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Retraction

Retracted: A Study of Industrial Convergence in the Context of Digital Economy Based on Scientific Computing Visualization

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] S. Zhou, X. Yang, and Z. Liao, "A Study of Industrial Convergence in the Context of Digital Economy Based on Scientific Computing Visualization," *Mobile Information Systems*, vol. 2022, Article ID 4025875, 12 pages, 2022.

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Research Article

A Study of Industrial Convergence in the Context of Digital Economy Based on Scientific Computing Visualization

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With the rapid development of computer hardware and software and the rapid spread of network, the amount of data in scientific computing has exploded. Big data visualization has become one of the important research contents in scientific computing. Against the background of rapid development of information technology and digital technology, the scale of digital economy is increasing day by day, and China's digital economy has ushered in unprecedented progress, and it has become an important force in leading economic development. The development of digital economy promotes industrial upgrading and transformation and facilitates industrial integration, and many traditional industries have given rise to a series of new industries. Scientific computational visualization is a new research discipline with a wide range of applications, including energy surveying, natural sciences, finance, and business. However, as a brand-new discipline, further research is needed in areas such as the application of scientific computational visualization techniques based on the digital economy environment. In this study, we propose a scientific computing visualization approach based on a big data framework for industry convergence analysis in the context of digital economy, which consists of a cloud computing platform for industry convergence in the context of digital economy by integrating neural networks in the platform, and scientific computing visualization by built-in GPU hardware. Traditional research methods for scientific computing visualization are discussed, and algorithms and techniques are classified in terms of the types of data domains studied. Finally, the further development and research directions of scientific computing visualization in the big data environment are given in conjunction with the main theoretical and application results achieved by our group in scientific computing for the field of big data visualization. Scientific computing visualization will not only promote the development and application of cutting-edge information technology, like cloud computing, big data, cyber security, artificial intelligence, computational science, system theory, and so on, but also bring a unique and disruptive development and change to the industrial integration in the context of digital economy.

1. Introduction

With the rapid development of information technology such as artificial intelligence, big data, cloud computing, and Internet of Things, traditional industries and economic development have stepped into the digital era, and digital technology is driving the development and change of traditional industries and economy, and digital economy is also regarded by countries as an important driving force to stimulate economic growth. Under the impetus of digital economy, the solid barriers between traditional industries have loosened, and different industries collaborate and promote each other, making industrial integration an inevitable trend. At the same time, industrial integration is also abstract: With the development of digital technology, digital economy is regarded by many countries as an important source of motivation to promote economic growth and optimize industrial upgrading. In recent years, China's economy has been in a period of deepening reform and industrial upgrading and change, and General Secretary has emphasized the importance of digital technology and digital economy on many important occasions. This study takes the digital economy as the entry point, and from the perspective of universality, through the method of logical rehearsal and reasoning analysis, it studies the promotion mechanism of the digital economy in the four directions of technology integration, market demand, scope economy, and external control for industrial integration [1–3]. Key words such as digital economy, industrial integration, and integration mechanism have become important driving forces for the development of traditional industries and economic growth and can effectively promote the optimization and upgrading of economic structure, which is the key to start the "new cycle" of Chinese economy. To sum up, the study of the digital economy on the promotion mechanism of industrial integration can provide certain theoretical value for promoting industrial upgrading and optimizing economic structure. Industrial integration was first proposed in 1963, and technological innovation has gradually blurred industrial boundaries, which in turn has led to industrial integration [4–6]. After the concept of technology-based industrial integration was introduced by means of three overlapping circles (three circles representing computer industry, broadcasting industry, and printing industry), all circles began to pay extensive attention to industrial integration. The definition of industrial integration has also formed a more unified view. Most of them believe that industrial integration is a cross-industry economic phenomenon, which refers to the process of mutual extension, penetration, and integration of different industries or different subsectors within the same industry to gradually form new industries due to technological innovation, demand pull, shared resources, and relaxed regulation. A schematic diagram of the integration of digital economy and multiple industries is shown in Figure 1. The types of digital economy and multi-industry integration mainly include service and agriculture integration, industry and agriculture integration, industry and service integration, and multi-industry integration. Among them, industry-services integration is the most important type of integration.

Scientific computing visualization can use the technology of computer graphics and image processing to display the data information in scientific computing visually and graphically through graphics or images, and it is a method and technology of interactive processing [7, 8]. In today's rapid development of science and technology, the meaning of scientific computing visualization has become more and more extensive, and the visualization of scientific computing also includes the visualization of engineering computing data, and the technology of scientific computing visualization is an emerging technology that has developed rapidly. This technology is closely related to virtual technology and digital technology, and so on. How to process a large amount of data is the difficulty and challenge that people need to face. This study proposes a scientific computing visualization method on the framework with big data for the analysis of industrial convergence in the context of digital economy and gives the further development and research direction of scientific computing visualization in the context of big data. The main contributions of this study are as follows. (1) A scientific computing visualization method for industry

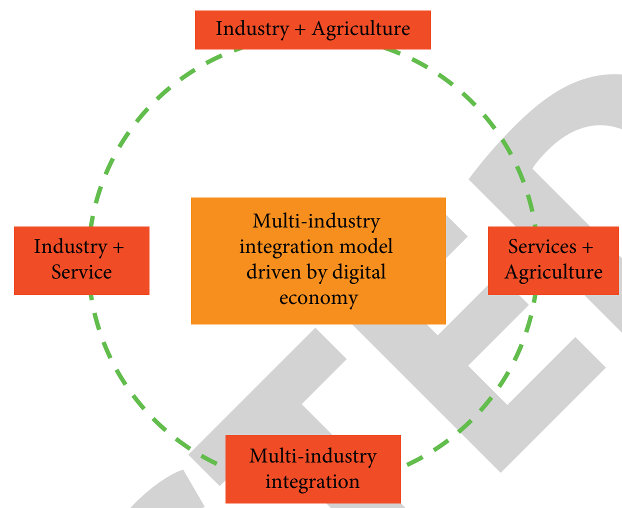

Figure 1: Digital economy and multi-industry integration diagram.

convergence analysis in the context of digital economy based on the big data framework is proposed. (2) Traditional scientific computing visualization research methods are discussed, and algorithms and techniques are classified in terms of the types of digital economy fields studied. (3) Further development and research directions for scientific computing visualization of industrial convergence in the context of the digital economy in the big data environment are given, combined with our main theoretical and application results achieved in the field of scientific computing big data visualization.

