

# Application of Data Mining Technology in Optimization of Mobile Communication Network

Yunhan Suo

College of Electronics and Information Engineering, Southwest Minzu University, Chengdu 610000, China.

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## Abstract

In recent years, with the continuous development of Internet technology, people's lives have been inseparable from mobile communications. However, the continuous development of the information society has led to the diversification of user needs, and the ever-increasing user needs continue to increase the load on mobile networks. Data mining technology, as a new type of practical intelligent technology, can dig out the potential connections between data from a large number of complex and small-scale information. Using data mining technology to build models and apply them in practice can effectively improve work efficiency. Therefore, this article will first explain the related concepts of data mining technology and network optimization, and then will analyze and introduce the related applications of data mining technology in mobile communication network optimization.

## Keywords

**Data Mining; Mobile Communication; Network Optimization.**

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## 1. Introduction

With the rapid development of Internet technology, mobile communication network operators have become more and more competitive in the market. The quality of the network has become the destiny that can determine the fate of operators and enable operators to seize the mobile network market. The fundamental factor. Increasing user demand requires operators to discover network problems in a timely manner and tap potential problems in order to improve the efficiency of network optimization. Combining the intelligent technology of data mining with network optimization can process massive data quickly and effectively, and find the information that customers need accurately and quickly. Therefore, applying data mining, an efficient and intelligent technology to complex network optimization work, can promote the development of mobile communication networks, and using intelligent technology to replace inefficient manual work can improve the technical content of network optimization work. While improving work efficiency, it also accumulates a certain amount of practical experience for future mobile communication network optimization research work.

## 2. Related concepts

### 2.1 Data mining technology

Data mining refers to the process of extracting previously unknown and potentially valuable hidden information and knowledge from a large amount of data in the database. This technology has high application value. It can find out the potential associations between data from numerous, complex and tedious information. Using data mining technology to build models and apply them in practice can effectively improve work efficiency.

As a new type of intelligent technology, data mining has many functions, such as association analysis, clustering, etc., but these are only a small part of it. When using these algorithms, we can't choose algorithms blindly and randomly, but according to the goals we want to achieve. After being familiar with data mining, you can further observe the operation of the network and discover network problems as early as possible. If network optimization engineers can use data mining technology to extract the connections between data, analyze user behaviors based on these potential connections, build models in a targeted manner, and apply the models to practice, then intelligent work will gradually replace engineers. A large amount of repetitive human work achieves the purpose of improving work efficiency and improving the level of optimization. At the same time, through comprehensive analysis of existing network resources to turn passive into active, so that network optimization engineers have a basis when formulating plans. This can better enhance the user experience and provide users with a better network experience environment. Figure 1 is the flow chart of the basic process of data mining.

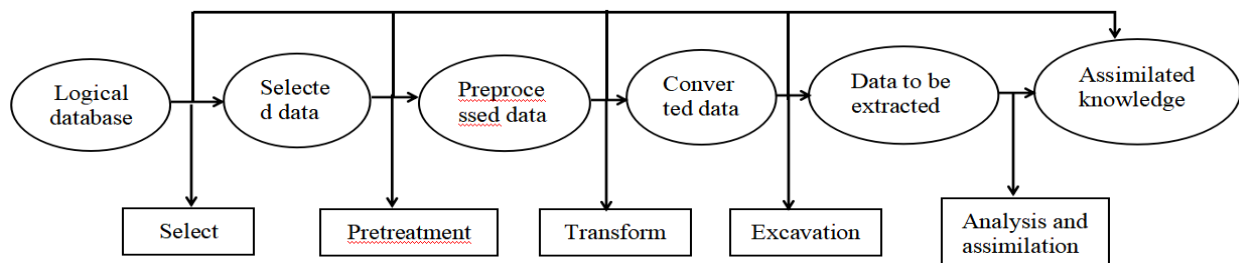


Figure 1. Flow chart of target tracking process

## 2.2 Network Optimization

Mobile network optimization means to analyze the application of mobile networks, collect relevant technical indicators, and find out the problem area and the cause of the problem with the support of useful technical means, so as to solve the network problem and solve the problem area. Meet the needs of mobile network users and achieve the goal of minimizing operating costs and maximizing economic benefits.

When faced with a complicated network communication system, using data mining to optimize operations can effectively shorten the network connection time and provide higher-quality information exchange methods for both communicating parties. As a huge and complex system, the mobile communication network has a large number of components, and the demand for information exchange is also updated in real time. Therefore, if the network-oriented platform can optimize the way to obtain information, then enter the subsequent information control system, Will also be able to get a higher quality call user experience. Although the application of data mining technology is only a small part of network optimization, it plays an important role in improving the overall communication quality. Network optimization is a long-cycle and arduous task. Therefore, in the optimization process, the network optimization engineer should fully consider the actual needs of users, so that the problems existing in the network operation can be solved in a timely and efficient manner. The mobile network service function improves the quality of mobile network operation.

## 3. Application of Data Mining in Optimization of Mobile Communication Network

### 3.1 Data mining technology can improve the accuracy of interference analysis

When the mobile communication network is working normally, it will be more or less interfered by various external factors, such as unreasonable power distribution, strong interference sources in the

network coverage, and uneven distribution of user traffic. Factors will all have a certain impact on the mobile communication network, which may lead to a decrease in the quality of network operation and a deterioration of user experience. In order to solve this problem, it is very important to use data mining technology to analyze the interference in the communication network.

