Competency Model of College Students' Innovation and Entrepreneurship from the Perspective of Deep Learning

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Abstract. In order to avoid problems in the process of innovation and entrepreneurship, a competency model is created to help further development. Therefore, this paper constructs and designs the college students' innovation and entrepreneurship competency model from the perspective of deep learning. Set the goal of creating competency model under deep learning, build the competency model matrix under deep learning, and SDNN algorithm realizes the construction of competency model. The test results show that the normalized completion ratio of the designed deep learning competency application model test group is relatively high, indicating that the effect of this innovation and entrepreneurship competency model is relatively good, stable and comprehensive, and has practical application significance.

Keywords: Deep learning · College students' innovation and entrepreneurship · Competency model · Entrepreneurial competence · Model structure · Competency summary

1 Introduction

The rapid economic development urgently needs professionals with innovative thinking and entrepreneurial ability. Innovation and entrepreneurship has gradually become a new engine and new driving force for regional economic development. Colleges and universities undertake the important task of Cultivating College Students' innovation and entrepreneurship ability and talent incubation [1]. Cultivating innovative and entrepreneurial professionals in Colleges and universities is an important mission to actively support the adjustment of regional economic structure and complete the supply of regional talents [2]. For college students of professional courses in China, entrepreneurship is one of the possible choices of personal career [3]. By cultivating college students' entrepreneurial knowledge, entrepreneurial ability and entrepreneurial quality in professional courses, students can master the law of identifying, evaluating and utilizing entrepreneurial opportunities, which will not only help students broaden

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their vertical career path, make rational choices between employment and entrepreneurship, and form a diversified and personalized career, It also helps students to plan the internal talent resources of the enterprise prospectively in the workplace, and stimulate the sustainable innovation vitality and entrepreneurial power of the enterprise. It is necessary to build the entrepreneurial competency model of college students in professional courses and improve the entrepreneurial competency of professional courses [4]. In terms of the current entrepreneurial practice of college students, with the support of national policies, college students' entrepreneurship has solved the employment problems of some college graduates and realized the combination of college education theory and practice. There are numerous successful cases of College Students' entrepreneurship, but compared with 20% of the average entrepreneurial success rate of international universities, The entrepreneurial success rate of college students in China is still at a very low level. The reasons are as follows: the imprisonment of traditional culture, the lack of support from parents, the backward employment concept of college students, the lack of entrepreneurial education and the low entrepreneurial competence of college students [5]. To some extent, the most fundamental reason affecting the success of entrepreneurial activities is the entrepreneurial competence of entrepreneurs, that is, the very low entrepreneurial success rate of college students in China lies in the low level of entrepreneurial competence of college students. Therefore, in the process of paying close attention to college students' entrepreneurship, we should focus on Improving College Students' entrepreneurial competence and strive to improve college students' entrepreneurial competence, Solve the problem of low entrepreneurial success rate of college students from the root [6].

For college students, innovation and entrepreneurship can help them know whether they have entrepreneurial competence and which entrepreneurial competence they have, so as to help them choose whether to start a business or to find employment. Relatively, the innovation and entrepreneurship model can, to a certain extent, help them rationally analyze their own competencies and enhance their comprehensive strength [7]. If you have entrepreneurial intention but lack entrepreneurial competence, which entrepreneurial competence should be improved? It can help students better plan their career and improve the success rate of entrepreneurship [8]. For the school, it can understand the competency characteristics required by college students in entrepreneurship, so as to determine what kind of entrepreneurship education plan needs to be made according to the specific situation [9], so as to help students improve their entrepreneurial competence and ultimately improve the success rate of entrepreneurship.

