Numerical simulation of deep learning algorithm for gas explosion in confined space

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Abstract: With the continuous innovation and development of science and technology, the use of digital Internet and computer and the application of scientific algorithms is becoming more and more extensive. With the development of the computer information technology revolution, various Internet information has been widely spread and developed. According to the data information transmitted above, various intelligent algorithms can be found in the data information network. Based on the depth learning algorithm, the simulation model of the numerical value of gas explosion in restricted space was studied and explored in this paper. The solution of practical problems can be achieved by building a function information model. In this paper, the deep learning algorithm and the various utilization and calculation methods of deep learning algorithm were introduced.

1. INTRODUCTION
Under the impetus of the revolution of science and technology, the development of computer algorithm is getting faster and faster. The computer algorithm can be used to simulate many kinds of experimental forms. The calculation model and the final result can be obtained by the unpractical experiment(Xu Y Let al 2016) [1]. In the process of simulation, what we can find is that the computer algorithm has a natural help to build the computing environment. According to the continuous interpretation and research of the algorithm model, the numerical simulation model of gas explosion in restricted space is built for the depth learning algorithm (Kaloudis Eet al 2016) [2]. The study of gas explosion in confined space is to study the possibility of gas concentration and gas explosion in the closed space of the mine or underground construction. The possibility of the possible explosion in the closed space is deduced according to the concentration of gas data (Zheng Cet al 2016) [3]. On the basis of the morphological simulation of different data models, different airtight spaces produce different simulation results. The gas concentration in the restricted space has a very high correlation performance. According to the precise operation and data matching, the difference between the gas concentration retrieval method in the first space and the actual retrieval method can be found (Sung K Het al 2016) [4]. According to the research data, under the confined space, the structure stability is not good and the gas explosion accident is easy to happen. Therefore, in the process of research, we should focus on improving and dealing with the problem of gas concentration and gas explosion. This is the key to our current work (Li Let al 2016) [5].
2. STATE OF THE ART
At the end of the last century, a series of intelligent data algorithms have come into being. These intelligent data algorithms are based on the retrieval and processing of some of the factors and the basic content of the data (Yousefi-Lafouraki et al 2016) [6]. The key global information operation in the data influencing factors is found. According to the model foundation, the characteristics of the data model are found to describe the influence of gas concentration on the possible height of gas explosion in confined space (Loft N J et al 2016) [7]. In observing this part of the search information, for data mining computing algorithms, the realization of the subjective data impact and the exclusion of factors is a problem to be overcome in front of us (Zanotti et al 2016) [8]. As to the speed of data removal and influencing factors of intelligent algorithms, the operation of intelligent data algorithm is more simple than that of our human beings. However, the depth learning algorithm in it makes global observation and analysis of the research graphics and research data functions. According to the results of observation and analysis, the problem of building the actual model in the learning algorithm is found. In the research process of the depth learning algorithm, the construction steps and the construction process of the neural network algorithm are mainly used to consider the data to eliminate the influence of the interference. In the use of a human brain-like processing and operating system (Feldgun V et al 2016) [9]. There are many advantages and advantages of the traditional computing algorithm, which can solve the actual factors that face the model and influence (Michael et al 2016) [10]. The foundation of deep learning algorithm is to reduce manual training and use computer algorithms to perform operations.

