

Personalized Services Based on Big Data Algorithms—taking Netease Cloud as an Example

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Abstract. Based on the rapid development of network technology and the arrival of the digital era, big data algorithms have gradually penetrated various fields, providing great convenience for users. The research focus of this paper is to analyze deeply how big data algorithms are widely used in personalized services. It will also take the music service platform NetEase Cloud as an example to explore its effects on improving user satisfaction, customized services, and optimization of recommendation systems. By analyzing the specific practices of NetEase Cloud, this article reveals the application value of big data algorithms in building user profiles, providing personalized services, optimizing recommendation systems, and providing competitive advantages in the music industry. In addition, the platform accurately meets user needs. It optimizes intelligent recommendations dynamically by integrating users' historical behavioral data and user feedback, improving NetEase Cloud's competitive advantage in music platforms. The significance of this research is to explore the strong competitive advantages that big data algorithms have brought to NetEase Cloud Platform in the field of personalized services and to look forward to the impact that big data algorithms will have on the music industry in the future.

1 Introduction

The rapid progress of network technology has promoted users' strong demand for personalized services. This demand mainly refers to the unique needs expressed by users when purchasing or using products and services, such as users' personal preferences, usage habits, psychological needs, etc. To meet the personalized needs of users, major companies have launched a personalized recommendation system. This recommendation system is based on big data analysis technology and analyzes users' historical behavioral data and situations to provide users with services that may interest them. As an advanced analysis method, big data analysis technology provides key technical support to meet this demand.

For example, Wang Na and others discussed the application of big data analysis and management systems in new energy vehicle accident analysis, providing a scientific basis for researchers [1]. The author Hai Wenbin discussed the research and application of intelligent inspection of photovoltaic power stations based on AI big data analysis technology, aiming to make the operation of photovoltaic power stations more efficient and reduce the costs required for their maintenance [2]. The author Lu Shangkun discussed the intelligent inspection of photovoltaic power stations based on AI big data analysis technology. As the complexity and risks of the financial market increase, big data analysis plays an important role in financial risk assessment [3]. The author Li Ling discussed that with the development of intelligent campuses, the demand for

digital processing has exploded, so big data analysis technology has been widely used in campus management systems [4]. To meet the current needs of basic surveying and mapping, author Xu Yechun researched basic surveying and mapping geographic information engineering quality inspection methods based on big data mining [5]. The author Liu Jiaqi discussed the value thinking and governance model of big data algorithms at the library service level [6].

NetEase Cloud Music APP is an online music service application carefully built by China NetEase. With its unique personalized services, powerful UGC attributes, practical social functions, and precise geographical location services, the NetEase Cloud Music APP has won widespread praise. Against this background, this article aims to take the music service platform NetEase Cloud as the research object and deeply explore how it uses big data analysis technology to provide users with a more accurate and personalized music experience. First, this article mainly explores personalized services based on big data algorithms, specifically taking the music platform NetEase Cloud as an example. Secondly, through this case study, this article mainly explores the practical application effects of big data algorithms in user portrait construction, personalized playlists, and recommendation system generation. Finally, this article also attempts to predict and discuss the future development trends of these technologies.

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2 The core role of big data algorithms in NetEase Cloud's personalized services

Based on the background of big data algorithms, this section introduces its core role in NetEase Cloud personalized services. The core role of big data computing is mainly reflected in the following four aspects: accurate construction of user portraits, personalized services, optimization of recommendation systems, and the manifestation of competitive advantages. User portrait is a term for a target user model based on real data, which creates a comprehensive view of the user by collecting and mining the user's historical behavioral data. Personalized services are mainly reflected in being good at observing and analyzing the psychological characteristics of users and providing corresponding services based on the users' different preferences and combined with the current situation. The optimization of the recommendation system refers to adjusting and improving the big data algorithm so that the algorithm can reach the optimal state in terms of prediction and recommendation accuracy. Competitive advantage refers to an enterprise's unique or superior position relative to competitors in the market for its products or services. This advantage allows the enterprise to obtain economic benefits in the market that exceed those of other competitors.

2.1 Accurately build user portraits

The diversity of data sources provides a rich information basis for the algorithm to build user portraits. This section mainly introduces how to build accurate user portraits through these data sources.

The advantage of the big data algorithm is that it can comprehensively utilize various data sources, such as social network information, search records, listening history, cycle times, etc., which will be recorded in the background to obtain deeper user insights. This approach allows the algorithm to build a more accurate user image, laying a stronger foundation for customized services.

With the help of big data technology, NetEase Cloud can mine in-depth information from massive amounts of user behavior data and build a huge database. The platform can understand users more comprehensively and accurately depict user portraits. This information covers multiple dimensions, such as users' music choices, preferences, social behaviors, and active periods, providing stronger support for personalized, customized services.

According to a survey by the independent third-party monitoring agency DICC (Internet Data Center), NetEase Cloud Music ranks first in the industry in song recommendation accuracy. Its personalized recommendation usage rate reaches 75%, and its accuracy rate over 50%. It is called the music brand that "knows itself best" by users [7].