For the society, it is convenient to know what support and services are needed to improve the entrepreneurial competence of college students, so as to improve their entrepreneurial enthusiasm and reduce the obstacles in the entrepreneurial process of college students. However, in the process of practice, there are also some problems and obstacles, so it is necessary to add some information technology to assist. Deep learning is a widely used analysis and processing technology, which can quickly summarize and integrate huge data and complete target analysis at the same time. It is often applied in the construction of college students' innovation and entrepreneurship competency model [10]. In the model, entrepreneurial motivation, entrepreneurial characteristics and self-recognition are also included, which are the intrinsic and deep-seated

entrepreneurial potential of entrepreneurs, which cannot be easily changed by external influence and difficult to measure. Therefore, the innovation and entrepreneurship competency model of college students based on the perspective of deep learning is constructed. The competency model creation goal under deep learning was set up, the competency model matrix under deep learning was constructed, and the competency model was constructed by SDNN algorithm. In a more realistic environment, deep learning technology is associated with the competency model to improve the overall level of innovation and entrepreneurship.

2 Construction of Innovation and Entrepreneurship Competency Model from the Perspective of Deep Learning

2.1 Competency Model Creation and Goal Setting Under Deep Learning

The construction of college students' innovative entrepreneurial competency model, usually need to set the corresponding target, and combined with the corresponding requirements, combined with reaction time lenovo's psychological changes, can be smoothly to student's comprehensive ability test, aptitude test, personality test, etc., to a certain extent promote the development of individual psychology. The theory of individual difference mainly focuses on cognitive difference, personality difference and gender difference. Only with the corresponding knowledge, by differences in gender, age, reveal the difference of individual, can be gained by measuring the difference of the difference of individual intelligence, for example through a survey of personality can be concluded that the individual is more suitable jobs, can identify and evaluate leaders, managers, employees in the work of personal qualities, In this way, the initial goal of competence can be set.

First, you need to set the target hierarchy, as shown in Fig. 1:

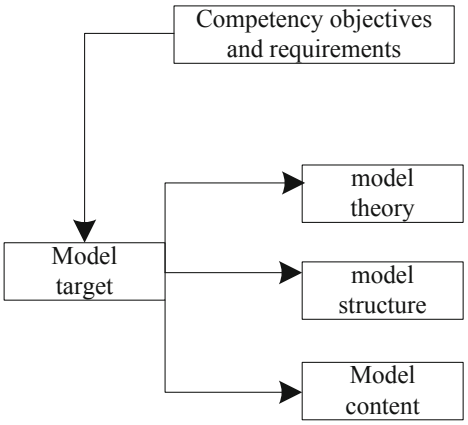

Fig. 1. Hierarchical structure setting of objectives

According to the structural setting of the target in Fig. 1, the setting range of the target can be finally formed. On this basis, the leadership theory is added. Entrepreneurial competency is not only related to leadership, but also essential for leadership in enterprise management. The entrepreneurial process of entrepreneurs is also the process of leadership. The research on leadership and leadership theory in organizational behavior provides a theoretical reference for competency modeling. The theory of leadership characteristics, also known as the theory of leadership quality, focuses on the personal characteristics or personal quality of leaders in order to find, cultivate and use qualified leaders. The theory of leadership characteristics holds that the characteristics of leaders are not innate, but acquired. In the long-term study and hard practice, the characteristics of leaders gradually appear and finally become leaders. Foreign research on core competitiveness includes coordination and integration view, knowledge view, resource view, combination view and cultural view. Domestic research on core competitiveness includes resource view, ability view, asset and mechanism integration view, consumer surplus view, system view and culture and values. The research of foreign scholars focuses on the core competitiveness of enterprises, which is at the organizational level; Domestic researchers gradually focus on the individual level. The research on individual abilities and skills has aroused people's interest in competence. The core competitiveness plays an increasingly important role in the development of enterprises and individuals, and has attracted more and more attention.

When the research of competency develops to a certain stage, competency model comes into being. Competency model is composed of multiple projects, and each project has different dimensions. This paper holds that the competency model is the sum of competency characteristics, which are required for a specific post and role.