3. METHODOLOGY

3.1 Operation process analysis of deep learning algorithm and deep learning algorithm
The research direction of deep learning algorithm is actually using deep learning theory to study the construction and integration of arithmetic models. The artificial intelligence algorithm is used to simulate the computing and learning functions of human brain. The computer is given the function of the actual learning and analysis of the problem. In the process of the operation of the depth learning algorithm, the algorithm type and operation order of the depth learning algorithm are considered by using mathematical factors to make a comprehensive comparison and analysis of the data. Combining the theoretical knowledge of the deep learning algorithm, the operation process of the deep learning algorithm can be got. The development of deep learning algorithms originated from Japan. Great breakthrough has been made in technology, and the use of deep learning algorithm in everyday life has begun to be applied in all aspects. The deep learning algorithm can be used to perform comprehensive horizontal operation and result analysis functions. In this paper, a numerical simulation model of gas explosion in confined space is constructed by using the deep learning algorithm. In the process of the actual reference depth learning algorithm, the content of gas concentration in the restricted space is monitored and grasped, and the saturation point of the explosion is the most important aspect of the use of the depth learning algorithm. The successful development of the deep learning algorithm is based on the renewal and perfection of the theory of deep learning algorithm. The guidance and operation experience of the deep learning algorithm have been mastered, which is of great significance to the practical problem of solving the operation and the construction of the data model. In the process of constructing and studying the depth learning algorithm model, the research and analysis of the numerical simulation model of the gas explosion in restricted space based on the depth learning algorithm can be carried out with different function formulas and mathematical calculation models. Considering the problem of data processing, the model and the basic calculation method based on the depth learning algorithm are considered as the steps in the algorithm. In the subsequent improvement steps, the data model and processing problem of the pre designed model algorithm are carried out. The problem of solving the world is regarded as the first problem that the algorithm needs to overcome. This expression can reflect the important characteristics of the depth learning algorithm. The operation feature of the model is as follows.
The depth learning algorithm is an algorithm model that uses a variety of discrimination and understanding measures to make setbacks. According to the operation type of the depth learning algorithm and the classification of data simulation, the difficulty of the overall operation data and operation of the data model algorithm can be reduced. For the operator of the deep learning algorithm, the new algorithm can satisfy the operator's overall operation experience. For the improvement of different operating data, many methods of operation and overall operation test are needed. In the process of developing these deep learning algorithms, the actual operation and test of the algorithm pattern and model are carried out. A variety of physical data need to be used to build the computing process. At the same time, not only the theory of depth learning algorithm and the combination of the data model needs to be updated, but also the solution of the entity model and the updating of the algorithm theory need to be done. Based on the computational data theory of the depth learning algorithm, the analysis and influence process of the operation steps in the depth learning algorithm are carried out. According to the analysis of the overall operation steps in the depth learning algorithm, the steps of the input and output of the algorithm of depth learning algorithm need to carry out the process of continuous operation and process. In the calculation of the depth learning algorithm, the overall data influence and the reference factor of the depth learning algorithm are influenced and analyzed. The decomposition and influence of this part of the algorithm are more important to the influence of the input data of the depth learning algorithm. According to the independent analysis of the depth learning algorithm and the process feedback of the operation, the feedback data factors can be found between the various algorithm types and the calculation results of the algorithm in the depth learning algorithm. Considering the analysis and input process of the feedback data factors and data influence factors, the operation of the model algorithm and function can be carried out according to the various calculation results in the depth learning algorithm. In addition, the deep learning algorithm is decomposed and utilized according to the feedback information of calculation results and calculation factors in the deep learning algorithm. According to the classification of the algorithm model, there is dozens of algorithms for classification. In this paper, because of the limited space, the decomposition process of the depth learning algorithm cannot be analyzed and analyzed one by one. Different algorithms should be used to complete the actual operation process. The calculation frequency and calculation method which consider the depth learning algorithm has different effects on our overall and distribution calculation results. According to the operation and analysis of the information model, the learning structure distribution map of the depth learning algorithm is divided into the following stages.
In the structure diagram of the above learning algorithm, we can learn that the existence of data and influence factors in the depth learning algorithm substitutes and changes the digital meaning of the number and the alphabet representation. According to the different classification numbers and letters, the numbers and letters have different meanings. Under this part of the operation, the impact of the whole data is reflected in the final result. Based on the data model of the algorithm and the result analysis of the operation data degree and influence degree of the alphabet, the problem of the selection of the digital and alphabet influence structure and the data function in the whole calculation process are got. According to the different stratification of selected data functions, the influence degree of different good level data is obtained. The existence of this degree of influence weakens the influence degree data in the depth learning algorithm. The depth learning algorithm becomes more and more complete when the influence degree is more and more perfect. Deep learning algorithm can improve his overall calculation accuracy and data operation ability as much as possible. The research on the use of depth learning algorithms is initially in Japan. Japan has been in the forefront of the world in the intelligent system and intelligent operation model. The content of which includes many aspects, not only the use of data research and use of data and simulation operation.

3.2 Numerical simulation model of gas explosion in confined space based on deep learning algorithm

After the introduction of the deep learning algorithm is completed, an explosion numerical simulation model begins to be built based on the deep learning algorithm. In the process of building the simulation model, the control and selection of simulation model data should be considered, and the selection and control of this part is introduced in detail. The following is the selection and calculation of the simulation data model. After the completion of the computation node, the calculation steps of the depth learning algorithm are carried out according to the actual computing nodes. The detailed steps of the calculation are shown below.

\[
m = \sqrt{n + \lambda + \alpha}
\]  

(1)

\(m\) is the number of hidden nodes. \(n\) is the number of nodes in the input layer. \(\lambda\) is the number of nodes in the output layer. \(\alpha\) is a constant, between 0 and 10. However, the general formula can only
be used as a reference and cannot be used directly. Just give us a range of calculations when making calculations.

The calculation formula of the impulse response function is as follows:

\[ \psi(\tau, \tau_0) = \frac{1}{\sqrt{\alpha}} \psi\left( \frac{t - \tau}{\alpha} \right) = g(t - \tau) e^{-j\alpha} \]  

(2)

In addition, set up \( \alpha = \alpha_0^m, \tau = n \tau_0 \alpha_0^m \), the upper form can be interpreted as follows:

\[ \psi_{m,n}(t) = \alpha_0^{-m/2} \psi\left( \frac{t - n \tau_0 \alpha_0^m}{\alpha_0^m} \right) \]

(3)

A neural network algorithm is called the two algorithms. It is usually used to take \( \alpha_0 = 2, \tau_0 = 1 \) in actual application, which is equivalent to making it discrete on the scale only in the process of filtering continuous neural network algorithm, but its displacement is continuously changed. The two neural network algorithms are shown as the following.

\[ \psi_{m,n}(t) = 2^{-m/2} \psi\left( 2^m t - n \right) \]

(4)

In addition, the calculation of information decomposition is also required. When calculate, the calculation information of the incoming algorithm is decomposed into two forms of high frequency and low frequency calculation. The calculation formula of the decomposition is as follows:

\[ f(t) = f^f(t) + f^d(t) \]

(5)

\( f^f(t) \) in the upper form is low frequency. \( f^d(t) \) represents high frequency. After a brief analysis of the calculation process of the deep learning algorithm, the complete model of the deep learning algorithm needs to be demonstrated.

