequency response of the Mayer filter. The obtained logarithmic energy is subjected to a discrete cosine transform, thus realizing the transformation of the Rusynan drum and bass music from the frequency domain to the spectral-frequency domain:

$$C(n) = \sum_{m=0}^{N-1} s(m) \left(\frac{\pi n(m-0.5)}{M} \right), n=1, 2, \dots, L \quad (11)$$

Where M is the number of Meier filters and $n=1, 2, \dots, L$ is denoted as the order of *MFCC*. Thus, this paper L takes the value of 12.

2.2.3 Fundamental frequency

Let the sound gate excitation signal $e[n]$, which is obtained by the system of vocal tract response and lip-tooth radiation to get the voice part in the Rusynan Drum and Blow music, $v[n]$ represents the corresponding response of the system and $s[n]$ is the new Rusynan Drum and Blow music that is obtained, there:

$$s[n] = e[n] * v[n] \quad (12)$$

In the frequency domain, the convolution of two signals in the time domain is equivalent to their product, so Fourier can obtain the multiplicative signal transform. Through the use of logarithmic operations, the multiplicative relationship becomes an additive relationship, and then through the use of the inverse Fourier transform, the cepstrum of the original signal is obtained:

$$c[n] = \frac{1}{2\pi} \int_{-\pi}^{\pi} \log |S(\omega)| e^{jn\omega} d\omega \quad (13)$$

Where, $S(\omega) = \sum_{n=-\infty}^{+\infty} s[n]e^{-jn\omega}$, it follows that the cepstrum is a Fourier analysis of the logarithmic amplitude of the input signal. The cepstrum can bring out the intrinsic information of the Rusynan Drum and Blow music scores, such as the frequency and its corresponding cepstrum peak information, and the size of the fundamental of the Rusynan Drum and Blow music can be obtained by calculating the peak value of the proposed frequency.

2.2.4 Resonance peaks

In this paper, the extraction of resonance peak features mainly uses the linear prediction method, and the process of obtaining resonance peak features is mainly divided into three steps; firstly, the prediction coefficients are obtained through linear prediction, then the sound channel model is established, and finally the spectrum and bandwidth of the resonance peaks are obtained according to the sound channel model and the values of the linear prediction. The linear prediction method is mainly used to predict the values of the future sample points by observing the values of the past sample points, and the expression can express the idea of this method:

$$\hat{s}(n) = \sum_{i=1}^k a_i s(n-i) \quad (14)$$

Where, a_i is the linear prediction coefficient, k is the observed k sample points, $s(n-i)$ is the value of the corresponding sample point, which represents the Lusitanian drumming music, and $s(n)$ is the desired linear prediction value. The expression for the predictable error is:

$$e(n) = s(n) - \hat{s}(n) = s(n) - \sum_{i=1}^k a_i s(n-i) \quad (15)$$

The optimal valuation of linear prediction is determined by minimizing the mean square error because by minimizing the error function, the sample points of linear prediction will be taken more accurately. The vocal tract model is established, and the predicted coefficients of each frame of Rusynan drumming and blowing music are brought in, and the functional expression of the vocal tract model is:

$$H(z) = \frac{G}{\left| 1 + \sum_{i=1}^p a_i z^{-i} \right|^2} \quad (16)$$

Where G is the model parameter, it can be seen that the model is related to the prediction coefficients and the past signal. The characteristic parameters of the resonance peaks can be obtained by solving the acoustic channel model $H(e^{j\omega})$ by the carryover of the predictive coefficients and the assignment of the past signals.

3 Research and Analysis on Digital Inheritance of Southwest Lu Drum and Blow Music under the Background of Informationization

3.1 Study population and questionnaire design

3.1.1 Research Objectives

For more than 2,000 years, Southwest Lu Drum and Blow Music have been gradually popularized and developed in the southwest step of Shandong and its surrounding areas, and the instruments used are mainly wind instruments and percussion instruments. There are some changes in the use of musical instruments and the composition of the orchestra, so this paper selects the corpus of Southwest Lu Drum and Blow Music as the research object.

