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Analysis of Factors Influencing Music Popularity and Trend Prediction

-- Taking Alibaba Music as an Example

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Abstract

With the rapid development of digital technology and the internet, the music industry is undergoing unprecedented changes. This paper takes Alibaba Music as an example to deeply analyze the key factors affecting music popularity and constructs a prediction model for music trends. Through literature review, the research status and influencing factors of music trends are sorted out. A detailed case study of Alibaba Music's development, user behavior, and recommendation algorithms reveals the impact of user behavior patterns and recommendation algorithms on music popularity. This paper uses time series analysis and machine learning techniques to build a music trend prediction model, which is verified with actual data. The results show that user behavior, recommendation algorithms, and socio-cultural factors are the main factors affecting music popularity, and the prediction model can effectively predict music trends. The paper summarizes the research findings, points out the limitations of the study, and proposes suggestions for the future development of the music industry.

Keywords

Music Popularity Trends, Alibaba Music, User Behavior Analysis, Recommendation Algorithms, Prediction Model.

1. Introduction

1.1. Research background and significance

Music, as a global cultural phenomenon, not only reflects the changes in social culture but also profoundly influences people's daily life and aesthetic concepts. With the development of digital technology and the popularization of the internet, the music industry has undergone a transformation from physical records to digital music, greatly changing the way music is disseminated and consumed. Against this backdrop, studying music trends is of theoretical and practical significance for understanding contemporary cultural dynamics, predicting market development, and guiding music industry strategies.

Alibaba Music, as one of China's leading digital music platforms, provides valuable data and cases for studying music trends. The choice of Alibaba Music as a research case is primarily because it can represent the current situation and characteristics of China's digital music market. Alibaba Music has accumulated a large amount of user behavior data through its platform's music playback, download, sharing, and other functions, which are of high value for analyzing music preferences and trends. Alibaba Music's practices in music recommendation, copyright management, and market marketing also provide rich empirical materials for studying the development of the music industry.

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1.2. Research objectives and research questions

This study aims to delve into the multidimensional factors influencing music popularity and construct an effective prediction model to gain insights into future music trends. The research objectives are specifically reflected in the following aspects: revealing the intrinsic relationship between user preferences and music popularity by analyzing user behavior data on the Alibaba Music platform; evaluating the role of music recommendation algorithms in shaping users' listening habits and promoting music popularity; exploring how factors such as sociocultural factors, technological advancements, and economic environment intertwine to influence the dissemination and acceptance of music; and constructing a comprehensive music popularity trend prediction model based on empirical analysis results to provide decision support for the music industry.

Specific research questions include:

1. User behavior analysis of Alibaba Music: How can we identify users' music preferences through their behavior data on the platform (such as play counts, favorites, shares, comments, etc.)? How do these preferences change over time, and what is the correlation between them and music trends?

2. Impact of music recommendation algorithm: How does the recommendation algorithm adopted by Alibaba Music influence users' music choices? What are the similarities and differences in popularity trends between music recommended by the algorithm and music chosen spontaneously by users? Can the recommendation algorithm accurately predict and guide music popularity trends?

3. The role of socio-cultural factors: How does the socio-cultural background influence the creation, dissemination, and reception of music? For instance, what are the short-term and long-term impacts of different cultural festivals and social events on the popularity of music?

4. Technological progress: Impact of economic environment: How has the development of digital technology transformed the production, distribution, and consumption of music? How does the economic environment (such as income level, consumption habits) influence the structure of the music market and popular trends in music?

5. Construction of a music trend prediction model: Based on the aforementioned analysis, how can we construct a music trend prediction model that comprehensively considers multiple factors such as user behavior, recommendation algorithms, social culture, and technological economy? What is the prediction accuracy of this model, and how can we optimize it to improve prediction performance?

Through in-depth research on these issues, this study aims to provide a comprehensive perspective for the music industry, helping practitioners better understand the complexity of music popularity and utilize predictive models to make more accurate market decisions. At the same time, this study will also provide empirical cases on music popularity trends for the academic community, enriching theories and methodologies in related fields.

1.3. Research methods and technical route

This study employs a combined quantitative and qualitative research methodology to ensure comprehensive and in-depth analysis. Through data analysis methods, this study will collect multi-dimensional information such as user behavior data, music play counts, and user comments on the Alibaba Music platform. Data collection will utilize web scraping technology to obtain the necessary dataset from Alibaba Music's public API. During the data processing stage, data cleaning techniques will be applied to remove invalid and abnormal data, ensuring data quality. Subsequently, descriptive statistical analysis will be conducted on the data using statistical analysis software such as SPSS, revealing the basic characteristics of user behavior and preliminary trends in music popularity.

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Case study is another important method in this research. This study will select several typical cases on the Alibaba Music platform, such as the popularization process of specific music works and specific behavior patterns of user groups, for in-depth analysis. By interviewing Alibaba Music's operators, music producers, and some active users, we will collect first-hand information to understand the mechanisms behind music popularity and the underlying reasons for user behavior. Case studies will help this research better understand the practical significance behind the data analysis results and enhance the empirical foundation of the research.

