Computer Performance Appraisal System Based on Balanced Scorecard under the Internet Background

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Abstract. In the new era of rapid development of Internet information technology and data processing technology, although the emergence of Internet technology has brought changes that cannot be underestimated in various fields of society, the computer performance evaluation system based on the Internet in the era of big data will definitely follow Technology trends in the new era. The balanced scorecard is one of the most commonly used financial performance appraisal tools in academia. The research purpose of this article is to study the innovation of enterprise computer performance appraisal management system in the current Internet era with the continuous development of big data technology. This paper first uses a neural network algorithm to build a model for it. Through this algorithm combined with a questionnaire survey method to screen the evaluation indicators of the computer performance evaluation system of Internet companies in the eastern coastal area, and finally build a BP model through the enterprise computer performance evaluation system. Model calculation samples, after calculation, the computer performance analysis of the target company can be obtained, and on the basis of summarizing the computer performance evaluation system and the balanced score card of the enterprise in the Internet era, the in-depth understanding and conclusion can be drawn. After studying the setting of performance appraisal system indicators, the setting of personal growth indicators is insufficient, the lack of effective cost control and the setting of computer performance indicators have not yet formed a complete system problem. This paper combines the actual situation of computer performance appraisal of Internet companies in the eastern coastal areas, applies the balanced scorecard to set up a management index system for the company's computer performance appraisal, and uses the analytic hierarchy process to analyze the weights of the various indicators of the corporate computer performance appraisal balanced scorecard. Compare the evaluation results with the designated enterprise computer performance management evaluation standards. Experimental research results show that the balanced scorecard can effectively improve the efficiency of the computer performance appraisal system, and the computer performance appraisal can be clearer, and based on the Internet background and big data technology, the performance appraisal system can be made clearer.
Keywords: Internet, Big Data Technology, Balanced Scorecard, Computer, Performance Appraisal System

1. Introduction
The balanced scorecard is an epoch-making strategic management performance evaluation tool proposed by the famous American management masters David P. Norton and Robert S. Kaplan on the basis of the successful experience of large-scale enterprise performance. It is called an effective performance appraisal management tool [1]. It is not only widely used by companies, but also highly recognized by non-profit organizations and government and military institutions [2]. With the development of economic globalization, the competition of enterprises is more reflected in the competition of talents. How to conduct effective human resource management for them, implement scientific and reasonable performance appraisal, and maximize their potential is of far-reaching significance for the development of enterprises and employees [3].

From the perspective of the enterprise, the scientific and reasonable performance appraisal can form comprehensive and accurate appraisal results. This provides data accumulation and fundamental basis for the company to determine comprehensive assessments such as personnel adjustments, salary changes, and advanced training. At the same time, it also laid the foundation for the company to continuously introduce talents and reduce the turnover rate [4, 5]. From the perspective of employees, objective and fair performance appraisal can not only effectively stimulate their work enthusiasm and initiative, but also meet their material and spiritual needs to a certain extent, and maximize their realization. Self-worth. In addition, the evaluation of the work performance of the employees in the appraisal, affirmed that the employees have paid, but also pointed out the shortcomings, which can guide the employees to continuously improve performance, further pursue work results, and obtain personal career development and promotion [6, 7].

In the operation of some modern enterprises, due to the lack of scientific evaluation standards and reasonable management systems within the enterprise, coupled with the influence of other special factors, a considerable number of employees will think that performance evaluation management is mainly for monitoring and management of themselves. Lead to the enthusiasm and enthusiasm of the employees themselves [8]. It is extremely easy to affect the sense of belonging of the company, and on the other hand, it causes employees to lack sufficient sense of security in their daily work, which will not only affect the performance appraisal work, but also affect the healthy development of related companies [9,10].

2. Method

2.1. Principle Model and Algorithm
Let \((X_k, D_k), k=1,2,...,n\) be the input and output sample data, for which \(X_k=(x_1,x_2,...,x_m)^T\), \(D_k=(d_1,d_2,...,d_p)^T\). Taking \(X_k\) as the input of the network, under the action of the connection right, the actual output of the network \(Y_k=(y_1,y_2,...,y_p)^T\) can be obtained. Assuming that the connection weight of neuron \(i\) to \(j\) is \(w_{ij}\), the adjustment amount of the weight is:

\[
\Delta w_{ij} = \theta \delta_j v_i
\]

\[
e = \frac{1}{2} \sum_{o=1}^{d} (d_o(k) - y_o(k))^2
\]  

(1)

The above formula is the learning rate, is the partial derivative of the error function to the input of neuron \(j\). \(V_i\) is the output of the \(i\)-th neuron, and the error correction learning algorithm is a very important learning rule in the neural network.
In recent years, neural networks have been widely used in many fields, such as computer vision, intelligent robot fault detection, real-time translation, business management, market analysis and other fields.