3.1.2 Questionnaire design

Based on the theme of experiential value and the experience of the Southwest Lucian drum and bassoon music corpus, the questionnaire was divided into two modules. The items corresponding to the five experiential dimensions of heritage value, contextual value, living value, economic value, and cognitive value of the Southwest Drumbo music corpus were designed into 20 question items to measure the feelings after the experience of the Southwest Drumbo music corpus. The questionnaire was mainly based on a 5-point Likert scale, with the numbers 5, 4, 3, 2, and 1 representing “strongly agree”, “agree”, and “not necessarily”, respectively, “disagree”, “strongly disagree” five kinds of answers, this research finally got 400 questionnaires, of which there are 40 invalid questionnaires, there are 360 valid questionnaires, the effectiveness rate of 90% to meet the requirements of the sample capacity.

3.2 Statistical Analysis of the Digital Heritage of Drums and Blows in the Southwest of China

3.2.1 Descriptive statistical characteristics of the sample

The personal basic situation description statistics of the surveyed sample are shown in Table 1, which mainly includes their gender, age, occupation, education, monthly income, and place of origin. In the gender composition, men accounted for 47.78%, and women accounted for 52.22%. The ratio of male to female data is more balanced, and the ratio of the two is close to 1:1, in line with the standard. In the age composition, the sample of 19-35 years old accounted for 43.06%, followed by 36-45 years old sample accounted for 36.39%, 45-60 years old sample accounted for 11.67%, 18 years old and 60 years old and above samples are less, respectively accounted for 6.11% and 2.78%. In the composition of education, the number of college and above is higher, with 61.11% of college and above, 19.72% of master and above, followed by 13.06% of secondary school and high school, and the least is below junior high school accounting for 3.33%. In terms of occupation, there are more students and self-employed businessmen, of which 32.49% are students, and 25.28% are self-employed businessmen, followed by employees of government agencies or institutions or enterprises, accounting for 14.72% and 17.22%, respectively, and samples of retired persons, farmers and other occupations are less. In terms of monthly income, the samples of 3001-5000 yuan and 7000 yuan or more were the most numerous, accounting for 23.61% and 24.17%, while the samples of other income levels were more balanced. In terms of place of residence, the out-of-province samples exceeded the in-province samples, with the in-province samples accounting for 93.89%, indicating that the digitization

construction based on the Southwest Lucian Drum and Blow Music Corpus is more capable of attracting samples from out of province.

Table 1. The personal basic situation of the sample

Variable	Categories	Sample size	Proportion
Gender	Man	172	47.78%
	Female	188	52.22%
Age	Age 18 and below	22	6.11%
	19-35	155	43.06%
	36-45	131	36.39%
	Aged 60	42	11.67%
	Over 60	10	2.78%
Educational background	Junior middle school and below	12	3.33%
	Secondary and high school	47	13.06%
	Junior college and undergraduate	220	61.11%
	Master's degree	71	19.72%
Occupation	Government or institution	53	14.72%
	Business worker	62	17.22%
	Individual business	91	25.28%
	Student	118	32.78%
	Retiree	7	1.94%
	Peasantry	22	6.11%
	Other	7	1.94%
Monthly income	Below 1500 yuan	48	13.33%
	1500 yuan 3000 yuan	78	21.67%
	3001-5000 yuan	85	23.61%
	5001-7000 yuan	62	17.22%
	More than 7,000 yuan	87	24.17%
Site	Province	22	6.11%
	Extrication	338	93.89%

3.2.2 Descriptive Statistical Analysis of Inheritance Value Dimensions Based on the Lusignan Corpus

The results of the descriptive statistical analysis of the heritage value dimension based on the Luxinan corpus are shown in Table 2. From the perspective of the heritage value dimension, the rating of “youth concern” is higher, with a mean and standard deviation of 2.11 and 0.958, respectively, indicating that digital innovation based on the Luxinan corpus can attract more and more attention from young people. Most of the young travelers are curious about the development of drumming music in Southwest China, so they are willing to participate in the experience of drumming music in Southwest China when they travel. The samples’ scores for “inheritance and aesthetics” are low, with standard deviation values of 0.941 and 0.914, respectively, indicating that young people do not always have a favorable attitude toward digital innovation based on the Lunanese corpus and that young

people's scores for "cultural confidence" and "production protection" are low. The average score for "cultural confidence" and "production protection" among young people is average, and the standard deviation is not very different, which indicates that the sample's attitude towards these two aspects is neutral.