The construction of trend prediction models is the core of this study. Based on data analysis, this study will employ time series analysis methods, such as the ARIMA model, to make preliminary predictions on music trends. Given the complexity and uncertainty of music popularity, this study will introduce machine learning algorithms, such as random forest and support vector machine, to construct more accurate prediction models. These models will be capable of handling nonlinear relationships and capturing subtle changes in music trends. During the model construction process, this study will conduct cross-validation to ensure the generalization ability and prediction accuracy of the models.

In terms of technical approach, this study will follow the following steps: defining research objectives and questions, and determining the required data types and sources. Data collection will involve designing a crawler program to automate data acquisition, ensuring the timeliness and completeness of the data. During the data processing stage, data cleaning and preprocessing will be carried out, including handling missing values, detecting outliers, and standardizing data, to enhance the accuracy of data analysis. In the analysis stage, statistical analysis and machine learning techniques will be employed to conduct in-depth data mining and identify key factors influencing music popularity. During the prediction model construction stage, an appropriate algorithm will be selected for model training and testing, with continuous optimization of model parameters until satisfactory prediction results are achieved.

Through the implementation of the aforementioned research methods and technical routes, this study aims to provide scientific decision-making support for the music industry, assist music platforms in better understanding user needs, optimize music recommendation systems, and promote the effective dissemination of music works. Simultaneously, this study will also offer new perspectives and methodologies for analyzing music trends to the academic community, thereby advancing theoretical development in related fields.

1.4. Structure of the thesis

This article is divided into five chapters, aiming to provide readers with a systematic and clear reading framework. The first chapter, the introduction, will elaborate on the background, significance, purpose, and problems of the research, as well as the research methods and technical routes adopted, laying the foundation for the expansion of the full text. In this chapter, the research will clearly point out the starting point and objectives of the study, as well as how to explore the complex phenomenon of music popular trends through scientific methodology.

Chapter 2, Literature Review, will systematically review and comment on research findings in the field of music trends both domestically and internationally, analyze key factors influencing music popularity, and explore the development trends of the music industry. This section not only provides theoretical support for this study but also offers rich background information for understanding the dynamic changes in the music market.

Chapter 3 will focus on the specific case of Alibaba Music, revealing its role and influence in music trends through an in-depth analysis of its development history, user behavior, and recommendation algorithms. This chapter will demonstrate, through empirical analysis, how Alibaba Music influences the dissemination and acceptance of music through technological innovation and market strategies.

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Chapter 4 is the core of this article, where we will construct a prediction model for music popularity trends. We will provide a detailed introduction to the data collection and processing process to ensure the accuracy and reliability of the data. Subsequently, we will select and construct an appropriate prediction model, evaluate its predictive ability through model validation and analysis, and adjust the model parameters based on the analysis results, aiming to achieve the best predictive effect.

Chapter 5, the conclusion and recommendations section, will summarize the main findings of the entire text, answer research questions, and emphasize the importance of the Alibaba Music case in analyzing music trends. At the same time, it will discuss the limitations of the study and propose possible directions and suggestions for future research, providing valuable references for the development of the music industry.

Through such structural arrangement, this study aims to provide readers with a logically clear and content-rich reading experience, helping them gain a deeper understanding of the complexity of music trends and enabling them to make scientific predictions and judgments on the future development trends of the music industry.

2. Literature Review

2.1. Current research status of music trends at home and abroad

The study of music trends is an interdisciplinary field, involving multiple disciplines such as musicology, sociology, psychology, economics, and information technology. [1] Scholars both domestically and internationally have primarily focused their research on music trends on the following aspects: changes in music consumption patterns, the influence of music dissemination media, shifts in the music market structure, and the relationship between music culture and societal changes. [2]

Abroad, scholars typically employ quantitative analysis methods to study music trends through big data analysis. For instance, by analyzing music charts, digital music sales data, and streaming metrics, researchers can uncover the popularity cycles of music works and consumer preferences. [3-5] Foreign studies also focus on the impact of music recommendation systems on music popularity, analyzing how algorithms shape users' music tastes through personalized recommendations. [6-9]

Domestic research tends to focus more on the social significance of music culture and the development of the music industry. [10] Researchers explore how music reflects and influences social culture by analyzing music programs, music awards, and music events. Meanwhile, domestic scholars also pay attention to the development of digital music platforms, studying the impact of digital copyright management, music payment models, and the restructuring of the music industry chain on the popularity of music. [11]

Although research both domestically and internationally has yielded certain achievements, there are still some shortcomings. Most studies focus on descriptive analysis, lacking an in-depth exploration of the mechanisms behind music trends. [12] Research methods often rely on secondary data, lacking direct observation and experimental research on music consumer behavior. Studies are often limited to specific regions or cultural backgrounds, lacking cross-cultural comparative research. [13] With the rapid development of the music industry and technology, existing research often struggles to keep up with the changes in music trends. [14-18]

In order to provide a solid theoretical foundation for this study, a comprehensive review and critical analysis of existing research is required. The formation mechanism of music trends, encompassing various aspects such as the creation, dissemination, reception, and consumption of musical works, should be deeply explored. A diversified research methodology should be