2. Related Work

2.1. Scientific Computational Visualization. The field of application of scientific computational visualization is very wide, and its applications in the fields of medicine, geological exploration, weather forecasting, and other scientific fields are very numerous. Applications in medicine in the process of disease diagnosis, MRI images, and computer scanning techniques are very widely used [9]. However, for many medical devices, due to the limitations of these devices, only two-dimensional images of the human body are available. For doctors, it is often very difficult to determine the specifics of a patient's condition with the help of two-dimensional images alone, which can cause a lot of problems in treatment. In the process of scientific computational visualization, a three-dimensional form can be obtained from a two-dimensional image, and then a three-dimensional image can be obtained through computer assistance. Based on this, doctors can then perform surgical treatment of the patient's lesion, which becomes much easier with the aid of computer simulation. For example, in children, dysplasia is a disease with a high incidence, and it is often prone to some errors when corrective surgery is performed. If a three-dimensional image of the hip joint is obtained by computer construction with the help of visualization technology, it is possible to perform computer simulation of the cutting site and shape [10]. Before surgery, the best surgical plan can be implemented after computer simulation of multiple options. *Application in Geological Exploration*. In China, the search for oil deposits is a long-term strategic task. The search for oil deposits cannot be done without geological exploration techniques. In the process of searching for oil deposits, with the help of geological exploration, we can better understand the geological structure, discover oil-bearing structures in time, analyze logging data, understand the stratigraphic structure, and clarify the reservoir situation so as to measure the number of reserves and exploration value [11]. In the process of geological exploration, a large amount of geological data and logging data can be collected, which are unevenly distributed, so it is difficult for us to analyze them by paper and pen. With the help of visualization techniques, we construct contour surfaces and contours that help professionals to process the raw data by showing their ranges and movements, using different colors to represent the parameters and relationships [12–14]. Through the application of this technology, the volume of operations will be significantly reduced and will also save money and increase the efficiency of finding oil deposits, which will be of great benefit to the economic efficiency of our oil. The science and technology visualization application is shown in Figure 2.

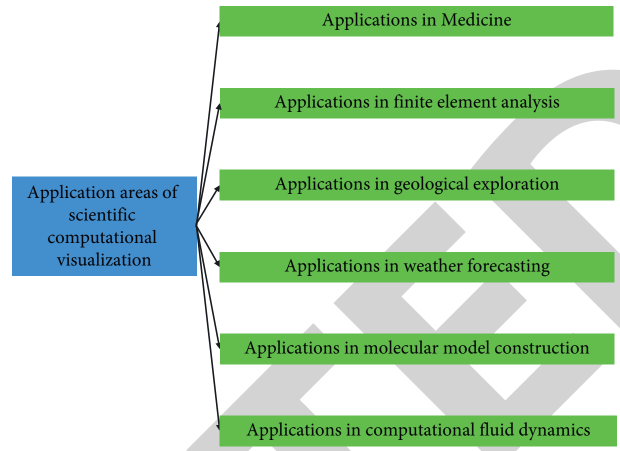

Figure 2: Schematic diagram of the application of science and technology visualization.

Application in Weather Forecasting. In weather forecasting, the accuracy of weather forecasting is greatly related to the calculation and processing of data. Through the visualization of scientific calculations, weather forecasters are able to transform data into graphic images, and by displaying these images on a computer screen, it is possible to make isobars, isothermal surfaces, and potential vortices visible, while the size and direction of storm areas and winds can also be displayed [15–17]. In this way, forecasters are able to make weather forecasts more accurate. In addition, after processing the weather monitoring data and calculation results, the global temperature, pressure, and rainfall distribution can be displayed in front of the weather forecasters through images, making it easier for forecasters to predict the weather conditions. The application of molecular model construction to the observation of complex chemical substances through interactive graphical generation techniques originated in the 1960s. Currently, the technique is widely used in academia and industry. With the aid of scientific computational visualization techniques, the construction of molecular models is transformed. Previously considered complex by a wide range of researchers, this method is now one of the very important methods for analyzing and designing molecular structures. For example, scientific computational visualization techniques, when combined with computers, allow for the construction of highly complex molecular structures.

Application in Computational Fluid Dynamics. When designing the shape of objects such as aircraft, it is important to take full account of the effects of the environment in which gases and liquids move at high speeds. *Application in Finite Element Analysis*. Finite element analysis is a numerical computational method introduced in the 1950s [18–20]. Finite element analysis is very widely used in structural analysis. This method is one of the powerful tools in computer-aided design and has been widely used in aircraft design and mechanical product design, and even in stress analysis of building structures. From a mathematical point of view, finite element analysis is able to decompose the object of study into multiple subunits. Based on this, the results are obtained through the solution of partial differential equations.

