Research on the Construction of Artificial Intelligence Platform Based on Cloud Edge Collaboration

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Abstract. In order to solve the problem of poor operation effect of traditional artificial intelligence platform, a cloud-based collaborative artificial intelligence platform construction and design method is proposed. The platform operation efficiency is improved by optimizing the cloud edge cooperative integration architecture and improving the platform configuration function. At the same time, the cloud-side collaborative data edge algorithm is optimized. Through denoising, clustering and iterative processing of data information, the interference noise in the data processing process is eliminated, and the problem of poor data effect is solved, thus ensuring the stable operation of the cloud-side collaborative artificial intelligence platform. Finally, the experiment proves that compared with the traditional intelligent platform, the operation effect and efficiency of the cloud-based collaborative artificial intelligence platform are obviously improved, which fully meets the research requirements.

1. Introduction
With the advent of the big data era, information has increasingly become the competitive capital of the current development of enterprises and society. Therefore, the design of data processing platforms has become the focus attention of various industries. Therefore, a method of constructing an artificial intelligence cloud platform based on the principle of cloud-side collaboration is proposed, and the value of data features is obtained through the integration and clustering of multi-dimensional data features [1]. Data processing platform through in-depth processing of the data, reduce data interference, clear data noise, and reduce abnormal data values. Finally, the cloud-side collaborative data is refined and transformed through deduction, comparison, and induction, and stored in the platform knowledge base, in order to make task decision on the data, realize the effective processing and storage of the data, and realize the optimized design of the artificial intelligence cloud platform for cloud side collaboration.

2. Construction of Artificial Intelligence Cloud Platform

2.1 Cloud Edge Collaborative Integration Architecture
In order to better realize the design of artificial intelligence cloud platform, the cloud edge collaborative integration structure is optimized. The main structure includes: cloud edge collaborative CNC pre-processing module, cloud edge collaborative data conversion module, cloud edge collaborative data storage module, cloud edge collaborative data computing storage module, etc. the specific module functions are as follows:
1. Cloud-side collaborative data processing module: This module mainly pre-processes the data by
combining hive software, builds a good data knowledge map, constructs the pre-conditions of multi-source domain data, and analyzes and extracts the original data feature situation according to the pre-conditions [2].

2. Cloud-side collaborative data conversion module: After completing the pre-processing of the cloud-side collaborative data, the original data situation is transformed. Combine the principle of Apache Spark to transform the structured and semi-structured raw data, standardize the execution method of the transformed data information, and improve the graph structure of the data [3-4].

3. Cloud-side collaborative data calculation storage module: Optimize the data collection and dispersion method by combination with MLlib custom algorithm, obtain the triple data structure, and classify the dynamic characteristic attributes and relationships of the data. The specific classification criteria are shown in the following table:

| Field Name  | Types of  | Allow empty | Description               |
|-------------|-----------|-------------|---------------------------|
| Admin ID    | Var Char(64) | -          | PK from Shizeng type      |
| Admin Name  | Var Char(104) | Yes        | Admin username            |
| Admin PWD   | Int       | Yes         | Admin password            |
| User Area   | Var Char(214) | Yes        | User Province             |
| User Question | Int     | -          | Security Question         |
| User Address | Author 2.0 | Yes        | User mailing address      |
| User Email  | Int       | -          | User email                |
| Pest WHSQ   | Author 2.4 | Yes        | Endangered period         |
| Pest Pic    | Var Char(1014) | Yes      | relative path             |
| Syfa        | Int       | -          | method                    |

After the optimization and construction of relevant models, the cloud edge-side integration collaborative architecture is further improved, and the entity, relationship and static characteristic properties of data are optimized by combining H-base dynamic attributes. The specific cloud edge-side collaborative integration architecture is shown in the figure below:

![Fig. 1 Cloud Side-End Collaborative Integration Framework](image-url)
Good cloud data based on the above framework is set up. After the acquisition of the original data, the missing segment, abnormal characteristic value and data error rate of the stored data were optimized by combining with HDFS calculation. The data feature table belongs to the feature consistent processing structure, as shown in the figure below:

Fig. 2 cloud edge cooperative anomaly data acquisition structure

In the above steps, the application platform is mainly responsible for the selection of the cloud-side collaborative data. After the effective selection of the data is completed, the relevant characteristic data of the pre-guided information items are adjusted to extract valid data for processing [5]. At the same time, based on the functions of the traditional artificial intelligence cloud platform, a model optimization module is proposed to realize the algorithm while adapting to the hardware conditions of the edge chip while ensuring accuracy [6-8]. With containerized packaging, users use docker images to download and deploy, which improves user deployment efficiency and enhances the reusability of the model on the basis of ensuring security.