Behavioral event interview is the most effective method to build competency model. Its advantages include the following two aspects: first, it is an open questionnaire for the respondents, and requires the respondents to describe the causes and consequences of things in detail as much as possible, so the interviewers get more information and have higher authenticity; Secondly, the interviewees are required to describe key events during the interview, which are often the key factors affecting job performance. Behavioral event interview also has some limitations. First, it requires high professional knowledge and skills of model builders, and interviews need a large number of events and the cooperation of respondents; Secondly, it is a review of the respondents' past behavior, without considering that the enterprise is in a changing situation; Third, it requires respondents to describe key events, which may omit other relatively important responsibilities. Therefore, on this basis, the relevant data of College Students' innovation and entrepreneurship can be described and analyzed, and the actual comparison coefficient can be calculated, as shown in formula (1):

$$K = (2\alpha + 1) - m \tag{1}$$

In formula (1): K represents the actual contrast coefficient, α represents the comprehensive assignment, and m represents the actual action range of the model. Through the above calculation, the actual contrast coefficient can be obtained. Bring the innovation and entrepreneurship knowledge into the training goal of professional curriculum teaching systematically, and promote the reconstruction of professional curriculum system.

Organize the course content in the form of entrepreneurial projects, so that the design of entrepreneurial projects emphasizes practicality, is close to life and work, and reflects interest and operability. Taking tourism management as an example, the primary course focuses on the basic knowledge and skill training of College Students' Entrepreneurship and computer, aiming to popularize universal science and technology and cultivate students' thinking ability, practical ability and professional quality. Intermediate courses can introduce tourism marketing, tourism e-commerce and other projects with a certain professional foundation, in order to further improve students' knowledge level and practical ability. Advanced courses can be provided with comprehensive, innovative and practical work problem-solving courses such as tourism planning, tourism commodity development and design, tourism planning and development, so as to improve students' ability of innovation and entrepreneurship and serve the industry. Based on the above, it is also necessary to set the change limit value of the target, as shown in formula (2):

$$M = \Im + \alpha \tag{2}$$

In formula (2): M represents the change limit value, $\Im$represents the level change conversion value, and α represents the change error. Through the above calculation, the actual change limit value can be obtained. Take it as the change standard of the goal and set it in the initial model to complete the setting of the goal of creating the competency model.

2.2 Construction of Competency Model Matrix Under Deep Learning

For complex classification regression problems, the generalization ability is restricted. Deep learning attempts to break the constraints of shallow learning on levels. It can realize the approximation of complex functions by learning a deep-seated nonlinear network, showing a strong ability to learn the essential characteristics of data in a small number of samples [11]. Compared with the shallow learning structure, this kind of neural network has a deep structure, so it is called deep learning. It is pointed out that the deep learning structure can simply express the complex function mapping relationship. Through the review of deep learning, this paper analyzes the necessity of introducing deep learning, and points out that the shallow structure neural network has certain limitations in the ability of network to express complex functions, which can not represent high-dimensional complex functions, but can be expressed effectively by deep-seated neural network, At the same time, the multi-level features obtained by deep learning can be reused in similar or the same different classification predictions, which provides more useful information for the solution of the objective function of new tasks. It is pointed out that the high-level features learned in deep neural network do not change with the change of actual data, and have stronger robustness to practical problems. On this basis, the actual robustness can be calculated, as shown in formula (3):

$$P = \chi + s \tag{3}$$

In formula (3): P represents the actual robustness, χ represents the change value of comprehensive processing, and s represents the range of neural network. Deep learning still adopts the idea of neural network, but the middle layer contains multiple hidden

layers, which forms a multi-layer network. The deep learning model has more hidden layers, has stronger data fitting ability, and can mine the deep abstract meaning in the data. Deep neural technology, convolutional neural network, recursive neural network and other models are constantly proposed. Deep learning is one of the most cutting-edge fields of machine learning and statistical learning methods. Deep learning learns the features of each layer from the original data of College Students' innovation and entrepreneurship, and learns to express higher-level and more abstract features through layer by layer feature transformation, so as to learn the complex laws in high-dimensional complex data. Facing the challenge of today's big data, college students' innovation and entrepreneurship deep learning, as a cutting-edge method of machine learning, has been proved to significantly improve the effect compared with shallow learning.