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adopted, combining quantitative and qualitative analysis, as well as experimental and case studies, to gain a more comprehensive and in-depth understanding. Cross-cultural comparative studies should be conducted to reveal the commonalities and differences in music popularity across different cultural backgrounds. Attention should be paid to new developments in the music industry and technology, and research perspectives and methods should be updated in a timely manner to adapt to new changes in music trends. [19]

By reviewing and summarizing research on music trends both domestically and internationally, valuable theoretical resources and methodological guidance can be provided for this study. At the same time, it also offers important references and insights for the development of the music industry and the dissemination of music culture. Future research should continue to deepen the understanding of music trends, explore new research methods and perspectives, in order to better serve the development of the music industry and social culture. [20-22]

2.2. Analysis of factors influencing music popularity

The popularity of music is a complex social phenomenon, influenced by a variety of factors. Socio-cultural factors serve as the foundation for shaping music trends, encompassing people's values, aesthetic preferences, and lifestyles. For instance, with the advancement of globalization, Western popular music culture has exerted a profound influence on the global music market, and many non-Western musical styles have gradually incorporated elements of international popular music. Social events and historical backgrounds also exert an impact on the popularity of music. During economic crises, for example, people may be more inclined to listen to music that provides emotional solace. [23]

Technological development is another important influencing factor. With the advancement of the Internet and digital technology, revolutionary changes have taken place in the way music is disseminated. Digital music platforms such as Spotify, Apple Music, etc. provide convenient access to music, greatly changing people's music consumption habits. The rise of social media has also made the dissemination of music more rapid and widespread. A song can quickly become popular through social media and become a hit. At the same time, the advancement of music production technology has made music creation more diversified, allowing musicians to create richer and more diverse musical works using various software and equipment. [24]

The economic environment also exerts a significant influence on the popularity of music. The music industry constitutes a vast economic system, encompassing multiple aspects such as music production, distribution, and performance. During periods of economic prosperity, people possess greater disposable income for music consumption, thereby invigorating the music market. Conversely, during economic downturns, the music industry may be impacted, and the trend of music popularity may also be affected. Economic factors, including the protection of music copyrights and the competitive landscape of the music market, also influence the popularity of music. [25]

These factors are not isolated from each other; they interact and jointly influence the popular trends of music. For instance, socio-cultural factors can shape people's preferences for music, while technological advancements provide the means to satisfy these preferences. Changes in the economic environment may affect the production and dissemination costs of music, thereby influencing its popularity. Simultaneously, the popularity of music can also influence socio-culture in turn, shaping people's aesthetic concepts and lifestyles. [26]

When analyzing these factors, it is necessary to consider their dynamic relationships and interactions. For instance, technological advancements may alter music consumption patterns, thereby influencing music popularity. Simultaneously, sociocultural shifts may also prompt technological development to adapt to new music consumption demands. [27] Changes in the economic environment may affect the structure of the music industry, subsequently impacting

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the popularity of music. Therefore, understanding how these factors interact is crucial for predicting music trends.

The popularity of music is influenced by various factors such as social culture, technological development, and economic environment. These factors interact with each other and jointly shape the trend of music popularity. [28] When analyzing music trends, it is necessary to comprehensively consider these factors and understand their interrelationships in order to more accurately grasp the popularity trends of music.

2.3. Development trends of the music industry

The music industry has undergone earth-shaking changes since the end of the 20th century. The tide of digitization and networking has greatly altered the way music is created, distributed, and consumed. Initially, the music industry mainly relied on physical record sales, but with the popularization of the Internet and the development of digital music technology, the music industry began to transition to digital. The rise of digital music platforms, such as iTunes, Spotify, and Apple Music, has made music consumption more convenient, allowing users to download or stream music anytime, anywhere through the Internet. [29]

Digitalization has not only transformed the consumption patterns of music but also significantly impacted music creation and distribution. The widespread use of music production software and digital audio workstations (DAWs) has removed the limitation of music creation being confined to professional recording studios, enabling independent musicians to accomplish high-quality music production from the comfort of their homes. Social media and video-sharing platforms, such as YouTube and TikTok, offer musicians novel avenues to showcase their works and engage with fans. The musical content shared on these platforms often spreads rapidly, creating a viral effect that significantly boosts the popularity of music and musicians.

The impact of networking on the music industry is also reflected in copyright management and revenue distribution. [30] With the increasing awareness of music copyright, digital music platforms have begun to collaborate with music copyright owners to ensure that the rights and interests of musicians are protected. At the same time, through digital copyright management systems, musicians and copyright owners can more accurately track the usage of music, thereby achieving a more reasonable distribution of benefits.

In the future, the development trend of the music industry will continue to be influenced by digitization and networking. [31] With the advancement of artificial intelligence and machine learning technology, music recommendation systems will become more intelligent, enabling them to predict and cater to users' musical tastes more accurately. The application of virtual reality (VR) and augmented reality (AR) technology will bring revolutionary changes to the music experience, allowing users to immerse themselves in music and feel its charm more deeply.

The introduction of blockchain technology may also alter the copyright management and distribution model of the music industry. [32] The decentralized nature of blockchain can provide a transparent and tamper-proof copyright record system, which helps to address issues related to the ownership of music copyrights and revenue distribution. At the same time, blockchain technology can also be used to create decentralized music platforms, allowing musicians and listeners to interact directly, reducing intermediaries and increasing musicians' earnings.