2.2. Algorithms and Steps of the BP Model for Corporate Performance Appraisal

First, select the k-th sample input sample and the corresponding expected input. Using the input layer to modify the connection authorization value is to use the \( x_i(k) \) of each neuron in the hidden layer and each neuron in the input layer to modify the connection value formula as follows:

\[
b_{h}^{N+1}(k) = b_{h}^{N+1}(k) + \theta \delta_{h}(k)
\]

The formula for calculating the global error \( E \) is as follows:

\[
E = \frac{1}{2m} \sum_{k=1}^{m} \sum_{q=1}^{q_0}(d_q(k) - y_q(k))^2
\]

When \( E< \) or the number of learning times is greater than the set maximum number of times \( M \), the calculation of the algorithm is ended, otherwise the next learning sample and the corresponding expected output are selected.

2.3. Analysis of the Calculation System of the Classification Weight of Employee Performance Appraisal

When the number of classifiers in the supervision integration system does not reach the maximum value, use the latest data block to build a new classifier and join the integration system. The error of the new classifier is calculated by cross-validation, and the weight and mean square of the classifier. The error is inversely proportional, and the mean square error of the random classifier is:

\[
\text{MSE}_r = \sum_t p(t)(1 - p(t))^2
\]

\[
W_i = \frac{1}{\text{MSE}_r}
\]

\[
\text{MSE}_{ij} = \frac{1}{|s|} \sum_{(s \in \text{S}, t \in \text{T})} (1 - f_i^{(s)}(s))^2
\]

Therefore, the mean square error can be calculated for the classifier in the integrated system on the latest data block, and the weight of the i-th base classifier on the J-th sample of the data blocks is:

\[
W_{ij} = \frac{1}{\text{MSE}_r + \text{MSE}_{ij} + \delta}
\]

The classification error rate of the integrated classifier is the proportion of the number of correctly classified instances to the total number of instances. The calculation formula is as follows:

\[
\text{err} = \frac{\sum_{i=1}^{\text{winsize}} I(S_j)}{\text{winsize}}
\]

2.4. Test and Application of the Effect of Computer Performance Assessment Model

Obtain a well-trained BP neural network. According to the calculated BP network connection weight and threshold, the performance evaluation effect is tested and applied in practice. Standardize and preprocess the measurement values of the enterprise's comprehensive computer performance appraisal as the input of the trained BP model. After calculation, the performance of the target company’s computer performance appraisal can be obtained, and the evaluation result can be compared with the specified corporate computer performance appraisal performance appraisal standard to determine the target company’s performance category and level.
3. Experiment

3.1. Determine the Experimental Object

Based on the design of this research, the research variables are the analysis and research of enterprise interconnection big data capabilities and enterprise computer performance appraisal system. In order to obtain high-quality samples to ensure the real validity of residence, this research selects M enterprises as the survey samples. Statistics based on the Internet and big data technology show that the enterprise database in the eastern coastal area has already received about 300 enterprises, and the number of enterprises will further increase in 2020, due to the application and industrial development of the eastern coastal area in the country leading Therefore, the sample data has a certain degree of representativeness. This article uses questionnaire surveys to survey the eastern coastal areas. The first is to conduct a questionnaire survey for middle and high-level companies participating in big data courses. The second method is to send emails to some companies with big data time experience or IT management. Experienced middle and senior managers conduct a questionnaire survey.

3.2. Employee Performance Appraisal Algorithm Model Construction

K-means clustering implements employee evaluation as follows:

First, for the construction of the performance appraisal system, k is set to 4 categories for analysis, and n is composed of 12 data sources, and finally K clusters are output to meet the minimum change value of the performance appraisal calculation formula.

By summarizing the datum points of the data of the data set for classification, calculating the clustering interval D obtained from the performance data training set, then the D points are about the class, where:

\[ i = \{1, 2, 3, 4, 5, 6, 7\}; j = \{1, 2, 3, 4\}; \]

(8)

According to the following Euclidean distance method, the cluster centers are involved as shown in (9):

\[ D(x, m) = \sqrt{\sum_{j=1}^{n} (x_j - m_j)^2} \]

(9)

Obtain the calculated values of clusters in the enterprise computer performance appraisal system cluster by refreshing, and calculate the data attributes and relative average values in all clusters; Calculate the criterion function according to the general formula of K-means for clustering. (10) The formula is as follows:

\[ J = \sum_{i=1}^{k} \sum_{x \in C_i} ||x - m_i||^2 \]

(10)

Finally, until performance does not change.