In the above setting of hidden hierarchy, you also need to add DNN instruction. DN N is an advanced deep learning method. It is a nonlinear combination of multi-layer representation learning methods. Representation learning is a method to learn features from data and extract useful information from data during classification and prediction. Compared with shallow learning, DNN has better feature learning and prediction ability, especially in complex classification and regression problems, it can create a matrix of hierarchical model, as shown in the following formula:

$$P = \chi + \frac{\sqrt{R}}{3} - \Re \tag{4}$$

$$Y = 2\chi + \frac{\sqrt{R}}{3} - \Re \tag{5}$$

$$U = 3\chi + \frac{\sqrt{R}}{3} - \Re \tag{6}$$

In formulas (4), (5) and (6): P, Y and U represent the range of the normalized level, χ represents the unbalanced vector, R represents the characteristic coefficient, and $\Re$represents the deep weight ratio. Through the above calculation, the actual normalization level range can be obtained. Combined with the DNN model, through multiple nonlinear fitting of the training data, it can mine the potential features in the data, and has a strong learning effect in the complex big data environment. The key to the calculation of DNN model is to minimize the loss function, and the weight of deep neural network can be trained by random gradient descent. SGD learns by updating the weight through error layer by layer back propagation, which can be divided into forward propagation stage from input layer to output layer and top-down error back conduction stage. Forward propagation calculates the activation function of each layer through the training data. During the error back propagation, the error between the actual output and the expected is calculated from the top down, and the weight of each layer is updated from the top down according to the gradient descent method. In the big data environment, deep learning can have strong learning ability for features, but there are still many problems in CTR prediction: there are many parameters, and parameter adjustment is a difficult problem. The number of layers of DNN and the adjustment of neuron nodes in each layer, that is, the setting of DNN model structure, is a difficult problem. To solve this problem,

the research idea of this paper is to determine the model structure first, then determine the key parameters, and carry out comparative experiments with various methods on the basis of optimal combination. Long training time. DNN is a powerful machine learning model, and the weight of the network can reach millions or more. It can learn the deep meaning of data features through the deep-seated deepening of the model. However, the deeper level means that the model needs to learn more weights, and the training time of DNN will be very long. Firstly, the resampling technology of unbalanced data is used to eliminate the impact of unbalanced characteristics on the prediction effect, and then the data features after resampling are deeply studied by DNN to calculate the feature depth neuron, as shown in formula (7):

$$q = \frac{\aleph + 1}{2} - \eta \tag{7}$$

In formula (7): q represents feature depth neurons, $\aleph$ represents the number of deep nodes, and η represents the number of mining systems. Through the above calculation, the actual characteristic depth neuron can be obtained. It is used as the implementation standard of the deep learning model. At the same time, DNN can mine the complex information that can not be simulated by shallow learning. Finally, two neural nodes are used as the prediction neurons of the overall model. The DNN model is constructed on the resampled data set that eliminates the influence, and the output of SDNN is obtained, that is, the prediction value probability and the corresponding prediction label. The core idea of SDNN is to construct a DNN model to eliminate the data imbalance, which can not only eliminate the impact of data imbalance on DNN, but also have the learning ability of high-level abstract features in DNN model, and finally complete the construction of competency model matrix under deep learning.