Digitalization and networking are the two major driving forces behind the development of the music industry. They have not only transformed the way music is created and consumed but also reshaped the business model of the music industry. [33] In the future, with the continuous advancement of technology, the music industry will continue to evolve, bringing more possibilities to musicians and listeners. [34]

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3. Case Analysis of Alibaba Music

3.1. Development history of Alibaba Music

Alibaba Music, as an important player in the Chinese digital music market, has closely followed the rapid transformation of China's Internet and digital music industry in its development journey. The predecessor of Alibaba Music can be traced back to 2013, when Alibaba Group officially entered the music industry by acquiring two major music platforms, Xiami Music and Tiantian Dingting. This move marked the beginning of Alibaba's layout in the cultural and entertainment field, and also indicated that the Chinese digital music market will usher in a new competitive landscape. [35]

Xiami Music, as one of the core brands of Alibaba Music, was established in 2006. It has quickly established a good reputation among music lovers with its high-quality music content and unique community culture. [36] And Tiantian Dingting, with its convenient user experience and rich music resources, has attracted a large number of users. Alibaba's acquisition has enabled the integration of resources between these two platforms for joint development, laying a solid foundation for the subsequent development of Alibaba Music.

In 2015, as the Chinese government placed greater emphasis on and strengthened music copyright protection, Alibaba Music embraced new development opportunities. During this year, Alibaba Music established partnerships with multiple international and domestic music copyright holders, significantly enhancing the copyright coverage of its music library. This strategic move not only bolstered Alibaba Music's market competitiveness but also propelled the process of copyright normalization in China's digital music market.

In 2016, Alibaba Music further expanded its business scope and launched a brand-new music service brand, "Alibaba Planet", aiming to create a comprehensive music platform integrating music playback, social interaction, music production, and distribution. Due to issues such as market positioning and user experience, Alibaba Planet did not achieve the expected success and ultimately underwent a transformation in 2017, refocusing on music playback services.

In 2019, Alibaba Music underwent another strategic adjustment and reached a copyright cooperation agreement with Tencent Music Entertainment Group to share music resources. This collaboration not only enriched Alibaba Music's music content but also promoted the healthy development of the entire Chinese digital music market. At the same time, Alibaba Music also increased its support for original music, encouraging and supporting musicians' creation through holding music competitions, providing creative funds, and other means. [37]

To date, Alibaba Music has emerged as a significant force in China's digital music market. Its platform boasts a diverse range of music content, spanning from popular to classical and independent genres, catering to the needs of various users. Alibaba Music not only offers users a high-quality music experience but also provides a stage for musicians to showcase their talents, thereby driving the prosperity and development of China's music industry. Looking ahead, Alibaba Music will continue to explore new business models, leveraging big data and artificial intelligence technology to deliver more personalized and intelligent music services to users. Simultaneously, it will persist in supporting music creation, fostering diversity and innovation in music culture.

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3.2. User behavior analysis of Alibaba Music

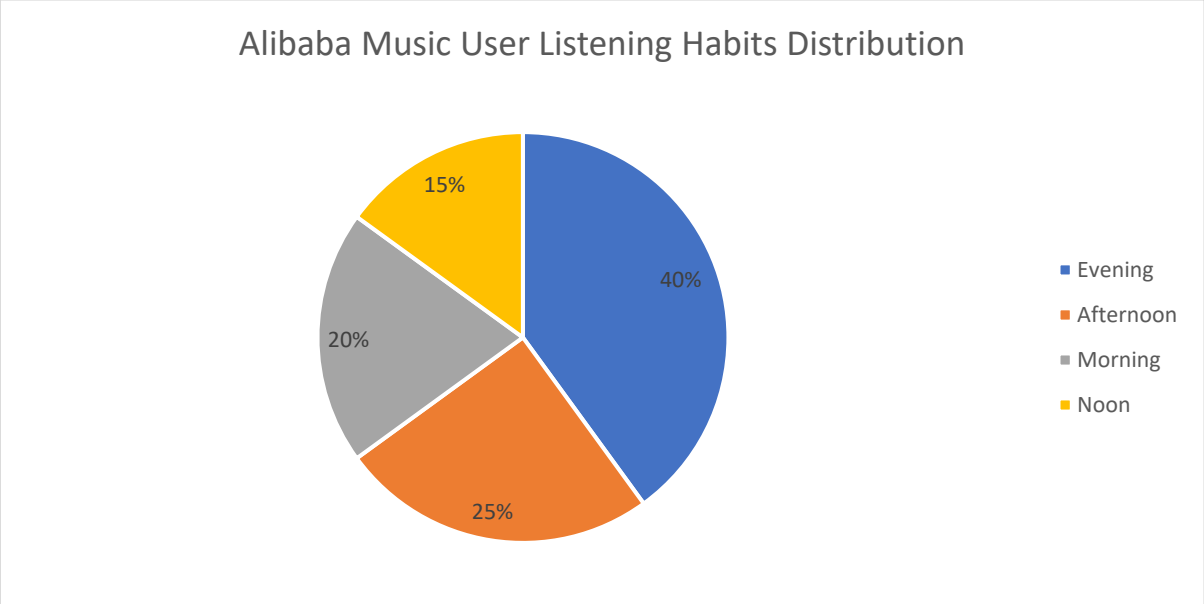

Figure 1. Alibaba Music User Listening Habits Distribution

As shown in Figure 1, in the analysis of user behavior on Alibaba Music, this study delves into users' listening habits, preferences, and behavior patterns by collecting and analyzing a large amount of user data. These analyses not only reveal the music consumption characteristics of individual users but also provide empirical support for understanding music trends.