Table 2. Descriptive statistical analysis of legacy values

Item	Case number	Minimum value	Maximum value	Mean value	Standard deviation
I think the culture of the music heritage is very high	360	1	5	2.05	0.969
I think that lu southwest advocates music has a lot of youth attention	360	1	5	2.11	0.958
I think the legacy of the music is very good	360	1	5	2.03	0.941
I think that lu southwest is very interested in music	360	1	5	1.95	0.914

3.2.3 Descriptive Statistical Analysis of Living Value Dimensions Based on the Lusignan Corpus

The results of the descriptive statistical analysis of the living value dimensions based on the Lunanese corpus are shown in Table 3. From the perspective of the living value dimensions, after experiencing the digital innovation of the Lunanese corpus, the fans of Lunanese drum and bassoon music expressed their great recognition, and so the experiencers rated high on the aspect of "innovation of skills" (2.14), followed by the aspects of "common participation (2.09)" and "ecological harmony (2.01)", and the lowest on the aspect of "self-identity" (2.06). "Participation (2.09) and Ecological Harmony (2.01), and the lowest rating was for Self-identification (2.06). The standard deviations are also very similar, with the smallest standard deviation for "participation" (0.995). Experiencers strongly agree with the degree of participation in the Lunanese corpus because in the digitization of the Lunanese corpus, experiencers have to connect with the digitized Lunanese intangible culture so that the Lunanese intangible cultural heritage can be better preserved in the context of Internet digitization. The Lunanese Drum and Blow Music Intangible Culture can be better inherited in the context of Internet digitization.

Table 3. Descriptive statistical analysis of living value dimensions

Item	Case number	Minimum value	Maximum value	Mean value	Standard deviation
Strong participation	360	1	5	2.09	0.995
Feel the harmony between man and nature	360	1	5	2.01	1.007
It's nice to feel the intangible cultural heritage	360	1	5	2.06	1.009
I feel that lu southwest is a great skill in promoting music	360	1	5	2.14	1.014

3.3 Differential Analysis of Digital Innovation Based on the Southwest Lucian Drumming Music Corpus

3.3.1 Differences in the experience of the Southwest Lucian Drumming Corpus based on different literacy levels

Through the experience factors of the Lusinan drum and blow music database of the experiencers with different cultural levels and the mean value comparison analysis, we analyze the differences in the degree of recognition of the experiential value of the Lusinan drum and blow music corpus by the experiencers with different cultural levels, and the results of the analysis of the differences of the

Lusinan drum and blow music corpus by the experiencers with different cultural levels are shown in Table 4. It can be seen that there are significant differences between the samples of different literacy levels in terms of “inheritance value” and “cognitive value”, and there are significant differences between the samples of different literacy levels in terms of “situational value”, “living value”. There are no significant differences in the “situational value”, “living value” and “economic value” of the Southwest Lu Drumbo music corpus. In terms of the “inheritance value” and “cognitive value” of the Southwest Lu Drumbo music corpus, data analysis reveals that the samples of the four cultural levels can be divided into two levels, with junior high school as the demarcation line, and the samples with junior high school education or below the junior high school education as the first level, and the samples with senior high school and master’s degree or above as the second level. Furthermore, master’s degree or above is the second tier. From the data, it can be seen that the samples of high school and above have a lower degree of recognition of the inheritance value in the database of southwestern Lucian drum and bassoon music (19.14%, 19.54%, 19.33%), but they have a higher degree of recognition of the cognitive value in the database of southwestern Lucian drum and bassoon music (19.54%, 20.3%, 20.52%), and in general, they The longer they receive cultural education, the less contact they have with Lusinan Drum and Blow Music in their daily study so that they may be more interested in the culture, and therefore they have a high level of recognition of the perceived value of the Lusinan Drum and Blow Music corpus.

