IIETA International Information and Engineering Technology Association
Advancing the World of Information and Engineering

Review of Computer Engineering Studies
Vol. 9, No. 2, June, 2022, pp. 49-52
Journal homepage: http://iieta.org/journals/rces

Research on Talent Evaluation Technology Based on Systematic Co-Reaction Force Method

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https://doi.org/10.18280/rces.090202

Received: 20 February 2022
Accepted: 1 May 2022

Keywords:
system co-reaction, force method, talent assessment, multi-model multi-method matrix

ABSTRACT

In the multi-method and multi-model collaborative matrix model clustering calculation analysis, the talent evaluation sample data itself is used as a dictionary to re-represent each sample data, and the sample-based collaborative data reconstruction is carried out, and the talent evaluation reconstruction coefficient matrix is sparse, Low rank and smooth constraints greatly improve the reliability and validity of enterprise talent evaluation samples [1]. The main purpose of this paper is to design and construct a multi-model and multi-view collaborative similarity matrix for enterprise talent assessment, to mine the relationship between talent assessment samples, and to achieve clustering and collaboration of assessment samples.

1. INTRODUCTION

The enterprise talent assessment system adopts target-driven multi-database co-cooperative mechanism, which is dynamically activated by the current information demand. The design of multi-database co-cooperative mechanism should consider co-cooperative planning ability, general control and scheduling ability, conflict arbitration ability and communication ability. Talent assessment based on the theory of the system agreement reaction technology application, in building enterprise talent index evaluation system of value and contribution in the process of the evaluation index system of enterprise value, system agreement decision technology, multiple model method and how library association agreement technology has played a good data coordination, sample and the efficiency of the model agreement together.

The co-cooperative methods of talent evaluation system based on system co-cooperative include: multi-model co-cooperative, multi-database co-cooperative, man-machine co-cooperative system and environment co-cooperative. The consistency of various books can be obtained by using multi-model and multi-method co-evaluation technology. Through the use of model construction method, method optimization combination method, model library and method library and other technologies [2], the combination of multi-model and multi-method components can be realized in talent evaluation, and the structure of model library and method library based on component pattern can be optimized.

2. DESIGN OF THE RELIABILITY AND VALIDITY MODEL OF THE ASSESSMENT

2.1 Design of the evaluation reliability model

The main technical element involved in the reliability of enterprise talent evaluation is the process of generalizing the measurement value. The measurement value of the overall evaluation can be inferred from the measurement value of one evaluation, so as to obtain the moderate value of the reliability of the evaluation. Test reliability is defined as the ratio of the variance of the true score to the variance of the actual score for a set of test scores. which is:

$$r_{XX} = \frac{S_T^2}{S_X^2} \tag{1}$$

where, ${S_T}^2$ represents the reliability of the assessment, ${S_T}^2$ represents the variance of the true score, ${S_X}^2$ represents the variance of the actual score.

Error formula ${S_X}^2 = {S_T}^2 + {S_E}^2$, can be deduced that the reliability can also be expressed as:

$$r_{XX} = \frac{S_X^2 - S_E^2}{{S_X}^2} = 1 - \frac{S_E^2}{{S_X}^2} \tag{2}$$

Each set of assessment data in talent assessment includes correct information and incorrect information. In order to provide valid data for the assessment, the assessment must provide more real data information, namely: signal and noise. The signal in the assessment can be represented by the variance of the scores, and the noise can be represented by the variance of the error scores. The relationship between signal-to-noise ratio and reliability in talent assessment is expressed as:

$$\text{Signal/Noise} = \frac{r_{XX}}{(1 - r_{XX})}.$$

Substitute $r_{XX} = \frac{{S_T}^2}{{S_x}^2} = \frac{{S_T}^2}{({S_T}^2 + {S_E}^2)}$ into the right-hand side of the above equation to get:

$$\frac{Signal}{Noise} = \frac{r_{XX}}{1 - r_{XX}} = \frac{\frac{{S_T}^2}{{S_T}^2 + {S_E}^2}}{(1 - \frac{{S_T}^2}{{S_T}^2 + {S_E}^2})} = \frac{\frac{{S_T}^2}{{S_T}^2 + {S_E}^2}}{\frac{{S_T}^2 + {S_E}^2 - {S_T}^2}{{S_T}^2 + {S_E}^2}} = \frac{{S_T}^2}{{S_E}^2} \quad (3)$$

If the reliability of one of the enterprise talent assessments is 0.90, the signal-to-noise ratio is 0.90/(1.0.90)=9.0, that is, the ratio of true variance to error variance is 9:1. The improvement of the evaluation reliability will improve the signal-to-noise ratio. The reliability increases from 0.90 to 0.91, and the signal-to-noise ratio changes from 9:1 to 10.1:1. Therefore, efforts should be made to improve the reliability of enterprise talent evaluation, and further enhance the reliability, reliability and scientificity of the evaluation.

