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*Retraction*

# Retracted: Optimization of Three-Dimensional Model of Landscape Space Based on Big Data Analysis

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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] C. Wang, "Optimization of Three-Dimensional Model of Landscape Space Based on Big Data Analysis," *Journal of Function Spaces*, vol. 2022, Article ID 7002983, 11 pages, 2022.

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*Research Article*

# Optimization of Three-Dimensional Model of Landscape Space Based on Big Data Analysis

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Based on virtual reality technology, landscape 3D modeling provides users with the possibility to construct a simulated garden landscape environment design effect online, so it has high requirements for accuracy. With the continuous improvement of precision requirements, the number of people involved in the construction of 3D models is also increasing, which puts forward higher requirements for modeling. Based on this, this paper studies the optimization strategy of landscape space 3D model based on big data analysis. Based on the analysis of the establishment of the 3D model and the related algorithm research, this paper analyzes the optimal design of the 3D model under the background of big data. In the 3D modeling of the edge folded area, it is based on the traditional quadratic error measurement grid simplification algorithm, combined with the vertex error matrix to simplify, so as to shorten the modeling time. Based on an efficient search algorithm, an adaptive nonsearch fractal image compression and decoding method is proposed in the image compression and decoding stage of 3D modeling. The search is performed by specifying the defined area block. Finally, an experiment is designed to analyze the performance of the optimization algorithm. The results show that the improved edge folding region algorithm can reduce errors on the basis of ensuring image quality, and the adaptive search algorithm can shorten the search time and improve the compression rate. This method provides a technical reference for the visualization experience and simulation system of garden landscape design and improves the presentation quality of virtual garden landscape design scenes.

## 1. Introduction

The construction of 3D landscape model is a comprehensive discipline, which not only covers computer graphics technology, visualization technology, and remote sensing technology but also involves virtual reality technology, spatial data structure technology, etc. [1]. Based on computer technology, virtual reality technology creates a nearly real three-dimensional virtual environment and realizes interactive functions [2, 3]. The current virtual environment has been able to realize the modeling of scenes and models. In this process, large-scale data is involved and the operation speed is slow [4, 5]. Therefore, in the three-dimensional model design of landscape based on big data analysis, it is necessary to optimize the design, focusing on improving the compressed model and improving the operation efficiency.

Based on this background, this paper studies the three-dimensional modeling and optimization of landscape space based on big data analysis, which is mainly divided into four chapters. The first chapter briefly summarizes the construction of 3D landscape model and introduces and analyzes the chapter arrangement of this study. Chapter 2 introduces the algorithms of 3D modeling at home and abroad and summarizes the shortcomings of the current research. In Chapter 3, the optimization model of landscape 3D modeling based on big data analysis is constructed. The edge folding algorithm is used to optimize the folding area in 3D modeling. In the compression design of 3D modeling, the traditional algorithm is optimized and improved, and the nonsearch fractal algorithm is used to shorten the compression time. Chapter 4 simulates and analyzes the landscape 3D modeling optimization algorithm constructed in this paper and evaluates the performance of the algorithm through indicators such as error rate and compression ratio. The simulation results show that compared with the standard algorithm and quadtree fractal algorithm, the algorithm proposed in this paper can improve the image compression ratio and reduce the coding error on the basis of ensuring the image quality.

The innovation of this paper is to propose a self-realization nonsearch fractal algorithm. In the image compression of 3D modeling, in addition to the distance factor, the geometric characteristics of sharp edges and corners in the original model are also considered. Taking the product of absolute curvature and quadratic error matrix as the error matrix, more data information is retained on the basis of ensuring the optimization model. The algorithm uses a fast nonsearch matching method between the range block and the defined region to decompose and combine and uses an adaptive decomposition method to improve the image quality. Secondly, in the model optimization design, in order to optimize the folding area, the edge folding algorithm is used. The algorithm is based on quadratic error measurement. The improved edge folding region algorithm can reduce the error on the basis of ensuring the image quality, while the adaptive search algorithm can shorten the search time and improve the compression rate. This method provides a technical reference for the visual experience and simulation system of landscape design and improves the presentation quality of virtual landscape design scenes.

## 2. State of the Art

In recent years, with the development of computer technology, virtual display technology, graphics, and remote sensing technology have also made a lot of research results. 3D model construction and visualization have been developed in an all-round way. Many scholars improve the fidelity of 3D modeling and shorten the modeling time from the perspective of modeling technology. For example, Shan and Sun and Yang et al. designed a new landscape planning effect simulation system based on virtual reality technology to preprocess 3D landscape images, remove noise information and redundant information, and adopt the parametric description rules of plant spatial layout [6, 7]. Zheng et al. used the spatial simulation of settlement distribution driven by random forest to conduct three-dimensional simulation in order to improve landscape visibility [8]. Tastan et al. compared and studied the availability and constraints of two modeling methods for 3D modeling in immersive virtual reality (IVR). They collected data through the screen capture video of the modeling screen and the video recording of user gestures during the modeling session. Through the analysis of qualitative coding method, they believed that DM modeling can be digitally input through a new keyboard [9, 10]. In their research, Li et al. used real-time computer graphics technology, three-dimensional modeling technology and binocular stereo vision technology to study multivision animated character objects in virtual reality technology, designed binocular stereo vision animation system and 3D graphics algorithm for three-dimensional geometric transformation of computer graphics, and studied image output processes such as basic texture technology and basic lighting model used in fragment processing stage [11]. In the research and analysis, Roy et al. proposed a new method to calculate the affine parameters of fractal coding to reduce its computational complexity and derive a simple but effective approximate value of scaling parameters [12]. Hernandez-Lopez and Muiz-Pérez proposed the fractal compression of Kelley table in their research and developed a parallel implementation of fractal image compression using quadtree partition [13].