Table 4. Different cultural levels of lu southwest promote the experience difference

Name	Heritage value	Situational value	Living value	Economic value	Cognitive value
Junior middle school and below	21.61%	20.25%	20.74%	19.05%	18.32%
High school	19.14%	20.41%	19.26%	21.57%	19.54%
Junior college and undergraduate	19.54%	19.71%	19.85%	20.24%	20.3%
Master’s degree	19.33%	20.41%	20.67%	18.91%	20.52%

3.3.2 Differences in the corpus of Lusitanian drumming music among experiencers of different occupational types

Comparative analysis of the Lusitanian drumming music corpus experience value indicator factors and retrograde mean of different occupation types, the results of the Lusitanian drumming music corpus experience differences of the different occupation types of experiencers are shown in Table 5, which can be seen that the samples of the different occupation types in the situational value and economic value by the significance of the difference, in the inheritance value, the living value, the cognitive value of the difference is not particularly significant. In terms of economic value recognition, according to the results obtained from the data, it is found that the samples of different occupation types can be divided into three layers: the first layer of government agencies or institutions, the second layer of enterprise workers, self-employed businessmen and others, and the third layer of students, retired people and farmers. According to the results of the survey, students, retired people, and farmers have lower recognition of economic value (19.11%, 18.35%, 18.57%), probably because the economic income level of this group of people is low compared to the samples of other occupational types, so they do not recognize the economic value of the Lusitanian Drum and Blow Music Corpus, whereas the government agencies and enterprise workers and others have a fixed income, so for them the convenience value of experiencing the product and getting the service is easier.

Table 5. Different career type experienter rusouthwest advocates the experience difference

Name	Heritage value	Situational value	Living value	Economic value	Cognitive value
Government or institution	19.48%	20.35%	19.35%	21.19%	19.25%
Business worker	19.45%	19.22%	19.88%	20.67%	20.59%
Individual business	19.44%	16.47%	19.57%	20.59%	23.57%
student	19.51%	20.61%	20.01%	19.11%	20.59%
retiree	19.51%	18.69%	21.71%	18.35%	21.51%
peasantry	19.82%	21.46%	20.79%	18.57%	19.11%
other	19.16%	18.77%	21.49%	20.21%	20.25%

3.4 Simulation Analysis of the Inheritance Protection of Southwest Lu Drum and Blow Music Based on Corpus

The extracted features of Luxinan drum and blow music were simulated using the Luxinan drum and blow music corpus, and the results of the simulation and analysis of the heritage protection of Luxinan drum and blow music based on the corpus are shown in Figure 6. Three main variables are selected for evaluating the corpus-based heritage protection of Lunan Drum and Blow Music, which are the degree of digital protection of Lunan Drum and Blow Music, Lunan Drum and Blow Music cultural and creative products, and tourism income. The corpus-based digital heritage protection of Lunan Drum and Blow Music reflects the effect of Lunan Drum and Blow culture protection and inheritance in the corpus of Lunan Drum and Blow Music, while Lunan Drum and Blow Music cultural and creative products and tourism income indicate the degree of digital development of Lunan Drum and Blow Music. In 2021 the cultural and creative products and tourism income reach 987 and 1105 respectively, and the degree of protection of digitization of Lunan drumming music is 0.7577, both of which have been substantially improved compared to the initial data in 2014. Through their development trends, it can be seen that the degree of digital protection of Lunan Drum and Blow music, Lunan Drum and Blow music cultural and creative products and tourism income are very similar to the trend of change, are rapid growth in the early stage, slow down in the middle of the speed, and stop growing to maintain a stable development trend in the late stage. Based on the corpus of the digital heritage protection research of Lunan Drum and Blow Music, it has a guiding role in the development of innovation and inheritance of Lunan Drum and Blow Music.