2.2 Evaluation validity model design

The validity of enterprise talent assessment is based on variance of test total score. Because there are some measurement errors in the measurement value, it affects the consistency of measurement. So we have to put the variance of the total score (${S_X}^2$) into the variance of true fractions (${S_\infty}^2$) and variance of measurement error (${S_E}^2$). Need to be able to put the total variance (variance of the real score ${S_X}^2$), is divided into three parts, which are expressed by the formula:

$${S_X}^2 = {S_{co}}^2 + {S_{sp}}^2 + {S_E}^2 \quad (4)$$

${S_{co}}^2$ represents the main variance caused by the talent characteristics of the participants, or the variance caused by common factors related to the characteristics of the measured dimension information; ${S_{sp}}^2$ represents the variance caused by other individual characteristics unrelated to the characteristics being measured (variance due to systematic errors); ${S_E}^2$ represents error variance, that is, the variance of measurement error.

Variance caused by the observed competency characteristics of talents (${S_{co}}^2$) is the content of real evaluation, and its proportion in the total variance is the level of validity measure. So far, the validity of enterprise talent assessment is the percentage of the variance of the measured characteristic in the total variance, namely:

$$Val = \frac{S^2_{co}}{S^2_X} \quad (5)$$

The reliability of the assessment is a necessary condition for validity. If the internal consistency coefficient of the enterprise talent assessment is too high, the homogeneity of the test questions will be too high, which will lead to the assessment not fully reflecting the professional ability and occupation of the participants. The quality of the situation will reduce the evaluation performance. It is difficult to improve the reliability and validity of the assessment at the same time. In order to improve the validity value of the enterprise talent assessment, it is necessary to appropriately reduce the value of the reliability coefficient of the assessment, in order to achieve an appropriate index of balance between the overall validity and reliability of the assessment.

3. DESIGN OF TALENT EVALUATION MODEL BASED ON SYSTEM CO-REACTION FORCE METHOD

3.1 The power of the system co-coordination mechanism

In the design of enterprise talent evaluation model, the system co-co-reaction method $S_{M_{(x)}}$ can be used to obtain co-co-compensation mechanism. If the element state in is given, the force of the system co-reaction is directly related to the quality of the element state in $S_{R_{(x)}}$. When co-promoting and co-compensating, $S_{R_{(x)}}$ the better the state, the more obvious the effect of co-promoting or compensating; when co-inhibiting, $S_{R_{(x)}}$ the worse the state, the more obvious the effect of co-inhibiting.

Using G to represent the co-reaction force of the system, and g to represent its force value, the force calculation formula is:

$$g_x = k_x \times g_{R_{(x)}} \quad (6)$$

Among them: g_x Indicates the force value of the co-reaction effect of the talent evaluation system corresponding to each combination D_x. k_s Represents the D_x co-cooperation type coefficient of the evaluation system corresponding to the combination; $g_{R_{(x)}}$ Represents the D_x co-reaction force of the evaluation system corresponding to the combination, namely:

$$g_{R_{(x)}} = \sum_{j=1}^{J} a_j \times g_{R_{(x)j}} \quad (7)$$

Among them: $g_{R_{(x)j}}$ Indicates the force base; a_j Indicates the force coefficient.

3.2 System cooperation force base

System cooperation force base $g_{R_{(x)j}}$ is the basic value of the calculation of the force stimulated by the co-operation of the enterprise talent evaluation system, indicating the effect of the j associated induction element in the state combination of the X system co-reaction element on the main induction element. effect size.

When the enterprise talent evaluation system performs the co-compensation response, that is k_x=1, the pros and cons of the associated element state and the weight factor of the element itself in the evaluation system are positively correlated with the state of the corresponding main induction element. For any co-promotion or co-compensation rule, the co-reaction element state combination D_x of the evaluation system. Its corresponding force base $g_{R_{(x)j}}$ is defined as the product of the evaluation score value of the j-th associated induction $r_{(x)j}$ evaluation element in the co-reaction element state combination of the evaluation system and the corresponding weight value $w_{(x)j}$.

The enterprise talent evaluation system conducts a co-inhibition response k_x=-1, and immediately defines the score of the associated sensor element as $2u_z - r_{(x)j}$, the force base

$g_{R_{(x)j}}$ at this time is defined as the product $2u_z - r_{(x)j}$ of the weight $w_{(x)j}$ of the j-th associated sensing element in the evaluation system.