2.2 Personalized service

With the assistance of big data algorithms, the NetEase Cloud Music Platform provides users with customized services through calculated user portraits, such as private playlists and private roaming modes, which include the user's favorite styles, admired singers, and potential interests. This provides users with convenience in discovering songs that suit them and reduces search costs.

In addition to providing private customized services, NetEase Cloud Music optimizes personalized experience by integrating user feedback.

The NetEase Cloud platform actively encourages users to provide feedback on recommended music works and further enriches and optimizes the generation process of personalized playlists through users' subjective evaluations and clear preference tags.

According to relevant reports, the user recommendation rate of the NetEase Cloud Music APP is as high as 73.65%.

This tends to satisfy the user's need to belong [8]. Personalized services based on big data algorithms satisfy users' personalized experience and have become an important factor in enabling NetEase Cloud to gain a place among many music platforms.

2.3 Optimization of recommendation systems

The optimization of the recommendation system is mainly reflected in the analysis of user historical behavior data and intelligent recommendations.

NetEase Cloud uses its advanced big data processing technology to deeply mine and analyze the data of users' historical behaviors, covering various types of information such as users' click frequency, number of likes, sharing, and collection behaviors. This detailed information constitutes the user's Behavior path map, thus providing a solid basis for personalized recommendation systems.

In addition, NetEase Cloud is also conducting dynamic optimization of intelligent recommendations. The intelligent recommendation system driven by big data not only focuses on the user's past behavior trajectory but also responds to the user's current status in real-time to achieve dynamic optimization. NetEase Cloud Music Platform uses an algorithm for situational awareness to meet the diverse needs of users. The algorithm conducts in-depth analysis based on various factors, such as the user's current emotional status, time node, and activity status, providing users with a customized music playlist.

This move enhances users' ability to interact with specific environments and further optimizes their listening enjoyment. This feature gives the recommendation system flexibility and further improves its ability to meet users' real needs.

2.4 Reflection of competitive advantage

This article obtained data from NetEase Cloud Music's IPO prospectus, financial performance announcements,

etc. , and conducted a visual analysis of the year-on-year growth of the total revenue of Tencent Music and NetEase Cloud Music, as shown in Fig. 1.

Fig. 1 is a year-on-year growth rate chart of total revenue calculated based on the total revenue of Tencent Music and NetEase Cloud Music from 2020 to 2022.

Since its launch, NetEase Cloud Music has greatly improved its competitive advantage with its unique and personalized services.

As can be seen from the figure, NetEase Cloud Music's total revenue growth has steadily increased, exceeding Tencent Music [9].

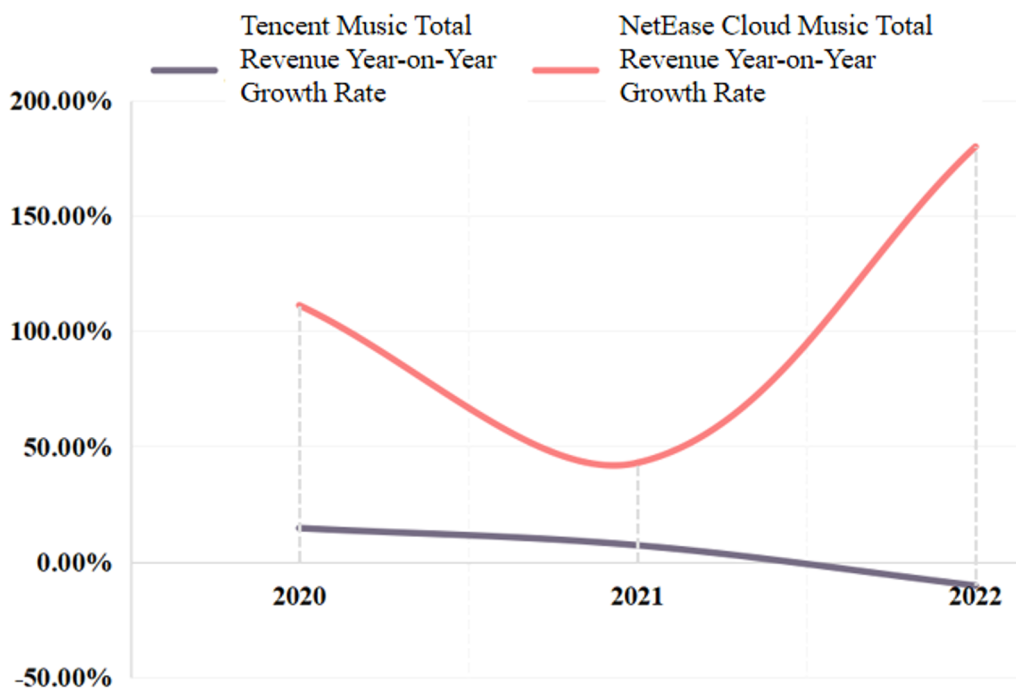


Fig. 1 Year-on-year growth chart of total revenue of Tencent Music and NetEase Cloud Music (Photo/Picture credit : Original)

3 Outlook

Based on the above research, this section introduces the outlook for personalized services under big data algorithms, mainly from privacy protection and compliance, user demand diversity, technological innovation and multi-party integration. Privacy protection refers to the platform's confidentiality, control and management of users' private information and prohibits leakage, abuse and unauthorized access to protect users' rights and interests. Compliance means that all actions of the platform must comply with corresponding laws and regulations, and relevant regulations must not be violated in the use of user privacy.