2.2. Digital Economy and Industrial Integration. With the development of digital economy, digital technologies such as big data, cloud computing, artificial intelligence, and so on are occurring in different industrial fields with extensive penetration and application, such as vehicle networking, smart city, unmanned supermarket, smart logistics, and so on. Digital technologies have become the key and universal technical means for different industries, which in turn form the technical integration between industries [21]. Technology fusion will gradually eliminate the technical barriers between industries, make the technology and process between different industries gradually homogenize, substitute, or correlate, realize the related technology and process widely used in the secondary and tertiary industries, and then change the technical characteristics of products and services and the way of value realization, prompt the original industrial sector to replace, and finally blur the boundary between different industries and form the fusion between different industries. At the same time, digital technology is widely used in the collection, processing, transmission, and storage of information. On the one hand, digital technology gradually integrates independent information dissemination forms, such as TV, telephone, fax, and network into one; on the other hand, digital technology digitizes different information carriers, such as text, image, audio, and video, making information structure change and giving birth to new information platforms and new ecology of traditional enterprises' phantomization [22]. The new platform and new ecology prompt traditional enterprises in the supply chain, research and development, production, sales, after-sales and other links of continuous synergistic development, and enterprises in different industries make full use of their relative advantages, integration and configuration of resources, technology, and so on, adjust the original production cooperation and business services, change the traditional industrial organization form, and develop new industrial models and business models to achieve the integration of different industries.

The digital economy is conducive to the realization of scope economy. The net income obtained by enterprises through cross-industry cooperation is called scope economy. The promoter and main body of industrial integration is enterprises, and the nature of enterprises is to chase profits, and only when enterprises can obtain net income through cross-industry operation and make their profits increase, enterprises will choose cross-industry operation and thus promote the integration between different industries. Under the role of digital economy, many production factors of enterprises have been digitized, and the application of digital technology has improved the supply chain of enterprises, which has lowered the supply cost of enterprises. At the same time, the digital economy has given rise to personalized and diversified demands from consumers and the market, driving enterprises to diversify their products and services and business methods and pursue economies of scope. Driven by both cost and demand, the economies of scope brought by the digital economy can strongly promote enterprises' cross-industry operations and industrial integration [23].

3. Methods

3.1. Model Architecture. The macroeconomic visualization decision support platform is built from data mining and analysis to knowledge understanding and then to the valorization and wisdom of data resources, providing a general, open, dynamic, and all-round data deep integration auxiliary decision support model with flexibility and scalability. The overall framework of the platform is shown in Figure 3. The proposed big data platform consists of display module, cloud network, data fusion features, and database.

3.2. Technical Support

(1) The metadata system throughout the whole process establishes metadata systems, such as indicators and codes based on the actual needs of the business, organizes indicator data by the data resource construction link, builds thematic analysis through the current economic hotspot analysis service management function, selects data analysis templates, circles the scope of indicators, and finally presents data analysis visualization services, which can switch indicators, codes, and other metadata. Through this kind of analysis and trial calculation, we can explore data application and realize visualization scenarios.

(2) The metadata system is the basis of data "resuscitation" to form the data resource system. The fundamental purpose of "resuscitation" is to prepare data on different business objects, business entities, and business elements, so as to use the metadata system for unified organization and management, realize the correlation application between data, and "assemble/invoke" the corresponding data instances (data resources) through resource management means. The corresponding data instances (data resource system) and service instances (service resource system) are designed and implemented on this basis so as to bring better applicability, scalability, and configurability for the deep integration of data and business.

(3) Data visualization to knowledge visualization: data visualization is technically more advanced method while knowledge visualization analysis is built based on data visualization, combined with business understanding, data perception, interactive operation, exploratory analysis of the impact of business changes on data, and prediction of future data changes. The data visualization technology used in the construction of this platform is mainly to organize the structured or unstructured data with the help of graphical means and present them in the form of graphics plus data coexistence, from time and space dimensions, so that users can understand the data changes and analysis of key analysis elements to achieve the effect that a picture is worth a thousand words.

3.3. Technical Realization. The full name of J2EE is Java 2 Platform Enterprise Edition, and as a whole, J2EE is the industry standard for developing enterprise-class applications using Java technology that can be used for big data platform development. The system construction takes into account the economic and social benefits and adopts an evolutionary construction method under the condition that the demand and effective technology are fully analyzed. The results of this phase plan the technical architecture of the platform on the basis of the first phase construction. The platform as a whole adopts J2EE standard technical architecture, carries out appropriate extensions, and integrates big data application, artificial intelligence, visualization, and other technologies to realize data visualization to knowledge visualization iteration.

(1) *J2EE Standard Technical Architecture*. J2EE has the features of fully integrating existing resources, supporting efficient development and heterogeneous environment, and so on. The main technical tools include ETL synchronization tools, import of database DMP files, and processing of CSV-like structured data files. Data layer: This system plans the technical framework of business big data storage and service and uses big data processing technologies, such as HBase, to handle unstructured data, mass data storage and management, and also uses graph database to handle the relationship between data and pictures to build a basic-level knowledge graph application. Data access layer: The data access layer is