2.2 Cloud edge collaborative data edge algorithm

Because in the process of data collaborative processing, data items have different measurement standards and measurement units, it is easy to cause the lack of clarity of the data set. Therefore, it is necessary to further normalize and integrate the data and clean the integrated data in order to process the data Handle the vacancy value, abnormal value and noise value of the operation, and the specific steps are shown in the following figure:

Fig. 3 Cloud Edge Collaborative Data Cleaning Process

Cleaning the data based on the above steps can effectively remove noise, correct data deviations, and implement discretization and clustering of chaotic data [5]. In order to better ensure the validity of the data, after the processing of the cloud-side collaborative data is completed, the measured data deviation noise value is discretely processed. The specific processing method is as follows:
Let $S_n(x, y)$ is expressed as the numerical transformation threshold during data transmission, and $r(x, y)$ is the frequency of data change in the case of noise interference. $K(x, y)$ is a known transformation value, and the discrete value of cloud-side collaborative data is calculated by combining the principle of direct averaging. The specific algorithm is:

$$E = \begin{cases} S_n(x, y), & 0 < x \leq 1, 0 < y \leq 1, \\ 0.5 \cdot [r(x, y) + K(x, y)], & x \geq 1, y \geq 1 \\ S_n(x, y), & x \neq 0, y \neq 0 \end{cases}$$

(1)

If $(i, j)$ is the fused data set of abnormal data, the point $R_2$ is the area where the two images overlap; $N$ is the discrete category of the data, $F(n)$ is the median of the discrete data, and $M$ is the average value of the data within the group where $G$ is the discretized boundary value of the abnormal data, and $L$ is the final value of the data, the average curvature, Gaussian curvature, and fitting curvature of the data are calculated in combination with the smooth data difference characteristics. The specific calculation method is as follows:

$$H = \lim_{n \to \infty} \frac{EN - 2FM + GL}{2[Eg + f(n)]} + 1$$

(2)

$$P = \sum H(i, j) - \frac{(LN - M)^2}{[Eg - f(n)]^2}$$

(3)

$$Z = \iint (G^2 - H - P) \frac{2EP*[f(n) - 1]}{[f(n) - 1]^{3/4}}$$

(4)

Cluster analysis is performed based on the above discrete values to obtain the normal cloud-side collaborative data cluster $B$ and the discrete noisy data cluster $A$ for specification. Let $W$ be the partial differential value generated during the discrete process, and $Q_1$ is the first in the clustering process. A basic invariant value, $Q_2$ is the second basic inconvenient value, then the clustering algorithm is:

$$\lambda = \sum AQ_1 \sum BQ_2 \lim_{n \to \infty} \frac{w - 1}{2(HP - Z)^{3/4}}$$

(5)

After the cluster calculation of the cloud-side collaborative data is realized, the fuzzy sets of different data categories are defined [9]. Let the edge fuzzy set of the corresponding output data be $\mu$, then the algorithm of the edge function of the data is:

$$I(t) = \lambda \lim_{t \to \infty} \frac{1}{2} O(t)$$

(6)

Furthermore, the edge information entropy of cloud edge collaboration data is calculated, and its expression is as follows:

$$H(\mu) = \lim_{t \to \infty} \left(\frac{1}{\lambda \ln 2}\right) \sum \lim_{t \to \infty} [O(t) - I(t) - 1]^{r^{-1}}$$

(7)

Based on the above algorithms, clustering processing of cloud-side collaborative data can be effectively implemented, so as to achieve edge computing of the cloud-side collaborative platform, thereby ensuring the effective operation of the platform [10-11].

2.3 Analysis of related diversification strategies

In order to better realize the specific application scenario of optimized deployment of cloud server and edge server models, the cloud-side collaborative intelligent platform is further optimized and designed [12]. Combined with the previous algorithm to further iteratively process the data, as the number of
iterations continues to increase, the platform data debugging parameters will also continue to increase, and at the same time, the amount of data calculation and re-diagnosis will be increased. The platform runs the edge data set for calculation. The specific algorithm is as follows:

\[ \begin{align*}
U_1 &= H(a)(i'_1, j'_1)E - wI(t) \\
U_2 &= H(a)(i'_2, j'_2)E - wI(t) \\
U_3 &= H(a)(i'_3, j'_3)E - wI(t) \\
\vdots \\
U_n &= H(a)(i'_n, j'_n)E - wI(t)
\end{align*} \]

\[ \omega = \begin{bmatrix}
U_1 \\
U_2 \\
U_3 \\
\vdots \\
U_n
\end{bmatrix} \quad (8) \]