2.3 Implement the Competency Model Based on SDNN Algorithm

The construction experiment of deep classifier has been proved to be simple and easy to parallelize, but its disadvantages are also obvious. In the face of more and more complex massive data, the correlation between data features is also very complex. It is difficult for us to use manual feature selection and extraction to design an intelligent feature extraction method - deep learning, and study the construction of classification prediction model and the implementation of algorithm. Through the theoretical elaboration of SDNN model in the above, SDNN model will be constructed and SDNN algorithm will be discussed. SDNN model is different from DNN and can be considered as a lightweight balancing algorithm of DNN. SDNN will be more effective for data with unbalanced categories. The data predicted by CTR has been proved to have the imbalance of College Students' Entrepreneurship and innovation data. According to the practical problems of College Students' entrepreneurship, an improved algorithm of DNN - SDNN will be designed for the background of big data. Calculate the description range of the model and set the algorithm, as shown in the following formulas (8), (9) and (10):

$$E = \sqrt{2W + 1.25} - \kappa \tag{8}$$

$$G = \sqrt{4W + 1.25} - \kappa \tag{9}$$

$$D = \sqrt{6W + 1.25} - \kappa \tag{10}$$

In formulas (8), (9) and (10): E, G and D represent the description range of the model, W represents the execution instruction value of the model, and κ represents the deep learning protocol coefficient. The above calculation shows the flow of SDNN algorithm, and finally obtains the corresponding model processing results to complete the construction of the model.

3 Model Test

The test is mainly to verify and analyze the application effect of College Students' innovation and entrepreneurship competency model under deep learning. The test is divided into two models. One is the traditional regression competency application model, which is set as the test group of the traditional regression competency application model; The other group is the competency model designed in this paper, which is set as the deep learning competency application model test group. The two models are tested at the same time, and the results are compared and analyzed under the same test environment.

3.1 Test Preparation

Select school a as the main target of this model test, and summarize and integrate the innovation and entrepreneurship data information related to college students. Due to the imbalance of the manually summarized data, the SDNN model is constructed according to the redesigned experiment. After resampling, the label proportion of the training data is approximately equal to 1:1. The validation set is divided by 10% on the training set, and the parameters are optimized by cross validation. When the loss function value on the validation set does not change or the change range is very small, the iterative training process is terminated and the model training is completed. Since the data sampled each time are different, so the results of the prediction model are different, we calculate 20 times and take the average value for each method. And set corresponding DNN parameters, as shown in Table 1:

Table 1. DNN parameter setting

Parameter item	Parameter setting	Unit ratio
model structure	2022-1024-1024-800-2	1.25
objective function	Mean_squared_error	0.25
Maximum number of training iterations	200	2
Activation function	Relu	4.25

According to the data information in Table 1, the DNN parameters can be set finally. The depth neural network based on random undersampling of data O 25% of the samples were randomly sampled, and the sampled balanced data set resample_ The DNN model is established on data, and the parameter settings of DNN model are the same as those above.

Based on the training data, random undersampling is carried out, gbdt is used for feature selection, and then the DNN of m-500-500-2 structure is used to mainly represent the feature dimension after dimension reduction. The depth neural network classification prediction is carried out independently, and the parameter configuration of each stage is the same as the above setting in this paper. The parameter setting of gbdt has not changed. Table 1 shows the AUC of various DNNS and their improved methods. After random sampling, the AUC of DNN has been improved. It can be seen that repeated sampling of competency model is of great significance to eliminate the impact of data imbalance on prediction model, and category balanced data can improve prediction performance. Due to the large data scale of the innovation and entrepreneurship competency sample model, only random samples are compared and analyzed this time. In reality, the sampling method will consume computing memory and reduce the speed of the algorithm, so it is not practical. The sampling method based on the similarity between samples will produce a lot of computing work on the computer, which is time-consuming and inefficient. Therefore, the method considering random undersampling is more suitable for the real environment.

In addition, it is found that after the competency model in sampling is associated with the initial processing and analysis model of deep learning, DNN is better than gbdt's DNN, which proves that the deep learning model can mine high-level abstract features between features, and gbdt's feature selection is slightly underperformed because its shallow pattern can only mine shallow information. DNN has the performance of automatically mining feature meaning. Due to its hierarchical feature abstract expression ability, DNN shows strong feature mining ability, which is better than the prediction effect of shallow learning.