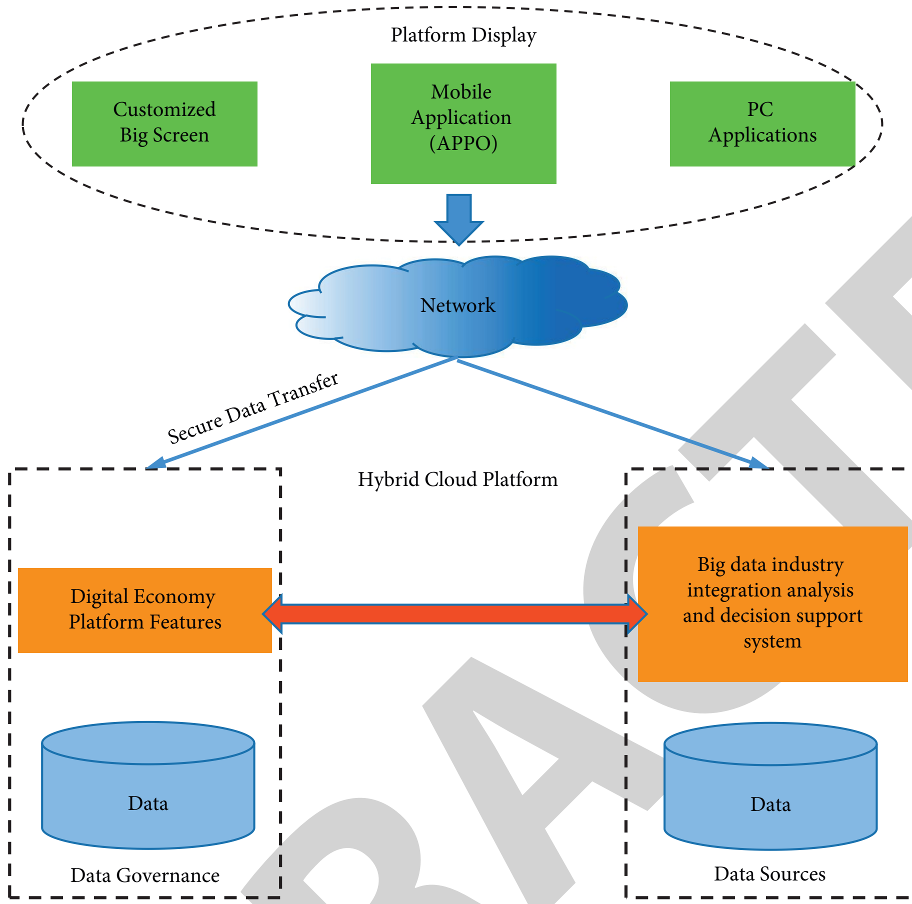

Figure 3: Schematic diagram of the model architecture.

the link between the business logic layer and the data layer, realizing the storage and reading of data. The system designs a unified data access interface, which supports both Spring JDBC way to interact with relational database and plans data access under the big data framework. Business logic layer: The business logic layer is responsible for system business logic control and processing of inputs during system interaction. The system is designed with business service management, computing resource services, unified resource scheduling, and third-party system interface modules to ensure the flow of business services, meet the needs of data computing, realize the scheduling of internal and external resources, and serve the third-party system interface requirements. Presentation layer: The system presentation layer design not only adopts mainstream UI frameworks, including Bootstrap, Framework, and jQuery, but also applies GIS presentation services and data presentation components to provide friendly support for business visualization and enhanced analysis page support.

(2) *Key Technology: Big Data Technology*. It aims to use the data involved with a certain scale, complex frequency, mixed relationships, dynamic and continuous, and variable, to achieve data capture, storage, distribution, refinement, integration, and analysis within a reasonable time and to extract valuable analysis points from them through scientific calculation methods for assisting and optimizing decision-making. The features are classified according to the learning mode, learning method, and algorithm. The knowledge graph connects all the different categories of information together to obtain a relational network, providing the ability to analyze problems from a “relational” perspective. Lightweight middleware DT technology: DT uses java, Python, R language, and other development tools to integrate Hadoop, HBase, Spark, Neo4j, ETL, NLP, and other big data technologies and applications to provide a common decision support model. With lightweight metadata, business data from different fields, different industries, different regions, and Internet big data, it continuously enriches decision support data resources, provides a variety of means such as derivative calculation, aggregate processing, indicator feature extraction, and so on, realizes flexible topological transformation, on-demand processing, and deep integration of data, and uses a variety of data analysis mining algorithms, such as regression analysis, correlation analysis, clustering analysis, and spatial feature analysis. It uses various data analysis and mining algorithms, such as

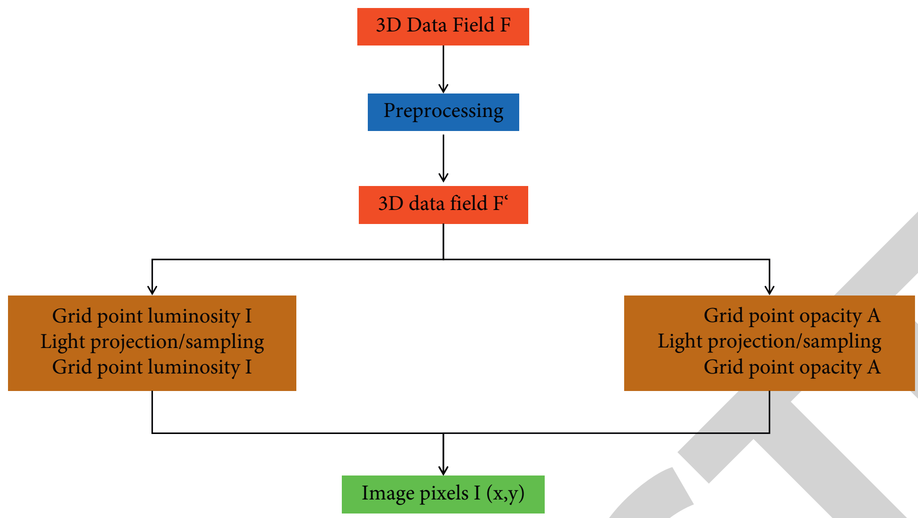

Figure 4: Schematic diagram of the scientific and technical visualization process.

regression analysis, correlation analysis, clustering analysis, spatial feature analysis, and visualization means, such as reports, graphics, and infographics, and relies on various decision-making resources, such as indicators, algorithms, models, data, and knowledge that are comprised of business-oriented combining.

3.4. Visualization for Scientific Computing. The study of visualization is divided into two main parts: visualization tools and visualization applications, and the process of visualization for scientific computing (ViSC) is a very important aid in the analysis of natural phenomena to the model building process. The steps of the visualization process can be divided into four parts, namely, "filtering-mapping-mapping-feedback" virtual environment. ViSC is divided into three aspects: visualization of 3D data field, visualization of engineering design, and virtual environment, which correspond to three processing methods: tracking, postprocessing, and driving. The following is a study of the contour method and the body drawing method.