$g_{R_{(x)j}}$ value formula is:

$$g_{R_{(x)j}} = \begin{cases} W_{(x)j} \times r_{(x)j} & k_X = 1 \\ W_{(x)j} \times (2u_z - r_{(x)j}) & k_X = -1 \end{cases} \quad (8)$$

Defining the score of the associated sensory evaluation element as $2u_z - r_{(x)j}$, it can be is the "inferior" boundary based on the quality status of the talent evaluation system. If the associated sensory factor evaluation score in the state of co-inhibition is on the "inferior boundary", that is $r_{(x)j} = u_z$, Then its force base for the evaluation system is $g_{R_{(x)}}(u_z) = w_{(x)} \times u_z$. Under $w_{(x)}u_z$ stable conditions, for either $r_{(x)j} < u_z$, Its force base must be greater than $g_{R_{(x)j}}(u_z)$, when $r_{(x)j} < u_z$ or $r_{(x)j} < u_z$, there must be $r_{(x)j} - u_z \geqslant 0$ difference between $r_{(x)j}$ and u_z, and $r_{(x)j}$ the lower the score value, the greater the difference.

The co-reaction mechanism of the talent evaluation system, $g_{R_{(x)j}}(u_z)$ can be defined as the difference between the benchmark value used as the base for calculating the co-inhibitory effect and the evaluation score of its associated sensory factor.

3.3 Adjustment of system co-evaluation value

The co-cooperative response of enterprise talent assessment system will show the co-cooperative response force in the quality assessment results. For co-cooperative promotion and co-cooperative compensation; For coco-inhibition, its force tends to have a low differentiation effect on the state of the whole system. Therefore, the adjustment formula is as follows [3]:

$$\begin{aligned} c' = c + g = \sum_{n=1}^{N} W_n \times c_n \\ + \sum_{|D_x|k=1} \sum_{j=1}^{J} W^2(x)j \times r_{(x)j} \\ - \sum_{|D_x|k=-1} \sum_{j=1}^{J} W^2(x)j \\ \times (2u_z - r_{(x)j}) \end{aligned} \quad (9)$$

It is located in the state combination of all system co-cooperative reaction elements adapted to the evaluation system C, the number of times that a certain quality factor C_n appears in the form of correlation induction factor $r_{(x)j}$ in these combinations is P.

Then the final weight value after multiple adjustments is:

$$w'_{cn} = w_{cn} + p\Delta w_{cn} \quad (10)$$

The adjustment method of evaluation value is as follows:

$$c' = \sum_{|D_x|} \Delta W_{(x)j} \times r_{w'(x)i} + \sum_{|} W_{0(x)j} \times r_{0(x)j} \quad (11)$$

or

$$\begin{aligned} c' = c + \sum_{|D_x|} \Delta W_{(x)j} \times r_{W'(x)i} \\ = \sum_{n=1}^{N} c_n + \sum_{|D|} W^2(x)j \times r_{W'(x)i} \end{aligned} \quad (12)$$

There should be many quantification methods of enterprise talent evaluation system, the method mentioned above is only one of them, does not represent all the quantification methods of quality evaluation under the model of system co-reaction.

4. DESIGN OF TALENT EVALUATION MATRIX BASED ON MULTI-MODEL AND MULTI-METHOD CO-COORDINATION

4.1 Consistency analysis of talent assessment output

Enterprise talent evaluation is to use multi-model and multi-method collaborative technical methods to construct two matrices for talent evaluation, namely: multi-model multi-view collaborative matrix for talent evaluation and multi-method multi-model collaborative matrix. The full semantic information representation of the talent evaluation target is obtained through the collaborative matrix method, so that the various modal data of the talent evaluation can be aggregated and mapped from the enterprise talent evaluation process through multi-model, multi-view and multi-method, and the scientific and rationalization of the enterprise talent evaluation report can be realized output [4] (Figure 1).

4.2 Technical route of multi-model and multi-view collaborative matrix

On the basis of deep learning neural network algorithm, multi-model and multi-method reconstruction calculation method is used to carry out multi-dimensional calculation of talent portrait multidimensional data, talent attribute characteristics evaluation dimension machine and individual achievement quotient, and establish the underlying quality factors of talent evaluation collaborative analysis data. Secondly, the machine learning calculation method is used to cluster analysis and calculation of the dimension elements such as the element chain of the talent portrait, the work goal and personal ability, so as to form the personal development ability elements of the evaluated talents in collaboration with the underlying analysis data.

4.3 Multi-method and multi-model collaborative matrix technology route

On the basis of the collaborative analysis data of the underlying quality elements of the talent assessment and the collaborative underlying analysis data of the individual development ability elements of talents formed by the multi-model and multi-view collaborative matrix, the weighted evaluation calculation is carried out on the professional quality, professional ability and work performance of the talents to be tested. Analysis, through the use of multi-model and multi-method clustering collaboration, the evaluation and analysis data of professional quality such as psychological quality, development potential, achievement excellence and professional personality of talents are formed [5].