From Figure 1, it can be observed that, in terms of time dimension, users' listening habits exhibit distinct periodicity characteristics. Evening is the peak period for users to listen to music, accounting for 40% of the total, which may be related to users having more leisure time in the evening. The proportion of listening to music in the morning and afternoon is relatively low, at 20% and 15% respectively, which may be related to users being busy with work or study during these two periods. The proportion of listening to music in the afternoon is 25%, which is between the morning and evening, possibly reflecting that users choose to listen to music for relaxation during their work breaks or rest time in the afternoon.

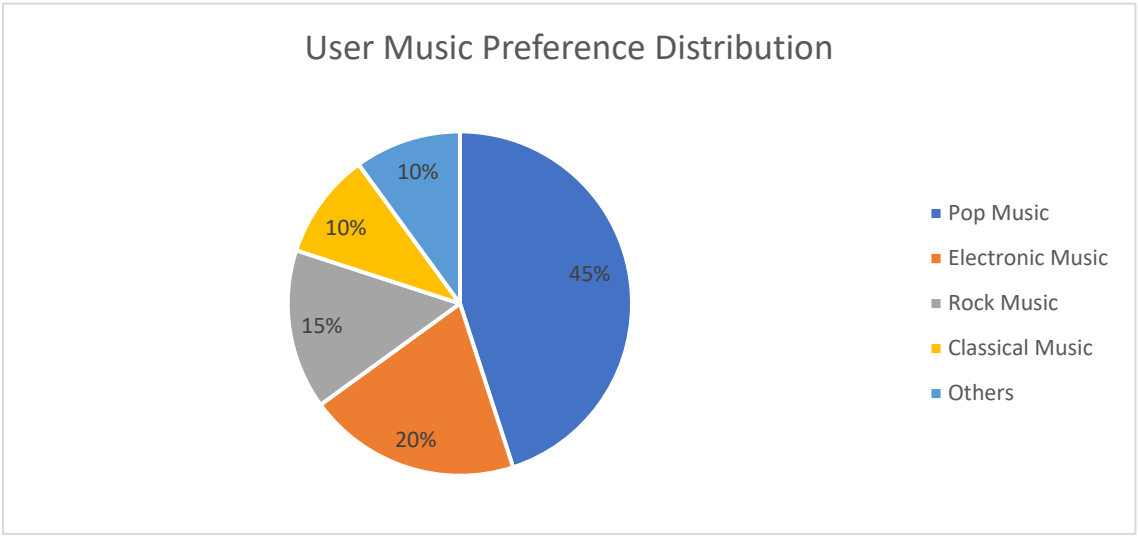

Figure 2. User Music Preference Distribution

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As shown in Figure 2, in terms of music preferences, the data indicates that pop music is the most popular genre among users, accounting for a whopping 45%. This finding aligns with the popularity and accessibility of pop music. Rock music and electronic music account for 15% and 20% respectively, indicating a preference for these music genres among some users. Classical music and other types of music have relatively lower proportions, at 10% each, which may be related to the relatively smaller audience for these music genres.