Contour Method. The contour method is a visualization method for two-dimensional planar data fields, and its drawing steps can be divided into the following three points: first, the intersection of each grid cell with the contour is calculated; then, the intersection of the contour within that cell is connected with a line segment; and finally, the collection of the abovementioned line segments constitutes the contour in that grid. The intersection of the grid cell and the contour is calculated mainly by calculating the intersection of each cell edge and the contour, which can be calculated by the vertex determination method and the interpolation method on the edge. Set the value of the contour as F_t; if $F_i < F_t$, then the vertex is "−"; if $F_i > F_t$, then the vertex is "+." If all four vertices of the cell grid are "−"or "+," then there is no contour in the cell of the grid; otherwise, for two vertices with "−" "+" cell edge using the interpolation function to calculate the intersection of the equivalence line. Grid cell contour line connection diagram: The body plotting method is to traverse the entire data field, resample the data field, and synthesize the sampling results. Body plotting algorithms are divided into two main categories: ray tracing method and projection imaging method. The projection imaging method is to project the impact of all voxels of the object onto the imaging surface and then to realize the color of each pixel through certain synthesis methods according to the iterative order of the voxel impact on each pixel. The main drawing steps can be divided into three steps: "voxel traversal-voxel decomposition-projection and synthesis." The scientific and technical visualization processing flow is shown in Figure 4.

By studying the contour method and body drawing method, we can conclude that the drawing speed of the image depends on the choice of the algorithm design and the hard requirements of the machine.

3.5. Analysis Model of Digital Economy and Industry Integration. The development and integration of digital economy industries are influenced by both the internal digital economy resource allocation and other external factors, such as multiobjective conditions in the context of digital economy. The economic system input vector has many dimensions and complex influencing factors. The data of the economic system are highly nonlinear and there are complex coupling relationships among the components of the input vectors. The economic system is a typical "black box" model, and there is no clear expression for the interactions between the data. The data of the economic system tends to grow year by year. Due to the above characteristics of the economic forecasting problem, it is difficult for general mathematical methods to effectively forecast the economy with multiple inputs and outputs. First, we determine the structure of the neural network acting on the digital economy industrial system in the context of digital economy, including the number of layers of the network, the nodes of neurons in the input and output layers, and the number of training samples and test samples. The relationship between the implicit layer and the output layer is as follows:

$$h_j = g\left(\sum_{i=1}^{n} w_{ij}x_i + \delta_j\right),$$
$$y_l = g\left(\sum_{i=1}^{k} v_{jl}h_j + \theta\right), \tag{1}$$

where $g(\,)$ is the transfer function and the Sigmoid function is used, $g(x) = 1/(1 + e^{-x})$. The neural network can fit the arbitrary many-to-many mapping relationship well within the range of computational power allowed. It is better than taking regression analysis to approximate the effect. The fitness function is as follows:

$$f = \frac{1}{E},$$
$$E = \frac{1}{2}\sum_{k=1}^{M} (y_k - \overline{y_k})^2, \tag{2}$$

where M is the number of training samples, $\overline{y_k}$ is the expected output value of the kth node of the network, and $\overline{y_k}$ is the actual output value. And the selection operation is to select the good individuals from the population

$$P_i = \frac{f_i}{\sum_{i=1}^{N} f_i}, \tag{3}$$

where N is the size of the population, and the smaller P_i is, the more likely the corresponding individual will be selected. The expressions of adaptive crossover probability P_c and adaptive variable probability P_m are as follows:

$$P_c = \begin{cases} P_{c1} - \dfrac{(P_{c1} - P_{c2})(f' - f_{avg})}{f_{max} - f_{avg}}, f' \geq f_{avg} \\ P_{c1}, f' < f_{avg} \end{cases},$$
$$P_m = \begin{cases} P_{m1} - \dfrac{(P_{m1} - P_{m2})(f - f_{avg})}{f_{max} - f_{avg}}, f \geq f_{avg} \\ P_{m1}, f < f_{avg} \end{cases}. \tag{4}$$

Using the training samples, the weights are adjusted by the training function until the target error of training is satisfied. The linkage weights and thresholds between the nodes of each layer of the neural network can precisely express the strong coupling relationship between the factors in the economic system that intertwine and influence each other. The neural network can determine the weights and thresholds of the network with only a small number of training samples for the analysis of industrial integration in the context of digital economy, and the calculation is simple, fast, and reliable. It can fit any many-to-many mapping relationship very well. The results of data fitting show that the relative error of system fitting is in the range of 0–0.75%, which is better than the approximation effect by regression analysis.

4. Experiments and Results

4.1. Dataset. In this study, first, we use the data from 1997 to 2016 to simulate the interaction between digital economy industry and new normal multiobjective using adaptive genetic algorithm optimization neural network model and compare the simulation results of the two models; second, we modulate different multiobjective conditions to analyze the sensitivity of digital economy industry development status; and finally, we make a sensitivity analysis of the development of digital economy industry in 2017–2019 digital economy industry development speed and quality are predicted and analyzed to reveal the development and integration of digital economy industry system under the new normal multiobjective conditions. In the experiments, the CPU computational speed of the server, the job requirements of the Big Data application, the software failure rate of the VM, and the hardware failure rate of the server were the first parameters evaluated: the computational speed of the server can be measured by mapping its CPU frequency to the MIPS level, and in the experiments, a multicore CPU configured with 163.0 GHz was used as the host physical node for the Big Data job. The job requirements of a Big Data job are quantified by its computational complexity as the number of instructions that need to be executed. In the experiments, the big data job used is a data processing task with an evaluated work requirement of 32T10 instructions.