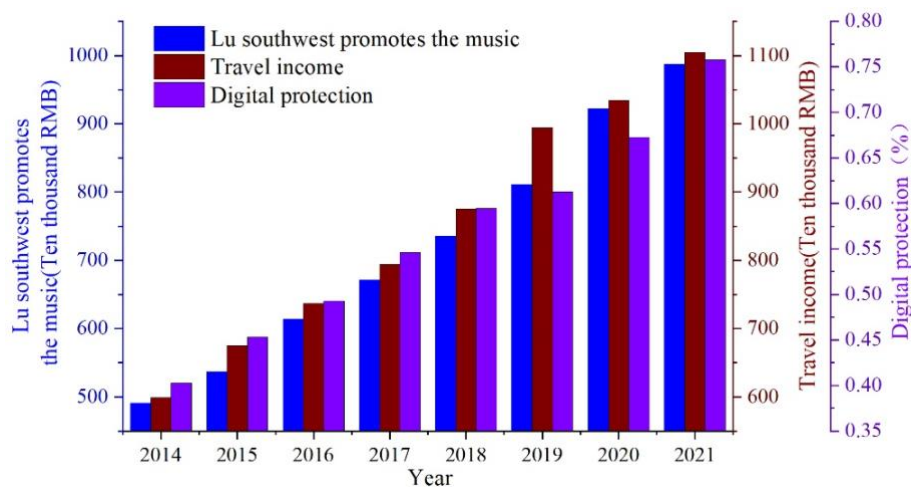


Figure 6. Lu southwest promotes the protection simulation analysis of music heritage

4 Conclusion

The development of Chinese folk art has been greatly influenced by Southwest Lu Drum and Blow Music, which has a lengthy history. Therefore, this paper starts from informatization and digitization and uses the statistical analysis method to research and analyze the inheritance of Southwest Lu Drum and Blow Music, aiming to help enthusiasts of Southwest Lu Drum and Blow Music and the general public to better understand and learn its artistic characteristics, so as to facilitate better inheritance and protection. The following conclusions are drawn:

- 1) From the perspective of the inheritance value of the corpus of Southwest Lu drum music, the sample scored high on “youth attention”, with the mean and standard deviation of 2.11 and 0.958, respectively, indicating that many young people are paying more and more attention to the development of the digitalization of drum music in Southwest Lu, and most young tourists are full of curiosity about Southwest Lu drum music. This study utilizes modern information technology to publicize and display the traditional and outstanding intangible cultural heritage of mankind, “Southwest Lu Drum and Blow Music”, in order to form a sustainable development of the cultural industry and to truly solve the problem of the inheritance of intangible cultural heritage on the basis of information technology, which is of great significance to the development of the inheritance of intangible cultural heritage.
- 2) Through the Lushinan Drum and Blow Music Corpus Value Indicator Factors of Experiencers with Different Literacy Levels and Conducting Mean Comparison Analysis, the high school and above samples of Lushinan Drum and Blow Music Corpus Inheritance Value are less recognized (19.14%, 19.54, and 19.33%), but they are more recognized of the Lushinan Drum and Blow Music Corpus (19.54%, 20.3%, 20.52%). The samples with high school education and above have low recognition of the heritage value so they may be more interested in culture, and therefore, they have high recognition of the perceived value of Lushinan Drum and Blow Music. In the process of publicizing the Southwest Lu Drum and Blow Music, we should follow the trend of the “Internet +” era, fully utilize the Internet platform, which is popular among the contemporary public, and cooperate with various media organizations in China to jointly publicize the Southwest Lu Drum and Blow Music as an excellent traditional cultural heritage.
- 3) Based on the simulation analysis of the digital inheritance of Southwest Lu drum and blow music based on the corpus, in 2021, the cultural and creative products and tourism income will reach 987 and 1105, respectively, and the degree of digital protection of Southwest Lu drum and blow music will be 0.7577, which is a substantial increase compared with the initial data in 2014. It reveals the development history of the digitization research of the southwestern Lusitanian drum-and-bugle music, from the beginning, the outbreak to the maturity, and highlights the promotion role of digital technology in the inheritance of the southwestern Lusitanian drum-and-bugle music. This tool aids in understanding the development trend of this field and provides valuable insights for future in-depth research on the digital preservation of intangible cultural heritage.

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