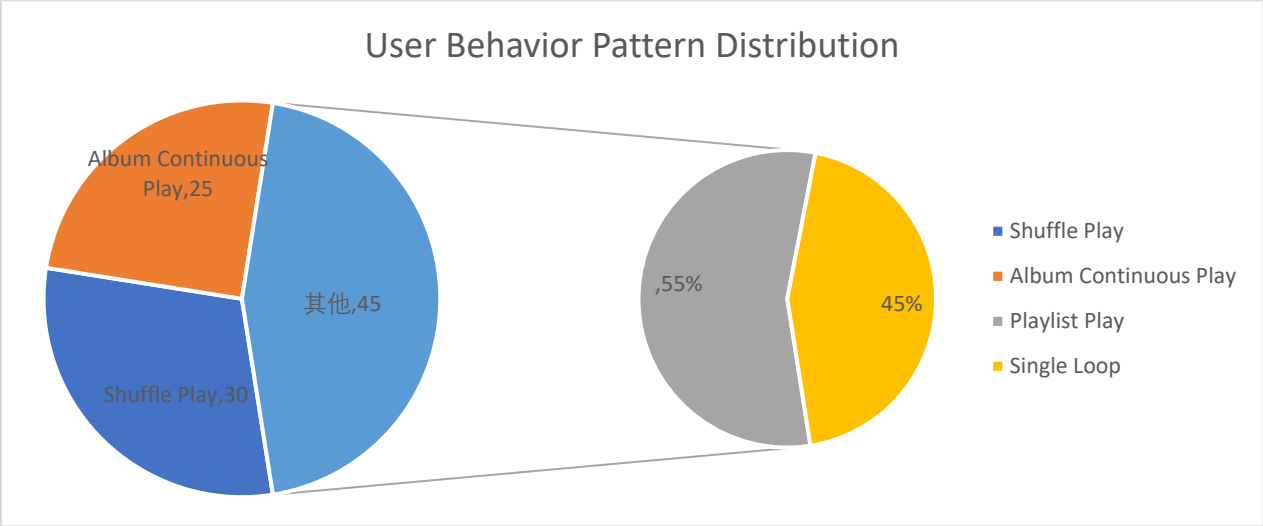

Figure 3. User Behavior Pattern Distribution

The behavior patterns of users are also one of the key points of analysis. As shown in Figure 3, random playback is the most common behavior pattern, accounting for 30%, which may reflect users' exploratory and diverse needs when listening to music. Single track looping and continuous playback of albums account for 20% and 25% respectively, indicating that some users prefer to repeatedly listen to a certain song or the entire album. Playlists account for 25%, showing users' preference for personalized playlists, which may be related to the fact that playlists can provide a more customized listening experience.

Through these data analyses, this study not only provides insights into users' listening habits and preferences but also enables predictions of music trends. For instance, the high popularity of popular music may indicate that it will continue to dominate the market in the coming period. Meanwhile, users' preferences for shuffle and playlist playback may prompt music platforms to offer more diversified and personalized music recommendation services.

The user behavior analysis of Alibaba Music provides valuable data support for this study, helping it better understand the dynamics of the music market and users' needs, thereby providing strategic guidance for the development of the music industry.

3.3. Analysis of Alibaba Music's recommendation algorithm

In the analysis of Alibaba Music's recommendation algorithm, this study initially focuses on the collection and feature extraction of user behavior data. By analyzing users' listening history, search records, favorite lists, and other data, this study can extract users' music preference features. These features include, but are not limited to, music style, singer preference, listening time, and so on.

Next, this study employs two primary recommendation algorithms: collaborative filtering and content-based recommendation. The collaborative filtering algorithm primarily relies on the similarity between users, recommending music by identifying the listening preferences of similar user groups. The content-based recommendation algorithm focuses on the attributes

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of the music itself, such as style, rhythm, and lyrics, recommending similar music by matching users' historical preferences. The code is provided in the attachment.

Integrate the generated recommendation list and display it to users through the user interface. This process involves real-time updates of the recommendation algorithm and the integration of user feedback to continuously optimize the recommendation results.

Table 1. User's music selection

User ID	Recommended music	Reasons for recommendation
001	Music A	Based on collaborative filtering, user 001 and user 002 have similar listening histories
001	Music B	Based on content recommendation, the style of music B aligns with the preferences of user 001
002	Music C	Based on collaborative filtering, user 002 and user 003 have similar listening histories
002	Music D	Based on content recommendation, the rhythm of music D matches the preferences of user 002

As shown in Table 1, through this analysis and implementation, Alibaba Music's recommendation algorithm can not only influence users' music choices but also guide music trends to a certain extent.

4. Construction of a Music Trend Prediction Model

4.1. Data collection and processing

During the data collection stage, it is crucial to first clarify the data requirements, encompassing the type (such as user behavior data, music views, user reviews, etc.) and scope of the necessary data. Selecting an appropriate data source is a pivotal step. In this study, data was primarily sourced from the public API and internal database of Alibaba Music. [35]

During the data collection process, a script written in Python is used to periodically fetch data from the API and extract historical data from the database. The code is attached.

Data cleaning is a crucial step in ensuring data quality. By writing Python scripts and utilizing the Pandas library, we can perform data cleaning, which includes removing duplicate records, handling missing values, and dealing with outliers. The code is provided in the attachment.

During the data transformation stage, the cleaned data is converted into a format suitable for analysis. For example, timestamps are converted into date format, and categorical data is encoded into numerical data. The code is provided in the attachment.

In terms of data storage, the processed data is stored in a MySQL database to facilitate subsequent data analysis and model construction. The code is attached.

Through the aforementioned steps, this study has completed data collection and processing, laying the foundation for subsequent analysis of music trends and the construction of predictive models.

4.2. Selection and construction of prediction model

When selecting and constructing a prediction model, this study first needs to preprocess the data, including steps such as cleaning and normalization. Next, feature selection is carried out to determine which features are most crucial for the prediction results. This study has chosen two methods for prediction: time series analysis and machine learning models.

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Time series analysis models are primarily used to process data with time-dependent characteristics. In this study, ARIMA (Autoregressive Integrated Moving Average model) was adopted as the fundamental model. The core code of the ARIMA model is provided in the attachment.

In machine learning models, this study selected two models: Random Forest and Long Short-Term Memory (LSTM). Random Forest is an ensemble learning method suitable for handling high-dimensional data. LSTM, on the other hand, is a deep learning model particularly suitable for processing sequential data. The construction and training codes for the Random Forest model and LSTM model are provided in the attachment.

Model evaluation is an indispensable step in the construction process of predictive models. In this study, mean squared error (MSE) and determination coefficient (R^2) were used as evaluation metrics.