4.2. Analysis of the Results of the Digital Economy and Industry Convergence Model. The sample data were divided into training sample (80%) and test sample (20%); the training sample was used to determine the parameters of the model, and the test sample was used to estimate the model and compare the errors of the 20 years of data from 1997 to 2016, 16 years of data from 1997 to 2012 were selected as the training sample, and the last 4 years (2013–2016) of data were used as the test sample. In this study, the MATLAB R2014a neural network toolbox is used to complete the neural network operation. The proposed neural network model of the digital economy industrial system under the new normal multiobjective conditions consists of an input layer, an implicit layer, and an output layer. The input layer of the network is 7 indicators of the new normal multiobjective and digital economy industrial system impact factors; the output layer is 2 indicators of the development status of the digital economy industrial system, while the implicit layer is set as one layer, and the number of implicit neurons is obtained by adaptive genetic algorithm. According to experience, in BP neural network training, the network training target is set to 0.001% and the learning rate is 0.05; in the process of optimizing the initial weights of the neural network by genetic algorithm, the number of populations is 100, the number of genetic iterations is 300, the

Table 1: Simulation results and error values of test samples (%).

Classification	Year	Actual value	Proposed method: Simulation value	Proposed method: Absolute error	Proposed method: Relative error	Contrasting approach: Simulation value	Contrasting approach: Absolute error	Contrasting approach: Relative error
Digital economy total assets change rate	2013	13.270	13.339	0.069	0.518	13.156	−0.114	−0.863
	2014	13.862	13.985	0.123	0.890	14.026	0.164	1.186
	2015	15.667	15.510	−0.157	−1.001	15.857	0.189	1.210
	2016	16.514	16.364	−0.150	−0.909	15.524	−0.990	−5.996
Commercial bank nonperforming loan ratio	2013	1.000	0.962	−0.038	−3.770	1.025	0.025	2.519
	2014	1.250	1.248	−0.002	−0.181	1.200	−0.050	−4.031
	2015	1.670	1.678	0.008	0.490	1.695	0.025	1.480
	2016	1.750	1.716	−0.034	−1.925	1.724	−0.026	−1.498

Table 2: Error analysis of simulation results of test samples (%).

Methods	Classification	Mean square error	Mean relative error	Maximum relative error
Proposed method	Total assets change rate of digital economy	0.129	0.830	1.001
	Nonperforming loan ratio of commercial banks	0.026	1.592	3.770
	Total	0.093	1.213	3.770
Contrasting approach	Total assets change rate of digital economy	0.514	2.314	5.996
	Nonperforming loan ratio of commercial banks	0.033	2.382	4.031
	Total	0.364	2.342	5.996

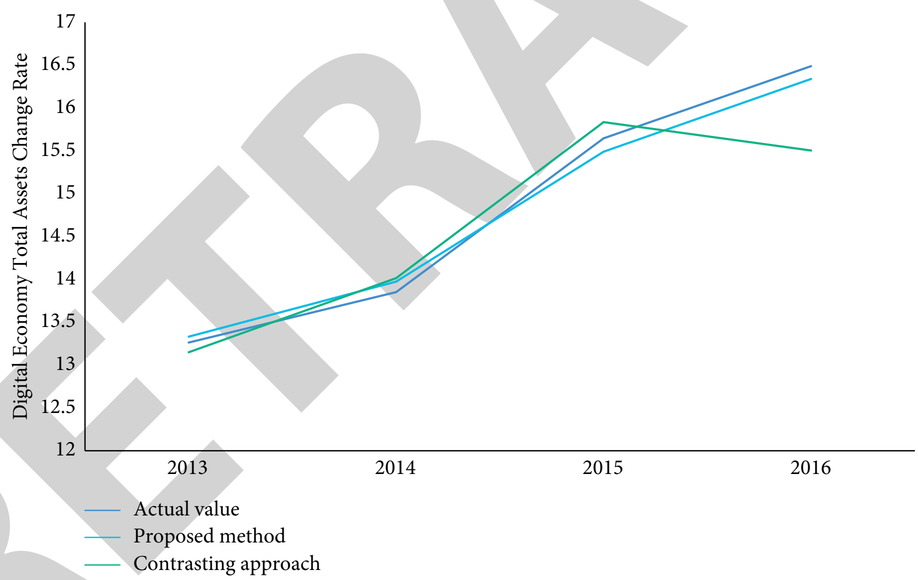

Figure 5: Simulated and actual values of the rate of change of total assets in the digital economy (%).

value of crossover probability is 0.7, and the probability of variation is 0.05; in the adaptive parameters, the upper and lower limits of variation probability are 0.25 and 0.05, and the crossover, the upper and lower limits of the probability are 0.8 and 0.5. The proposed neural network and the comparison method neural network are used to simulate the development and integration of the digital economy industry system, respectively, and after the training, the trained network is used to simulate and predict the test samples. The simulation results of the test samples from 2013 to 2016 are given in Tables 1 and 2 and Figures 5 and 6.

From Figures 5 and 6 and Tables 1 and 2, it can be seen that the average relative error between the simulated and actual values of the training results of the proposed neural network model for the total asset change rate and the nonperforming loan rate of the bank is 1.213% and the maximum relative error is 3.77%, while the average relative error of the training of the neural network model of the comparison method is 2.342% and the maximum relative error is 5.996%. It is known that the proposed neural network model is better than the comparison method neural network model. To further illustrate the superiority of the