4.4 Collaborative application analysis of multiple models and methods

Multi-model multi-view synergy matrix model is used to establish the underlying quality of personnel evaluation elements of collaborative analysis data and personal development ability elements together the underlying analysis data, with multiple methods model talent personal development ability elements formed by the matrix model of collaborative analysis of the underlying data clustering collaborative computing, the process of implementation of enterprise talent assessment, Forming multi-model, multi-method and multi-view collaborative effectiveness of talent evaluation to ensure reliability, validity and stability of evaluation quality.

In the multi-method and multi-model collaborative matrix model clustering calculation analysis, the machine learning clustering method uses all the talent evaluation sample data itself as a dictionary to re-represent each sample data, performs sample-based collaborative data reconstruction, and reconstructs the talent evaluation coefficient. The matrix is sparse, low-rank and smooth, and based on the multi-model multi-view collaborative similarity matrix based on the talent evaluation coefficient, the relationship between the talent evaluation samples is mined, and the clustering and collaboration of the evaluation samples are realized.

In the same way, the multi-method multi-model collaborative matrix model can integrate multiple views of talent portraits and their talent attribute characteristic data. In the clustering calculation analysis, it can improve the comprehensive evaluation matrix big data of talents with a single view of talent portraits and a single evaluation dimension element. Over-reliance on feature quality can form a complete presentation of individual assessment, group analysis, and talent and organizational profiles.

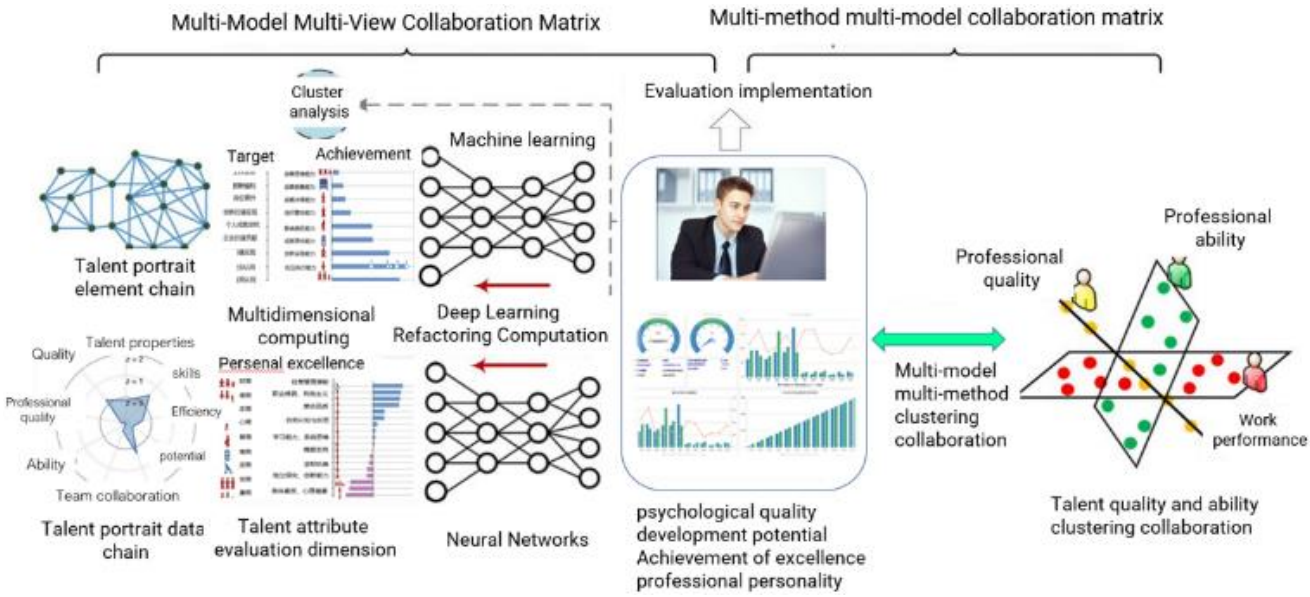

Figure 1. Talent evaluation matrix model based on multi-model and multi-method collaboration

5. RESEARCH PROSPECTS

Multi-model multi-view synergy matrix model is used to establish the underlying quality of personnel evaluation elements of collaborative analysis data and personal development ability elements together the underlying analysis data, with multiple methods model talent personal development ability elements formed by the matrix model of collaborative analysis of the underlying data clustering collaborative computing, the process of implementation of enterprise talent assessment, forming multi-model, multi-method and multi-view collaborative effectiveness of talent evaluation to ensure reliability, validity and stability of evaluation quality.

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