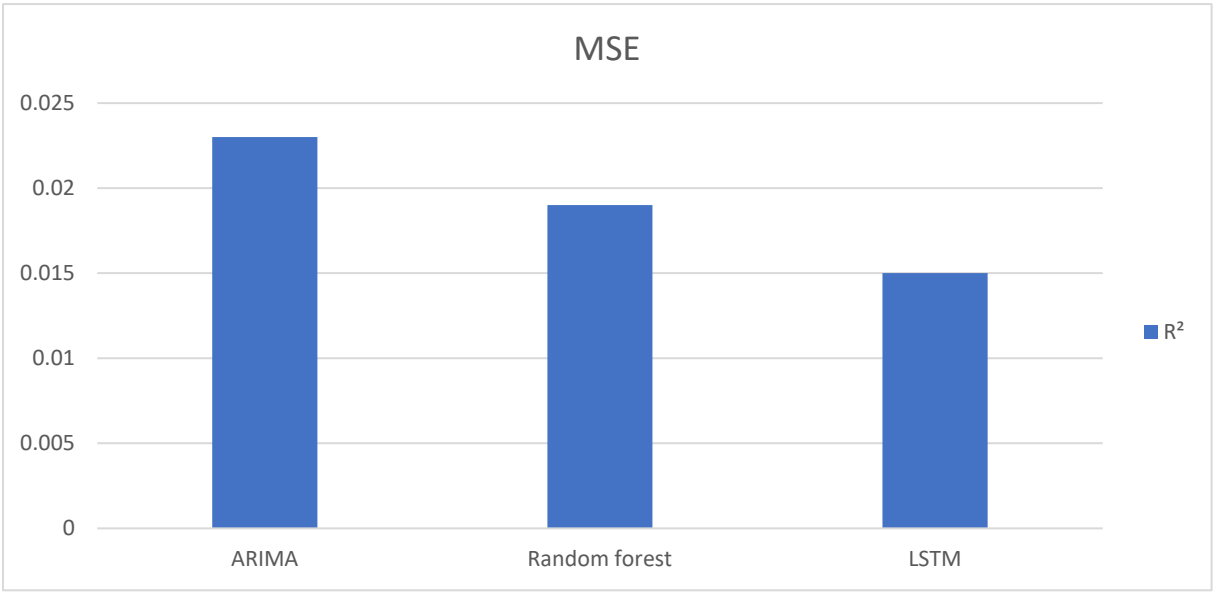

Figure 4. MSE Under Different Models

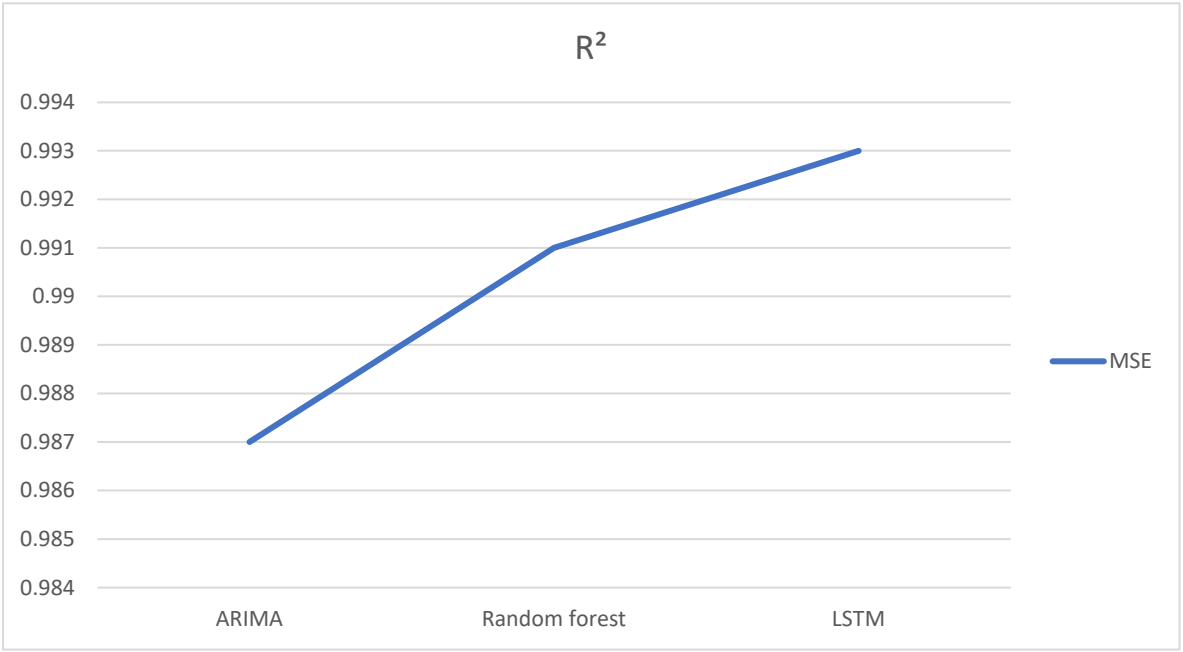

Figure 5. R^2 Under Different Models

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Table 2. R^2 and MSE Under Different Models

Model	MSE	R^2
ARIMA	0.023	0.987
Random Forest	0.019	0.991
LSTM	0.015	0.993

Through Figures 4 and 5, as well as Table 2, this study can select the best-performing model for further optimization and application. In practical applications, the selection and construction of models need to be adjusted according to specific data characteristics and prediction requirements.