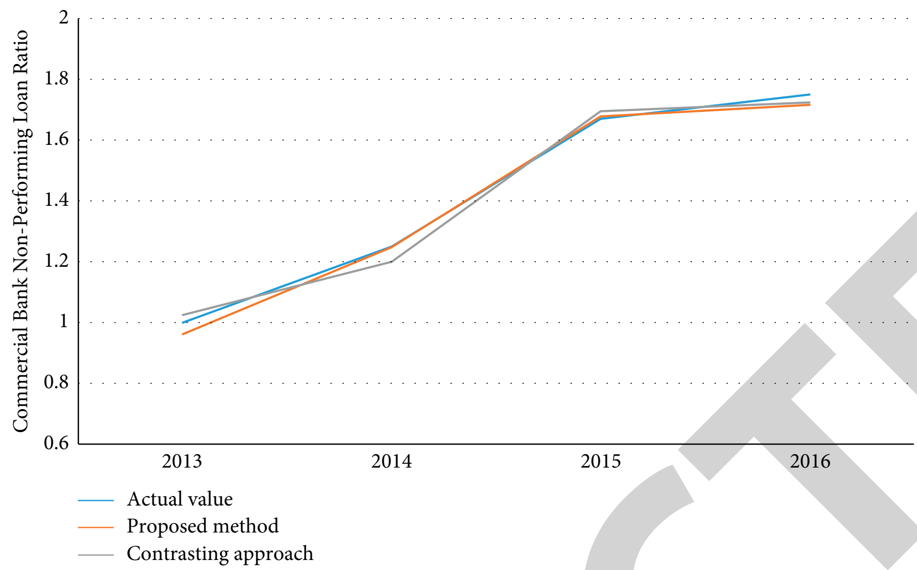

Figure 6: Simulated and actual values of NPL ratio of commercial banks (%).

Table 3: Comparison of the simulation performance of the two models.

Method	Training time (sec)	Convergence accuracy	Number of iterations
Proposed method	461.11	247	0.0011
Contrasting approach	910.18	328	0.0316

proposed neural network model, the training time, number of iterations, and convergence accuracy of the proposed neural network model and the comparison method neural network model are compared, and the simulation performance of the two models is analyzed, and the results are given in Table 3.

It can be seen that the training time, number of iterations, and convergence accuracy of the proposed neural network model are significantly better than those of the comparison method neural network model. In summary, it can be seen that the proposed neural network model has stronger simulation capability, lower error value of the test sample simulation, higher accuracy of the simulation, and shorter running time. Therefore, this study concludes that the proposed neural network model can be used as a method to predict the development and convergence of the digital economy industrial system, and this study will regulate and predict the development and convergence of the digital economy industrial system on this basis.

4.3. Scientific Computing Visual Analysis

Moderation. In order to further analyze the impact of the new normal objectives on the industrial system of digital economy, this study proposes three scenario hypotheses and sensitivity moderation of multiobjective conditional variables to study their impact on the rate of change of total bank assets and the nonperforming loan rate of commercial banks, respectively. The visualization of the training process performance improvement is shown in Figure 7. The visualization of the loss-drop of the training process is shown in Figure 8. Economic transformation and upgrading need the support of innovation drive, and under the new normal conditions, China cannot rely only on factor scale drive and investment drive to promote the development of economic digital economy but should rely more on technological progress and let innovation become the new engine to drive development. R&D as the driving force of technological progress: increasing the proportion of R&D expenditure can mobilize the enthusiasm of innovation and increase the vitality of the economy, according to which the third scenario hypothesis is proposed; the proportion of R&D expenditure to GDP rises by 10%. Using the already trained neural network model, the indicators of 2016 are used as the initial values, based on which the sensitivity of the regulatory variables is controlled according to the multiobjective conditions, and the results are given in Table 4. *Scenario Hypothesis 1*. When the GDP growth rate decreases by 10% and other variables remain unchanged, the growth rate of total bank assets is 14.82% and the nonperforming loan rate of commercial banks is 1.64%. *Scenario Hypothesis 2*. When the contribution of the three industries rises by 10%, the growth rate of total bank assets is 14.42% and the nonperforming loan ratio of banks is 1.78%. *Scenario Hypothesis 3*. When the ratio of R&D expenditure to GDP rises by 10%, the growth rate of total bank assets is 15.97% and the nonperforming loan ratio of banks is 1.62%. When the economic growth rate decreases, the growth rate of total bank assets decreases and the nonperforming loan ratio of commercial banks decreases. When there is downward pressure on the economy, the investment and

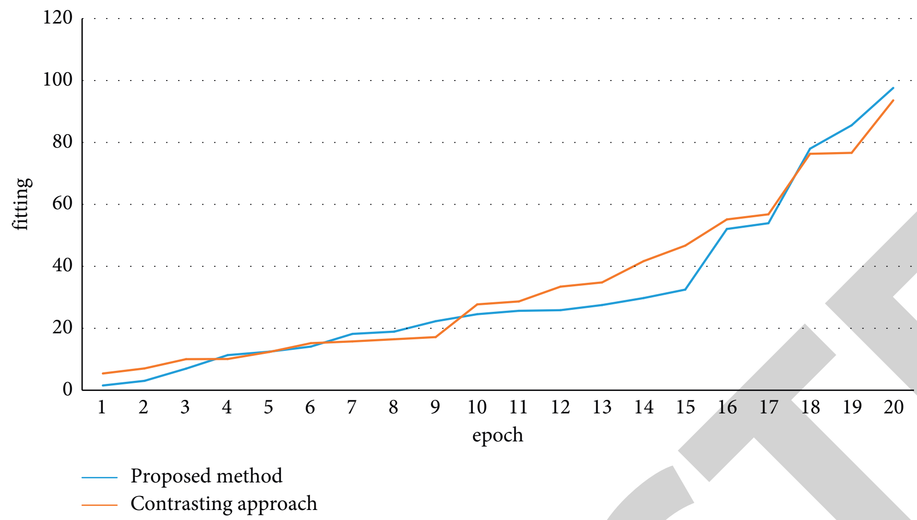

Figure 7: Visualization of training process performance improvement.