3.1 Privacy Protection and Compliance

3.1.1 Handling of user privacy information

As personalized services deepen, the NetEase Cloud platform has obtained a large amount of user data. In the process of processing and using user data, there are data security risks. Therefore, the privacy protection issue has become an urgent issue to be solved. For example, some information is leaked to third-party platforms without users' consent, users' personal information is abused, and

the opacity of privacy agreements prevents users from effectively protecting their rights and interests. Therefore, for the future use of big data algorithms in personalized services, platforms must pay more attention to maintaining user privacy, allowing users to choose which personal information they want to see on the platform, and improving transparency and user participation. So that users can know how their data is used.

Secondly, the platform should upgrade information technology so that users' information can be better protected. User demand refers to the user's expectation to have certain requirements for the service by using a product or service. Different users have different preferences, historical behaviors, and situations, resulting in the diversity of user needs.

3.1.2 Application compliance

When using big data algorithms to provide customized services to customers, platforms must comply with relevant laws and regulations. With the development of technology, more emphasis will be placed on compliance with regulations in the future to ensure that the rights and interests of users are fully protected. Moreover, government departments need to strengthen legislation on personal privacy protection, introduce corresponding laws and regulations to protect personal privacy rights

and increase penalties for illegal acts to make the platform's behavior more legally based.

3.2 Consideration of diversity of user needs

When using big data algorithms to provide customized services to customers, platforms must seek a strategy to achieve the harmonious coexistence of users' preferences and the diversity of recommended content. This means that platforms cannot just limit themselves to providing limited recommendations but should encourage users to be exposed to various new and unique music genres, thereby broadening their musical horizons. Or develop an "algorithm difference" to form a unique brand algorithm to enhance users' stickiness and sense of belonging [10]. Under future technological development trends, big data algorithms will be more deeply used in various fields of personalized services.

This is not limited to the music industry but will also be extended to other fields such as movies, reading, medical care, etc. For example, in the medical field, health advice and personalized treatment plans can be provided based on the patient's past medical history, family history, living habits, physical condition, and other data, and then prevention and treatment work can be carried out. Big data algorithms will bring users a richer and more comprehensive personalized experience.

3.3 Technological innovation and multi-party integration

The application of big data algorithms in different fields will be discussed below, and the importance of technological innovation and cross-field cooperation will be further explored.

To cope with the development trends of future society, the platform must continue to introduce innovative technical tools, such as the current new directions of machine learning, deep learning, transfer learning, reinforcement learning, etc. Important directions in computer science and artificial intelligence, such as natural language processing, to further improve the advanced intelligence of personalized services.

Cross-industry collaboration is also a key factor in the advancement of personalized services. To further deepen the application of big data algorithms in personalized services, it can work together with academia, industry, and government departments to achieve cooperation and joint efforts.

Collaboration between industries is essential to achieve common goals. By leveraging big data analytics, these algorithms can analyze various factors such as individuals' preferences, tolerance to different temperatures, and current weather conditions provided by the Meteorological Bureau. Based on this analysis, personalized recommendations for daily outfits can be generated. For instance, individuals who prefer warmer clothing and have a low tolerance to cold may receive suggestions for layering up on colder days, while those who enjoy cooler temperatures may be advised to dress lightly on warmer days.

4 Conclusion

This article mainly explores the practical application of NetEase Cloud Music's personalized services. This article concludes that big data algorithms play a core role for NetEase Cloud Music Platform in four key aspects: building user image, generating personalized playlists, optimizing recommendation systems, and improving competitive advantages.

This has enabled NetEase Cloud Music to achieve remarkable results since its launch. Big data algorithms build user portraits through diverse data sources. Integrating private customized services and user feedback further enhances the personalized services assisted by big data algorithms.

The intelligent recommendation system driven by big data can also respond to the user's current situation in real time. With the continuous development of big data algorithms and artificial intelligence technology, personalized services will gradually penetrate various industries.

NetEase Cloud aims to bring users higher intelligence and thoughtful experience in various fields. However, platforms must also be aware of the severe challenges they face regarding privacy protection, regulatory compliance, and user diversity during development. This requires close cooperation and joint efforts between industry, academia, and government departments to develop big data.

Through the specific practice of big data algorithms in NetEase Cloud, this paper reveals the application value of big data algorithms in the music industry, thus having a positive impact. In the future, big data algorithms will play an increasingly critical role in personalized services, thereby promoting the continuous progress of the digital society.

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