4.3. Model Validation and Analysis

During the model validation and analysis phase, this study first preprocesses the collected data, including data cleaning, handling missing values, and data standardization, to ensure the quality and applicability of the data. [36] The preprocessed data is used for model training and validation.

Next, this study selected appropriate prediction models, such as Random Forest and Long Short-Term Memory (LSTM), for comparison. After selecting the models, this study trained them using the training set data. [37]

After the model training was completed, this study used the validation set data to validate the model and evaluate its accuracy and reliability. Mean squared error (MSE) and coefficient of determination (R^2) were adopted as evaluation metrics in this study.

Based on the results of model evaluation, this study adjusts model parameters to optimize prediction performance. For example, for the random forest model, this study may adjust the number and depth of trees; for the LSTM model, this study may adjust the number of neurons and the number of training epochs. The code is provided in the attachment.

Through continuous parameter adjustment and model validation, this study ultimately obtained a model with the best predictive performance, which will be used for subsequent prediction of music popularity trends.

5. Conclusion and Suggestions

5.1. Research conclusions

Through an in-depth analysis of Alibaba Music, this study reveals the multidimensional influencing factors of music popularity trends and constructs an effective trend prediction model. The study finds that user behavior, recommendation algorithms, and socio-cultural factors are key elements affecting music popularity. User behavior analysis shows that Alibaba Music users' listening habits exhibit significant personalization and diversification characteristics, which directly influence music popularity trends. Behavioral data such as users' age, gender, geographical distribution, listening time, and frequency provide important clues for understanding music preferences. The recommendation algorithms adopted by Alibaba Music play an important role in guiding users to discover new music and form music preferences. The algorithms analyze users' historical listening data to predict the types of music that users may be interested in, thereby influencing the dissemination and popularity of music. Socio-cultural factors, such as festivals and social events, also have a significant impact on music popularity. For example, during specific festivals or social events, music works related to these events often receive higher play counts and attention.

In terms of constructing a trend prediction model, this study adopted a method combining time series analysis and machine learning. Through in-depth analysis of historical data, it

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successfully predicted the popular trends of music in the coming period. The validation results of the model indicate that this prediction model has high accuracy and reliability, and can provide valuable decision support for the music industry.

The significance of the Alibaba Music case lies in the fact that it is not merely a successful music platform, but also a typical example reflecting contemporary music consumption trends. Through analyzing Alibaba Music, this study can gain a deeper understanding of the internal mechanisms of music popularity, predict future music trends, and provide guidance for the development of the music industry. The success of Alibaba Music also offers valuable experience for other music platforms, particularly in terms of user behavior analysis and recommendation algorithm optimization.

This study not only answers the questions about the influencing factors and prediction of music popularity trends, but also demonstrates the integration of theory and practice through the specific case of Alibaba Music. The research results show that in-depth analysis of user behavior, optimization of recommendation algorithms, and attention to socio-cultural factors are key to grasping music popularity trends. In the future, with technological advancements and changes in user needs, the music industry will continue to face new challenges and opportunities. Therefore, continuously paying attention to music popularity trends and constantly optimizing prediction models are of great significance for the sustainable development of the music industry.

5.2. Research limitations and future prospects

Although this study conducted an in-depth analysis of the case of Alibaba Music and constructed a music trend prediction model, there are still some limitations. The availability and quality of data have a significant impact on the research results. Due to data privacy and commercial confidentiality, some key data are difficult to obtain, which may affect the accuracy and predictive power of the model. This study mainly focuses on the Alibaba Music platform and does not extensively cover other music platforms, which may limit the universality of the research results. Music trends are influenced by various complex factors, including culture, economy, technology, etc. Although this study attempts to consider these factors comprehensively, there may still be omissions.

Future research could consider the following directions: expanding the scope of research to include more music platforms and regions, in order to enhance the universality and applicability of research findings. Delving into the specific impacts of music recommendation algorithms on user behavior and music popularity may require interdisciplinary collaboration, integrating knowledge from multiple fields such as computer science, psychology, and musicology. With the advancement of artificial intelligence and big data technology, future research could explore more advanced prediction models, such as deep learning models, to improve the accuracy and timeliness of predictions. Research could also focus on emerging trends in the music industry, such as virtual reality music experiences and music copyright management, which may have significant impacts on music popularity trends.

For the sustainable development of the music industry, it is recommended that the industry and academia strengthen cooperation to jointly promote the standardization and openness of music data, which will help improve the quality and efficiency of research. At the same time, music platforms should continuously optimize their recommendation algorithms to ensure that they can not only meet the personalized needs of users but also promote the diversity and innovation of music. Policy makers should pay attention to the development trends of the music industry and formulate corresponding policy support, such as tax incentives, copyright protection, etc., to promote the prosperity of the music industry and cultural diversity.

The study of music trends is a complex and multidimensional subject that requires continuous attention and in-depth exploration. Through ongoing research and practice, this study can

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better understand the patterns of music popularity, predict future trends, and provide strong support for innovation and sustainable development in the music industry.

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