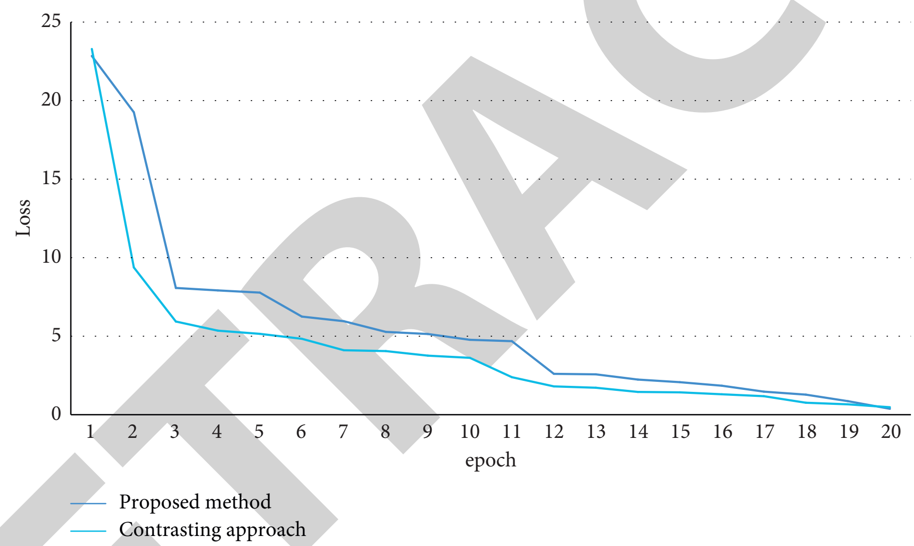

Figure 8: Training process loss degradation visualization.

Table 4: Sensitivity modulation table of the new normal target to the digital economy industry.

Scenario assumptions	GDP growth rate	Contribution rate of three industries	R&D expenditure as a percentage of GDP	Total assets of banking industry growth rate (%)	Nonperforming commercial banks loan ratio (%)
Initial value	9.96%	51.91%	2.10%	16.51	1.75
Scenario 1	10% decrease	Unchanged	Unchanged	14.82	1.64
Scenario 2	No change	10% increase	Unchanged	14.42	1.78
Scenario 3	Unchanged	Unchanged	10% increase	15.97	1.62

financing demand of the real economy will decrease, and banks, as the main indirect financing channel, will tighten their banking and deposit and loan business in order to prevent being affected by the risks of the real economy, and the growth of credit assets decelerates, causing the growth rate of total assets of banks to decrease and the growth of earnings to slow down. However, at the same time, banks' risky assets decrease, banks' nonperforming loan ratio decreases, and the quality of digital economy industry improves.

When the contribution rate of the three industries increases, the growth rate of total bank assets decreases and the nonperforming loan rate of commercial banks increases. The integration of digital economy industries relies on the real economy, and the secondary industry is the main component of the real economy. When the proportion of tertiary industry increases and the proportion of secondary industry decreases, it will cause the decrease of investment and financing demand of real economy, and the increment of bank assets decreases, causing the decrease of asset growth rate. And the rise of bank NPL rate indicates that the tertiary industry is more likely to generate nonperforming assets and default risk than the secondary industry, causing the increase of bank NPL rate. When the share of R&D expenditure in GDP increases, the growth rate of total bank assets and the NPL rate of commercial banks both show a decrease. When technological R&D is the driving force, increased investment in technological innovation reduces the demand for factors such as capital, decreases the reliance on financing channels such as banks, reduces banks' credit assets and risky assets, and decreases the growth rate of bank assets, while the quality of assets increases. The sensitivity of the regulatory variables to the growth rate of total bank assets and the nonperforming loan rate of commercial banks shows an opposite trend, with a smaller impact on the nonperforming loan rate when there is a greater impact on the growth rate of total assets, indicating that the impact of a single new normal target on the speed and quality of digital economy industry integration cannot be achieved at the same time. Therefore, to achieve the unity of speed and quality of digital economy industry integration, it is necessary to combine multiple goals of the new normal and not to emphasize only one new normal goal of integration. Under the new normal, the digital economy industry has entered a stable period of growth. The digital economy industry actively adjusts the structure of the digital economy, from improving the financing structure, optimizing the investment of loans, and expanding the profit model of digital economy institutions and other aspects, to promote the reform of the digital economy industry, reduce the risk of the digital economy, and improve the quality of digital economy assets. The digital economy industry should actively adapt to the new normal, adjust the psychological expectations of the speed of business integration, and change the past mode of pursuing large-scale, high-velocity integration to one of maintaining moderate and high-quality integrations.

5. Conclusion

In the foreseeable future, the digital economy can not only help China's real economy, but also enable China to win long-term economic development momentum in the future. A strong innovation capability is certainly a sufficient condition for the sustainable development of the digital economy, and its own development also requires the regulatory role of the market mechanism. The successful experiences of Silicon Valley and Taiwan's Industrial Technology Research Institute are typical cases of attaching importance to market technology, and the enterprises that survive through market battles are bound to having comprehensive capabilities, and such enterprises are capable of doing industrial structure migration and productivity in the new round of digital economy development. The tide of scientific and technological innovation: In terms of policy, all places should thoroughly implement the central decision and deployment, accelerate the circulation of digital economy elements and the distribution of factor resources, accelerate the development of science and technology, and promote industrial optimization and upgrading. The sudden new pneumonia epidemic has forced more enterprises to "go to the cloud," which provides opportunities for the development of the digital economy. To seize this window period, not only build a new digital ecology, create an experimental zone for the development of the digital economy, and clarify the systematic circulation, trading, and use of factors around the mechanism but also protect the security of information, planning data as a property right to establish the mechanism. In the future, we plan to carry out scientific computational visualization on convolutional neural networks and knowledge graphs for industrial convergence in the context of the digital economy.

Data Availability

The datasets used during the current study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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