Based on the above algorithms, the platform is further optimized to construct a knowledge graph, and to implement data processing services based on natural language and JAVA language [13-14]. Optimize the platform software in combination with the principle of decision tasks, improve the improvement of the WEB interface, and facilitate users to more quickly implement related processing tasks such as information extraction, knowledge fusion and data update. Specific platform WEB interface intelligent decision task framework is as follows:

![Fig. 4 Platform WEB Interface Intelligent Decision Task Framework](image)

Based on the platform WEB interface intelligent decision task framework, the cloud side collaborative data is combined and arranged, and the service components are optimized through the browser [15]. Retrieve and configure the original feature information, define and simulate the configured information, generate a JSON file for information storage processing, and annotate the logic logic script to form an information processing service process.
Based on the above process, and further combined with OLTP online operation processing technology to output the acquired information data and process the accounting data, in order to solve the problem of low operating efficiency of the traditional platform, Map Reduce technology was introduced to integrate the collected information features [11]. Multi-task assignment output is performed according to the characteristic data to form a personalized report to ensure comprehensive rejection analysis of the data [12]. Based on the above steps, a reasonable design of the cloud-side collaborative artificial intelligence cloud platform can be effectively realized.

3 Analysis of results

In order to verify the actual operation effect of the artificial intelligence cloud platform coordinated by the cloud, a comparison test is performed in combination with the traditional platform. To ensure that the test results are really effective, the experimental environment and parameters are set uniformly.

3.1 lab environment

To ensure that the experiment runs reasonably, an AWS-Web server, Intel-X (R) CPU @ 2.4 GHz is selected. The operation of the device selected the 80-Power-Edge-2.2.1 Node version operating system. The system client selected the Mac Core High Sierra 4.4.1 operating system and selected a 64-bit browser for retrieval. The number of cloud-side collaborative data connections is 60DDT, the built-in devtool FPT measurement tool, and the HTMLS laboratory LAN and Performance-2.2 device front-end interfaces.

In the above environment, further set the experimental parameters uniformly, as follows:

| Test content | Detection Indicator                                                                 | Risk Analysis                                         | Program                                      |
|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------|
| Features     | The degree of data integration, the intelligence of each module of the platform, the three-dimensional degree of decision analysis, the dynamic degree of data access rights and confidentiality of data operations | Permission control program, file system encryption, storage encryption |
3.2 Experimental results

Under the above experimental environment and parameters, compare the operating results of traditional cloud platforms with the collaborative effects of the artificial intelligence cloud platform proposed by this paper. In the experimental detection process, the higher the degree of integration of the platform, the higher the platform's operating efficiency and its decision. The higher the degree of three-dimensionality, the better the platform's operating effect. On this basis, the integration degree and decision-making three-dimensional degree of the two platforms are compared and tested. The specific test results are as follows:

Fig. 6 comparison test results
3.3 Experimental results

According to the above test results, the A curve is the detection result of the cloud side collaborative artificial intelligence cloud platform, and the B curve is the detection result of the traditional platform. It can be seen that the cloud side collaborative artificial intelligence cloud platform has a degree of integration and three-dimensional decision-making during operation. Significantly it's higher than traditional platforms. With the increase of the running time, the two detection curves of the collaborative artificial intelligence cloud platform have obvious regional upward trends. However, the disadvantage is that the rising values of the two curves are difficult to maintain stability. However, if the traditional platform is operated for more than 80 minutes, its two curves show a clear downward trend, which shows that the edge collaborative artificial intelligence cloud platform has higher use efficiency and fully meets the research requirements.

4 Concluding remarks

Through the analysis and research on the operation of the traditional artificial intelligence cloud platform—the current platform's data collection effect is poor and the operation efficiency is poor, targeted optimization and improvement are made. A design method of artificial intelligence cloud platform for cloud-side collaboration is proposed, so as to meet the correlation analysis of massive data, collect data characteristics, and create data value. The goal is to improve platform operating efficiency and reduce enterprise application costs. Finally, it was confirmed through experiments that the cloud-side collaborative artificial intelligence cloud platform has higher effectiveness and accuracy in the actual application process. Compared with the traditional platform, it can better meet the research requirements.

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