4. RESULT ANALYSIS AND DISCUSSION

After introducing the basic calculation process of deep learning algorithm and depth learning algorithm, the simulation and analysis of the operation of the depth learning algorithm and the calculation process of the algorithm are the comprehensive effects of the operation of the algorithm data model of the depth learning algorithm and the overall data and the simulation test environment. According to part of operation and analysis process of the deep learning algorithm, the accuracy and the actual reference degree and influence degree are found in the data model. The numerical simulation model of gas explosion in limited space based on depth learning algorithm is continuously compared and analyzed on the basis of the correctness of the final results of the guaranteed depth learning algorithm. The complete data model is shown as follows.
Find the best algorithm model and build the best solution for the centralized test.

Table 1. Test results expected value table

| Status number | Expected output |
|---------------|-----------------|
|               | Y0   | Y1   | Y2   | Y3   | Y4   | Y5   |
| 1             | 0    | 1    | 0    | 1    | 0    | 1    |
| 2             | 1    | 1    | 1    | 0    | 1    | 0    |
| 3             | 0    | 0    | 0    | 1    | 1    | 1    |
| 4             | 1    | 0    | 0    | 0    | 0    | 0    |

In the calculation process of the optimal solution, the following arithmetic calculation and analysis process is made. Under the influence of processing results, part of the data is obtained. This part of the operation data reflects the superiority of the depth learning algorithm that is designed by us, and has a high reference level for the design of the next part of the control test. Use mathematical formula function to compare and select data analysis, and then observe and analyze according to our actual data model. In the process of observation and analysis, we have done a practical research on the overall conversion degree of data. The results of the study are as follows.

Table 2. Optimization algorithm test results

| Status number | The number of iterations | Calculating time | Accuracy |
|---------------|--------------------------|------------------|----------|
| 1             | 5                        | 18               | 85%      |
| 2             | 6                        | 11               | 96%      |
By comparing the data in Table 2 and table 3, the improved algorithm used in this paper greatly reduces the number of iterations we have calculated. The problem of the most common local minimum in the neural network algorithm is solved. The number of iterations is reduced to less than 5 times, and the number of iterations of the traditional algorithm is more than 30 times, which greatly reduces the difficulty of our calculation and reduces the calculation pressure.

Table 3. Test results of traditional algorithms

| Status number | The number of iterations | Calculating time | Accuracy |
|---------------|-------------------------|------------------|----------|
| 1             | 32                      | 55               | 60%      |
| 2             | 41                      | 37               | 73%      |
| 3             | 37                      | 24               | 51%      |
| 4             | 51                      | 52               | 84%      |

In addition, in the calculation, the local minimum of the sixth sets of data in the traditional algorithm leads to the failure of the calculation, but the optimization algorithm does not have such problems. In the process of similar process, the problem of how to improve the computing speed and the overall calculation efficiency in the operation of neural network algorithm need to be solved. The calculation time of this paper is only about 15 seconds, but for the traditional algorithm, in order to show the computational time contrast of our optimized algorithm more clearly, the contrast of the figure 3 in the form of the lower figure is set up.
The information got in the above picture is that after the comparison test of the calculation time, the optimized algorithm reduces the calculation time greatly by reducing the calculation step and reducing the number of iterations, which makes the calculation time of only about 15 seconds under the article. For traditional algorithms, the computation time is generally higher than 40 seconds and the computation time is too long, which show more clearly the computational time contrast of our optimized algorithm.

5. CONCLUSION
With the continuous improvement and perfect of science and technology, the utilization of intelligent algorithm is more and more extensive. In the aspect of model building, the traditional computing algorithms of graphic design and all aspects of life are not suitable for the development of the times. It is necessary to make use of the actual computing algorithm of the Internet to study and deal with the model mode. According to the existing problems and functions in the actual model, the depth learning algorithm we need is studied. The depth learning algorithm proposed in this paper is a bit existing in his ductility and high development ability to meet people's needs and help to provide a lot of technical solutions. The study and improvement process of a depth learning algorithm based on many times of contrast and contrast tests can obtain the accuracy of our calculated and calculate overall data. On the basis of considering the calculation results and calculating the overall accuracy, the target image updating and management of the intelligent data model algorithm is completed. In the research process of deep learning algorithm, the overall accuracy of the algorithm is better than that of the deep learning algorithm. For the study of computer without contrast, the computation time is saved. This is the focus of our research and development in the future. Although there are still some problems in the deep learning algorithm proposed in this paper, we can improve it step by step through continuous improvement.

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