

Design and implementation of Asset Evaluation upgrade Model based on Principal component Analytic hierarchy process

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Abstract: With the continuous development of artificial intelligence technology, the financial industry is facing unavoidable technological subversion, so the asset appraisal industry should also grasp the technological trend and understand in advance the upgrading and development of the asset appraisal industry in the era of artificial intelligence. and do a good job in the business layout in advance in order to be at the front end of the industry in the future. As the basic guarantee of data fusion application, open sharing and transaction circulation, data asset evaluation has become the "lifeline" of data asset value. There is an urgent need for organizations to carry out data asset evaluation in a scientific and compliant manner to support the improvement of the level of data operation and management. This paper introduces the research on data asset evaluation standards, theoretical research results and practical status of relevant organizations at home and abroad, and puts forward a CIME model of data asset evaluation, including evaluation elements and evaluation methods. In order to speed up the process of data flow, the valuation and pricing of data assets are necessary conditions. For this reason, the basic evaluation index and weight of the data asset are calculated scientifically by the fuzzy hierarchical method, and the coefficient of the reference data asset is modified by the market method, and the valuation of the data asset is calculated. Through the establishment of the evaluation index system of asset evaluation risk management, the use of Analytic hierarchy process ((AHP)) to identify risk factors, estimate and evaluate risks, and evaluate the effect of risk management are discussed, to further improve the risk prevention ability of asset evaluation and optimize the quality of asset evaluation.

1. Introduction

Today, China has begun to step into the era of artificial intelligence. With the rise of new technologies, all industries are facing new challenges, especially the high-end service industry, which is also facing the pressure brought by technological change and must take the initiative to seek transformation and upgrading to cope with the trend of The Times [1]. Artificial intelligence is an important driving force of the current industrial transformation. Through the combination of artificial intelligence and asset appraisal industry, the added value of the industry is further strengthened, and the original industry boundary is broken, through intelligent operation process to achieve a high degree of automation and collaboration, and thus has been widely concerned by the industry. Based on this, this paper analyzes the combination of artificial intelligence and asset appraisal industry, to provide a solid theoretical foundation for the industry transformation [2].

With the deepening of the supply-side reform, the implementation of the One Belt and One Road strategy and the promotion of the mode of state-owned enterprise reform such as the merger and reorganization of central enterprises, asset appraisal has been playing a more and more important role in recent years [3]. Although a relatively complete theory and operation system has been established in the asset appraisal work, risks and hidden dangers still exist in the actual appraisal and management work, showing some loopholes and defects. In addition to the regulatory role of the management

department of the evaluation institution, the personnel of the institution should combine the actual situation and start from their own work to strengthen the control ability of the assessment risk[4].

Assets evaluation in China began in the market reform of state-owned enterprises, with the development of the socialist market economy and prosperity, the objective demand of assets evaluation from the sale of state-owned enterprises, joint venture cooperation, share management and bankruptcy liquidation, etc., to the enterprise merger and acquisition, the value-added management of enterprise value investors, capital market analysis of the true value of the invested enterprise, and other areas of the business.

2. Construction of the system

2.1. Overview of the model

The risk of asset appraisal emphasizes the uncertainty in asset appraisal, which means that the result of risk may bring loss [5]. Therefore, asset appraisal risk can be defined as the possibility that the objective value of the appraised asset deviates from the appraised value due to the uncertain factors before, during and after the appraisal process, leading to the possibility that the appraiser bears the corresponding responsibility and the user of the appraisal report suffers losses [6]. Therefore, the asset appraisal risk is divided into three categories: ex ante, in-process and ex post risk. Based on the theory of asset appraisal, this paper forms a systematic asset appraisal risk indicator system, as shown in Figure 1.

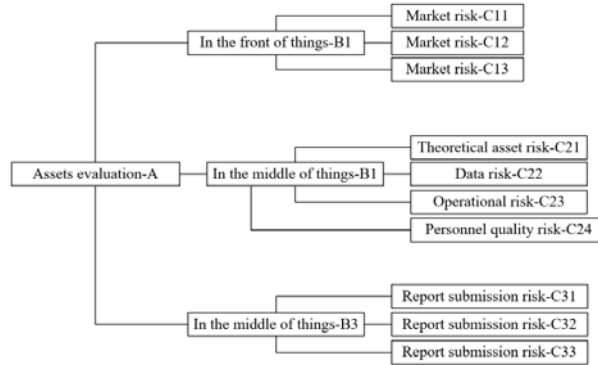


Fig.1 Asset appraisal risk index system

2.2. Model design

The basic model is shown in Formula (1):

$$P_m = (\sum_{i=1}^n PR_i \times W_i) / n \quad (1)$$

PM: Value of assessed data assets;PRI: the base value (PR) of the ith referable asset;WI: Correction factor. $N \geq 3$, the specific data can refer to the number of assets is not less than 3

According to the basic attributes and commodity attributes of data assets, three primary indicators, quality indicators and market indicators and 15 secondary indicators of data assets are preliminarily divided and interpreted. Among them, the indicators include basic indicators: data source, generation mode, data type, reusability, application category; Quality indicators: timeliness, integrity, consistency, accuracy, identity; Market indicators: type of counterparty, data activity, user rating, brand impact index, price impact index.

