Application of Data Mining in the Coal Enterprises in ERP

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Abstract. With the development of science and technology, and to meet the need of the coal enterprise development, the ERP system has been more and more used in coal enterprises day-to-day management, and has played the increasing important role. With the wide application of ERP system, how to deal with a lot of data and information for reasonable application becomes the focus of attention. Data mining is an effective analysis and processing of various data technology, and is being applied in the coal enterprise ERP system. Firstly, the technology of data mining is introduced. Secondly the concrete application of data mining technology in coal enterprises ERP system is introduced and analysed.

1. Introduction
Coal enterprises can produce a lot of valuable data information during daily run. Under the surface of these data, very complex relationship is hidden, and it is related closely with the run and development of enterprises. At present, many coal enterprises are using ERP to analyze all kinds of data information. But the real situation is that under the limit of ERP software technology itself, many enterprises used these data information effectively, and produced extremely waste of resources. It is against to enterprise’s long term quickly development. Data mining is a technology which can use all kinds of data information effectively.

2. Data Mining
2.1. Meaning and Process of Data Mining Technology
Data mining is also called knowledge discovery in database, or it is a step of knowledge discovery. The procedure of data mining can be divided into: Using computer system and combined with all kinds of manual functions, mining all kinds of useful rules and methods from lots of data, and transform these rules and methods into acceptable and suitable data and information. But in the real procedure of data mining, not all the procedures of information discover are included. For example, searching a record in database or searching a certain page with search engine, these procedures aren’t belong to procedure of data mining, they should be classified as procedure of information retrieval. But data mining technology can effectively enhance the function of information searching function[1].

2.2. Structure of Data Mining Technology
The whole procedure of knowledge discovery usually has three steps, data preparation, data mining and results expression and explanation. The procedure of data mining can generate more relations with users or knowledge lib. The structure of data mining system is shown in Figure 1.
2.3. Implementation of Data Mining Technology

Specifically, implementation of data mining technology has following procedures: (1) Mining objects determination. The determination of mining objects is the basic step of data mining. First according to the mining task purpose, the mining objects should be determined. In fact, we can’t control and forecast the last result of mining. But we can reasonably forecast mining objects. After mining objects determination, the whole mining work can be more clear, to avoid the whole data mining process aimlessly. (2) Preparation before data mining. Before data mining, a lot of preparation work should be done. Firstly, we should select data and search all the related data information that we have searched, select those data can be regarded as mining objects, and use them into the real mining procedure. Secondly, to ensure the final quality of mining data, we should pre-process the data, that means to do further analysis to the data that got in the first step. Thirdly, we should transform the data. The procedure of transform should transform the data that needed be mined to reasonable data model. The data model should include many calculate principles and methods and should ensure scientific principle of data model and mining algorithm, so it can ensure the success of data mining[2]. (3) Data mining. Using the model that prepared in the last step and mining deeply. During mining, algorithm should be chosen carefully. If we ensure the scientific of algorithm, the following work needn’t be considered, it can be done with system. (4) Analysing data mining results. After the end of data mining, analysis should be done to the mining results. Usually analysis method should be determined according to the data mining procedure. In current situation, visual technology is often used. (5) The assimilation of knowledge. After mining and analysis of data information, we can use the final mining results to gain the function of data mining in real application.
3. Coal Enterprise ERP System and Data Mining Technology

ERP is Enterprise Resource Plan. It is the procedure of that the enterprise use all kinds of information technology and modern advanced management thought to integrate and plan reasonably all kinds of enterprise’s resources. ERP includes enterprise’s many aspects, it can provide comprehensive and systematic management platform for enterprise, so scientific management to all kinds of plans and organizations and control and policy decision can be realized. To coal enterprise, ERP also includes many management problems, such as procurement and production and sales management, and logistics management and financial management and human resources management. With the actual needs of the development of science and technology and the development of the enterprise itself, many coal enterprises in China are long-term efforts of enterprise information infrastructure, and have begun to take shape. ERP enterprise management model has been widely used in many enterprises, and relates to financial and decision-making and other aspects of the content, role play and become more and more important. However, in the coal enterprises to implement specific process of ERP, because the ERP software system every day can accumulate a large amount of data, but the lack of effective means for management, management is relatively backward, so data management issues are more prominent[3]. Traditionally, when the coal enterprises analyse and process various data itself produced, the traditional method is mostly used, such as query and report etc.. These traditional methods can't screen out the most valuable data information from large amounts of data quickly and accurately. And, for the ERP system in coal enterprises, only for the enterprise leadership and decision-making layer it provides a simple data display and data query service, and it has no high level data analysis and effectively decision support method. So, by using the ERP management system, business decision makers can't from the multitude of data information to get the useful information, which cannot be global to the enterprise carries on the reasonable control, and it causes great influence to the formulation of more development strategy of the enterprise. Therefore, the positive analysis of a large number of valuable data resources by taking effective measures of ERP system in the long-term accumulated, thereby enhancing the data resource utilization and enterprise's decision making ability is very important to all of the coal enterprises[4]. At this point, we can apply data mining technology to establish the system of enterprise ERP application system based on data mining. Specific model system is as shown in Figure 2.
4. Analysis of Specific Application of Data Mining Technology in Coal Enterprises

We analyse the concrete application of data mining technology in the coal enterprise ERP instance, to prove the feasible degree and effect of application of data mining technology in the coal enterprise ERP. We take part in nearly five years of coal enterprises in China as an example to analyse the turnover. First of all, the relevant information we participated in the study of coal enterprises are collected and compiled, and then data mining technology is used to the specific turnover forecast. Then, we use enterprise ERP system database to query, obtains the numerical actual turnover of enterprises, and then compares the predicted turnover using data mining to predict with actual turnover, the specific comparison results as shown in Table 1:

**Table 1. Comparison of actual and predicted turnover in some coal enterprises of China**

| Year | Actual Turnover | Predicted Turnover |
|------|-----------------|--------------------|
| 2014 | 24036           | 24063              |
| 2015 | 26448           | 28915              |
| 2016 | 27542           | 25038              |
| 2017 | 28604           | 28000              |
| 2018 | 30275           | 31565              |

From the results in Table 1, after using data mining technology, there is a minimal gap between the actual turnover and forecast turnover in enterprise, some even almost no difference. Therefore, it is feasible for the application of data mining technology in the coal enterprises ERP management system.
and has good results. By analysis of data mining technology results for the coal enterprises to formulate a reasonable business strategy, determine the target customers are be of great advantage.

5. Conclusion
With the continuous expansion of the scale of production and operation of coal enterprises, a large amount of data information will be produced every day. How to use these data reasonably and efficient is a problem that apparently all enterprises need to pay attention to [5]. In this paper, we briefly introduce the connotation and process of data mining technology and concrete structure, and analyse the specific implementation process of data mining technology. Then, we summarize the problems of the data information existing in the application of ERP system in coal enterprises in China at present, and point out the importance of the application of data mining technology. Through prediction and comparison on turnover of nearly five years of a part of the coal enterprises in China by using the data mining technology, we find that the application of data mining technology in the coal enterprise ERP is feasible and very fruitful. So, the application of data mining technology in the ERP enterprises is of great significance. It can effectively improve the decision-making level of ERP system in coal enterprises, and realize implementation of the technological transformation of traditional coal enterprises, so as to enhance the comprehensive competitiveness of enterprises in the coal industry.

6. References
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