After completing the construction of the above model test environment, it is necessary to set the corresponding test equipment and corresponding index parameters. The experiment runs in a 64g memory, 2.25 GHz processor, the operating system is random, and the experimental programming tool is Python 2.6. In the construction experiment of CTR college students' innovation and entrepreneurship competency model with shallow learning, the experiments of logistic regression, decision tree and gbdt are completed based on Python's scikit learn machine learning library, and the experiments of neural network based on theano's keras library. The sampling algorithm in the CTR prediction experiment of deep learning is completed based on Python's balanced learning library, the design experiment of DNN is completed based on theano's keras deep learning framework, and the main experimental platform is GPU cluster. Complete the above test preparation, check whether the test equipment and environment are in stable operation state, and there are no external factors affecting the final test results. In order to ensure the fairness of the experiment, it is necessary to set the same experiment to swap in, and start the test after completion.

3.2 Test Process and Result Analysis

Through the above built model detection environment and test equipment, then start the test. Through exploratory factor analysis and confirmatory factor analysis, this paper determines the entrepreneurial competency model of college students. The survey objects of College Students' entrepreneurial competency are college students, but these college students also have more or less differences, such as gender, age, education and major. In order to further explore the impact of different groups of college students on the evaluation of College Students' entrepreneurial competency, this chapter tests the difference of the mean by taking the four factors of gender, age, education and major as independent variables and the five factors of College Students' entrepreneurial competency index as dependent variables.

In school a, 100 boys and 100 girls are selected as the test objects to test whether there are differences between men and women in the evaluation of College Students' entrepreneurial competence, and set the corresponding test standards, as shown in Table 2:

Table 2. Test standard setting table

Competency standard indicators	Mean difference	DF	Mean square deviation	Significant range	Change ratio
Conceptual power	0.25	4.2	5	1– 2.5	0.32
Opportunity power	0.34	4.16	4.5	1– 3.5	0.21
Organizational power	0.42	5.21	5.05	0.21– 4.25	2.1
Innovation	0.51	4.15	4.31	1– 0.68	0.11
Achievement ability	0.44	4.31	3	0	0.326
Guiding force	0.61	3.19	4.56	1.5–6.25	0.219
Comprehensive analytical power	0.65	4.2	5.65	2 –10.25	0.3

Complete the settings in Table 2 above, conduct actual tests, and compare and analyze the test results, as shown in Table 3:

Table 3. Comparison and analysis of test results

Test group	Normalized completion ratio of traditional regression competency application model test group	Normalized completion ratio of Deep Learning Competency application model test group
Test group 1	85.21	90.42
Test group 2	73.16	94.16
Test group 3	70.54	95.17
Test group 4	76.43	92.33
Test group 5	72.25	93.15

According to the data information in Table 3, the actual test results can be obtained, as follows: in the same test environment, compared with the traditional regression competency application model test group, the final normalized completion ratio of the deep learning competency application model test group designed in this paper is relatively high, indicating that the effect of this innovation and entrepreneurship competency model is relatively good, At the same time, it has stronger stability and comprehensiveness, and has practical application value.

4 Conclusion

To sum up, it is the design and analysis of College Students' innovation and entrepreneurship competency model from the perspective of deep learning. Through research, investigation and interview, this paper constructs the entrepreneurial competency model of college students, and the research hypothesis is verified. The competency model obtained in this study includes four competency characteristics: craftsman spirit, personality characteristics, market potential and entrepreneurial spirit. The weight of the four characteristics is determined. The results show that personality characteristics have the most far-reaching impact on College Students' entrepreneurial competency, followed by entrepreneurial spirit. Market potential and craftsman spirit need to be strengthened. This paper discusses the influencing factors of College Students' entrepreneurial competence. From the perspective of internal factors, gender, age and professional knowledge all have more or less influence on the exertion of College Students' entrepreneurial competence; From the perspective of external factors, region, family support, socio-economic status and school education have an impact on College Students' entrepreneurial competence, while family income has no impact on College Students' entrepreneurial competence. Improve the overall entrepreneurial quality level.

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