Establish the level of evaluation index and set of comments. Basic indicators, quality indicators and market indicators are the middle layer, and the sequential hierarchical structure as shown in Table 1 is established. The set of comments is: $V = \{5, 4, 3, 2, 1\}$, in order of importance to the lowest.

$$a_i = \sum_{j=1}^n a_{ij}, i = 1, 2, \dots, n \quad (2)$$

Priority complementary judgment matrix transformation fuzzy consistency matrix, formula:

$$a_{ij} = \frac{a_i - a_j}{2n} + 0.5 \quad (3)$$

Calculating formula of weight of each index:

$$W_i = \frac{1}{n} - \frac{1}{2a} + \frac{1}{na} \sum_{j=1}^n a_{ij} \quad (4)$$

The matrix of A-B precedence relation and A-B fuzzy consistency matrix, the matrix of B1-C precedence relation and B1-C fuzzy consistency matrix, the matrix of B2-C precedence relation and B2-C fuzzy consistency matrix, the matrix of B3-C precedence relation and B3-C fuzzy consistency matrix were solved respectively.

2.3. Assesment steps

In order to realize fast, automatic, and mass data asset valuation, it is necessary to establish a database of comparable data asset value instances. The concrete implementation can build a structured instance library of comparable data asset value through network capture technology.

The Yaahp software is applied to transform the well-constructed asset evaluation risk index system into a hierarchical structure model, as shown in Figure 2. The model structure consists of three layers: the target layer (represented by A), the first-level indicator layer (represented by B) and the second-level indicator layer (represented by C).

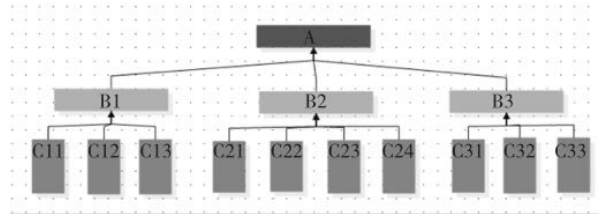


Fig.2 Structural model

3. Result analysis

3.1 Result production

Search for an identical or similar instances ($n \geq 3$) in the database of data asset reference value instances, and select the relevant data asset instances. Among them, similar instances should be selected in descending order according to the weight of the data asset base index, until the number of instances is met.

The existing data assets to be evaluated are meteorological data of a city from 2011 to 2021, which is expressed as S, and its valuation is set at VS. Data attributes include maximum temperature, minimum temperature, weather, wind direction, and air quality index. The comparable data asset instance filter is shown in the following table.

Tab.1 Examples of comparable data assets

Data asset name	Data type	Trading volume	Transaction price
Meteorological big data	API	360	1
Air quality data	Doc	371	0.85
Gas reality	API	362	0.78

Tab.2 Examples of comparable data assets

A	B1	B2	B3	Wi
B1	1.0000	0.4493	1.0000	0.2409
B2	2.2255	1.0000	1.8221	0.5061
B3	1.0000	0.5488	1.0000	0.2575

First, a questionnaire is issued to the experts in the pre-order asset evaluation, and each expert is asked to score the importance of each level of elements relative to the target decision. The score ranges from 1 to 10, and the higher the importance of the element, the higher the score. Secondly, the 30 valid data collected are counted and sorted out. According to the statistical results, the relative importance of the first and second evaluation indexes are compared, and the comparison results are transformed into 1-9 scales to assign values. as shown in Table 1, the judgment matrix of the first-level index layer to the target layer and the second-level index layer to the first-level index layer is formed.

3.2 The influence of artificial intelligence on asset appraisal industry

With the application of artificial intelligence, which will further enlarge the scope of business of asset evaluation, now all kinds of assets evaluation enterprise in developing intelligent business operation, by the assessment of enterprise to set up a APP, the client can login name, enter within the platform evaluation object, purpose, scope and other relevant information, through the platform of intelligent system cloud computing, can give customers to provide online appraisal report, related assessment fee payment also can be finished with the aid of artificial intelligence system, and integrate the process information added, dissent, modify, and other issues.

In artificial intelligent drive mode, assets appraisal industry played an important role on the business process of artificial intelligence, will completely replace traditional asset appraisal model, artificial intelligence will assign to big data management and calculation of the asset appraisal industry, providing countless humanized operation properties, achieve high efficiency and low cost of large data processing. To be specific, the typical application of artificial intelligence in the asset appraisal industry in big data collecting and processing industry, and this collection is comprehensive, can dig all can contact with all the information of asset pool, the useful information efficiently code acquisition to the cloud platform, and storage, by intelligent systems integration and processing large data structures.

Can be expected, with the support of cloud platform of artificial intelligence, can not only make a single enterprise to optimize efficiency, also can pass the intelligent contract to build the cooperation mechanism between enterprises, asset appraisal institution for industry to produce effective competition pattern, under the precondition of reasonable implementation peer information sharing and collaborative operations, the standardization of construction and building industry, and also established the data security.

4. Conclusions

In this paper, the analytic hierarchy process is used to solve the problem of data asset valuation. from the hierarchical ranking of AHP model, we can see that the order of the importance of the first-level index of asset evaluation risk is mid-event risk (B2), ex post risk (B3) and ex ante risk (B1). The first

five items in the second-level indicators are data risk (C22), report use risk (C32), personnel quality risk (C24), assessment subject risk (C12) and operational risk (C23). In the risk index system of asset evaluation, the above indicators are the key indicators and play an important role in the risk management of asset evaluation. A calculation method based on market method is proposed. The weight of the basic evaluation index of the data asset is scientifically calculated according to the hierarchical method, and the correction coefficient of the data asset is obtained combined with the market method, and the valuation of the data asset is calculated. It is undeniable that the value evaluation of data assets is a complex system engineering. How to dynamically evaluate the value of data assets and improve the recognition and universality of the evaluation will be an important direction of sustainable research.

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