Under normal circumstances, many factors will interfere with the establishment of a base station. When classifying interference, there are mainly internal interference and mutual interference. Internal interference refers to the interference caused by the internal factors of the mobile communication network. Mutual interference refers to interference caused by surrounding buildings or environmental factors. For areas that are severely disturbed, data mining technology can be used to analyze the data in the changed area. Through the analysis of the disturbed data, the area where the interference point is located can be determined more accurately, so as to quickly search for the interference point in the area. In this way, the interference signals that appear can be eliminated in time, so as to ensure the safety and stability of the quality of the mobile communication network. In addition, the mobile communication network base station, in the process of continuously transmitting radio frequency signals, may cause some loss due to the influence of path selection. These losses can be controlled by data mining techniques. The data mining algorithm is used to calculate and determine the optimal path transmission mode, so as to fully reduce the loss caused by the transmission of radio frequency signals.

### **3.2 Reasonable selection of sites using data mining technology**

In the mobile communication network, the choice of the site is very important. Setting too many sites may result in waste of resources. The number of sites affects the investment cost of mobile communication operators, and the choice of site location directly determines the quality of mobile communications.

When selecting communication sites in a mobile communication network, consideration should be given to factors such as whether external factors such as surrounding buildings and the environment will affect the network, information coverage requirements, and the feasibility of the construction of communication base stations. When using data mining technology for site selection, you can first determine a few feasible sites before setting up the site. Through data mining, you can determine a reasonable threshold and determine a basic feasible solution, and then you can determine the location of the site. To confirm the specific area of the, through continuous optimization, the data of the target value can be closer to the actual value. After multiple solutions, when the current data change is small, the determined station location can be output. In data mining, there are many algorithms that can be used. These algorithms can be used alone or in combination. Using data mining technology to select mobile network sites can not only ensure the high quality of communication, but also reduce site layout and improve efficiency. In addition, mobile communication operators can also reduce capital investment in this area, so that the company's funds for equipment maintenance will be greatly reduced, while also saving labor costs.

### **3.3 Application of Data Mining Technology in Traffic Forecast**

Traffic forecasting refers to forecasting the communication demand of a region and establishing corresponding hardware facilities according to the demand. According to the result of the traffic forecast, it can help the communication operator to determine whether more investment in hardware is needed. When the traffic forecast is small, overflow traffic will occur, which will lead to a decrease in future revenue; When the forecast is large, it will cause excessive investment in hardware facilities and waste of resources. Therefore, the use of time series algorithms based on data mining technology to predict and analyze the traffic volume of the mobile network planning stage can scientifically predict the traffic volume of the stations in the future mobile network work, and ensure that the prediction results have certain application value to meet the mobile network requirements. The configuration requirements of the hardware equipment required in the network planning stage to avoid resource waste due to excessive or low traffic forecasts.

### 3.4 Use data mining to analyze dropped calls

In the process of mobile communication, the most common fault is disconnection, which is commonly known as the phenomenon of dropped calls. The deterioration of communication quality will lead to a sharp drop in user satisfaction. This fault will directly affect the user experience. . In response to such problems, we use data mining technology to collect sample data, analyze and sort out a large number of failure phenomenon data, and find similarities in order to quickly and efficiently find failure points, and then focus on the most likely failure points. The classification and hierarchical method is used to conduct in-depth analysis of the cause of the fault, quickly and effectively find the cause of the fault, so as to realize the continuous improvement and optimization of the fault diagnosis. After optimization, it can also be tested for reliability. Data mining technology can be used to analyze the data sequence again to master enough data samples to analyze its internal laws and characteristics to make the network information more complete and convenient.

## 4. Conclusion

In summary, with the rapid economic development and people's continuous pursuit of quality of life, future mobile communication users will put forward higher requirements for mobile communication networks. As a very practical intelligent optimization technology, applying data mining technology to mobile communication network optimization can give full play to its advantages and play a certain role in improving the data processing efficiency of mobile communication networks in operation. Generally, mobile communication network operators will have a large amount of data resource information in their hands. If data mining technology is combined with network optimization to give full play to the value of these data, it will be a major breakthrough in network optimization. Data mining technology is applied to mobile network optimization, there is still a lot of room for development, and it is worth continuing to study in depth.

## References

- [1] Li Jiaqing, Yuan Shidong. Analysis and Exploration of Key Technologies of Data Mining[J]. Computer Products and Circulation, 2020(3):81.
- [2] Jin Wei, Liu Dongqiu. Analysis of data mining technology in the era of big data[J]. Shandong Industrial Technology, 2017(13):147.
- [3] Bai Ping. Development and application of computer data mining technology [J]. Electronic World, 2020, (07): 160-161.
- [4] Dang Li-hua. Application of Data Mining Technology in Mobile Communication Network Optimization [J]. Digital Users, 2017, 23(34):13.
- [5] Dong Xue. Campus Wireless Network Optimization Based on Data Mining Technology[J]. Electronic Design Engineering, 2018, 26(17):40-44.