Finally, through the analysis of the employee evaluation link of the quantitative performance appraisal system implemented this time, the realization of the balanced scorecard and clustering algorithm is not limited to a certain algorithm, assuming that we can achieve many kinds of Clustering method, so we have some limitations in the realization of multiple clustering methods for an algorithm to explain the division of Sydney Harbour, so this algorithm must integrate multiple clustering techniques to play its role.

According to the 100 sample data collected from the prediction and evaluation data, 5 groups of representative data are selected for rationality verification. The 5 groups of enterprise employee performance appraisal system evaluation data are shown in Table 1:
Table 1. Data Analysis of Computer Performance Appraisal System for Group of Employees

| Name | Work Performance | Work Efficiency | Communication Skills | Teamwork | Total |
|------|------------------|-----------------|----------------------|----------|-------|
| B employee | 7 | 8 | 8 | 9 | 32 |
| C employee | 8 | 8 | 6 | 9 | 31 |
| D employee | 9 | 9 | 7 | 8 | 33 |
| E employee | 7 | 8 | 9 | 9 | 33 |

4. Results

It can be seen from Figure 1 that the investigators’ company working hours (less than 3 years, 3-5 years, 5-10 years, and more than 10 years) and other different working hours were investigated. The work ability of employees has a greater impact on the management of corporate performance. Relevant survey data show that the work of employees has seriously affected their work performance. Due to high work pressure, long working hours, long working hours, and long-term concentration and tension, psychological pressure problems related to employees’ emotions, pressure, communication, interpersonal relationships, depression, fatigue, etc. are increasing, which not only cause physical and mental stress to employees Greatly hurt, and seriously affect the work performance of employees, reducing the efficiency of the company's performance appraisal system for employees.

Figure 1. Sample survey of M company employees' working hours analysis diagram

In the context of the Internet era, an enterprise's human resource performance appraisal system is one of the important content of an enterprise to improve its breeding ability. It is the collection of data. The data collection channel is not a single one, but is reflected in multiple aspects. In the resource management department, the human resources management department will make the final statistical classification. The data is organized to facilitate managers to have a clear understanding of personnel changes, and lay a solid foundation for future work. The data of human resources dynamic changes follow the personnel Changes and constant changes, managers should analyze and judge the data before using it, in order to maximize its value in the human resource performance management system.
Table 2. Descriptive Statistics of Each Dimension of the Balanced Scorecard in Computer Performance Appraisal Management

| Numbering | Process Dimension Item         | Sort | Minimum | Maximum | Mean   | Standard Deviation |
|-----------|--------------------------------|------|---------|---------|--------|-------------------|
| 09        | Learning growth dimension     | 1    | 2.00    | 6.00    | 3.5735 | 0.7315            |
| 13        | Financial dimension           | 2    | 3.00    | 4.00    | 6.2317 | 0.6310            |
| 15        | Internal process dimension    | 3    | 5.00    | 7.00    | 4.2519 | 0.7257            |
| 17        | Customer service dimension    | 4    | 1.00    | 3.00    | 1.5317 | 0.2319            |

As shown in Table 2 for the data displayed by the descriptive statistics of each dimension of the balanced scorecard in the computer performance appraisal management, the descriptive statistical analysis of the internal process dimension indicators of the sample is carried out, and the indicators are considered to be of certain importance. Among them, the average value of the "financial dimension" index is the highest, which can be understood as whether the financial management structure can be appropriately adjusted according to the changes in the current talent market demand, whether financial management can quickly adapt to the needs of local economic and social development, and whether it is scientific and reasonable. The key to improving the level of corporate performance, promoting the development of corporate connotation, and achieving the strategic goals of the college lies. In addition, the "learning growth dimension", "internal process dimension" and "customer service dimension" indicators have higher average scores.

Synthesize the above data, use the BP model to analyze the corporate performance appraisal system, use the K-means algorithm to analyze the calculations based on the balanced scorecard, and comprehensively study the processing distribution diagram of the corporate employee performance appraisal analysis as shown in Figure 2.

Figure 2. Distribution diagram of analysis and processing of employee performance appraisal based on BP model of balanced scorecard

5. Conclusion
The balanced scorecard is not only a performance appraisal management method, but also embodies a balanced performance management idea. By balancing financial and non-financial indicators, the balanced scorecard expands the focus of corporate financial managers on short-term and long-term financial management performance appraisal, and cannot ignore key points. In the era of Internet big data, computers use digital information technology in the system of corporate performance appraisal based on the balanced scorecard. It is necessary to informatize various data within the enterprise and use the data to lead the performance appraisal work. The arrival of the Internet big data era means
comprehensive innovation in enterprise performance resource management. In the context of today's era, how to effectively grasp the opportunities of big data application is an important way to realize the innovation of enterprise performance appraisal management, and it is also an important issue that needs to be explored in the field of enterprise performance resources.

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