To sum up, up to now, there are many researches on 3D modeling, and many scholars have improved the model from a technical point of view. The image data itself has a certain redundancy. The existence of these data not only wastes modeling time but also affects the image quality. In the research of eliminating redundancy, most of them rely on distance parameters for optimization. However, this kind of algorithm plays a very limited role in optimizing time and model. It only focuses on the simulation of individual geometric features and ignores other geometric features. On the other hand, there is little analysis on the modeling and optimization of overlapping areas. Most of them are optimized for a terrain simulation, which is not scalable. Therefore, the research on the optimization of three-dimensional model of garden space based on big data analysis has important practical significance.

## 3. Methodology

*3.1. 3D Modeling Data of Landscape Space.* The three-dimensional modeling of garden landscape space needs to cover all space substances. According to the existing point of view, the space should include terrain, buildings, transportation, vegetation, and public facilities. The specific data sources can come from satellite data, aerial photography data, scanning data, photographing data, manual measurement data, etc.; the content and form of different data sources will be different.

In the three-dimensional modeling of landscape space, many terrains will be involved. In the terrain simulation, underground pipelines, bridges, and buildings are difficult parts. The above ground part only considers independent space in the modeling, which is convenient to determine the spatial location, but the carrier needs to be determined and the specific location needs to be marked in the modeling. Once the spatial position of these terrain is determined, the spatial changes of terrain surface can be analyzed [14]. The terrain surface itself is a continuous space, and the buildings are built on this plane. Therefore, without any treatment, the buildings will overlap with other terrain in space to form gaps, and similar problems will occur in other terrain modeling. At present, the popular GIS modeling methods and terrain simulation are very necessary and basic tools, which play a vital role in other carrier modeling [15]. Therefore, in the three-dimensional modeling and calculation, this paper sets that all vertices are displayed in four-dimensional coordinates. When transforming the space, the coordinate system can be changed by using mathematical transformation methods, such as translation, rotation, and scaling. After the landscape 3D modeling is displayed, the transformed results can be expressed as follows:

$$[x', y', z', 1] = [x, y, z, 1] \times T, \tag{1}$$

where $T$ represents the transformation matrix, which is the result of transformation. At present, there are mainly two kinds of model projection: parallel projection and perspective projection. Among them, parallel projection is mainly positive parallel and oblique parallel, and perspective projection is mainly applied to quadrangular platform. No matter what projection method is adopted, after determining the projection window and size, only the objects in the projection will be displayed, and all other objects will be cut off.

The parallel projection direction refers to the projection vector of the center point of the window, and the oblique parallel projection is that the equation in the projection space is not standardized, so it is necessary to use some staggered transformation to convert the oblique plane projection into orthogonally parallel projection [16]. The process of converting face coordinates into plane coordinates is called projection. The essence of projection coordinate system is plane coordinate system. The projection coordinate system is defined in a two-dimensional plane. Different from geographical coordinate system, the length, angle, and area of projection coordinate system are constant in two-dimensional space. When defining the projection volume, it is necessary to define the projection vector and convert it into the observation coordinate system. The transformation of the projection matrix can be expressed as follows:

$$M = \begin{bmatrix} 1, 0, -p_x/p_z, 0 \\ 0, 1, -p_y/p_z, 0 \\ 0, 0, 1, 0 \\ 0, 0, 0, 1 \end{bmatrix}. \tag{2}$$

In the three-dimensional landscape modeling, the reality of the object surface feels the influence of lighting conditions, so it is necessary to analyze the lighting model in the modeling. Considering the reflection of the object caused by the light source, the local illumination model can be expressed as follows:

$$I = K_a I_{pa} + K_d \sum \frac{J_{pd} N_o L_o}{r + c}, \tag{3}$$

where $V$ represents the observed object, $K_a$ represents the brightness of the ambient reflected light, $K_d$ represents the diffuse reflection intensity, $N_o$ represents the light vector, $c$ represents the constant, and $I$ represents the brightness.

*3.2. Optimization of 3D Scene Simulation in Folded Area.* In terrain modeling, folding area is a problem that must be faced. If there are relatively small objects in modeling or they are far away from each other, LOD model can be used to draw objects directly [17]. Node LOD model: itself is a resolution structure. Different resolution models are connected by nodes, and the corresponding components are operated by activating the nodes. When all nodes are activated, it is essentially a full resolution structure. Its advantages are simple structure, convenient operation, and suitable for expressing complex discontinuous volume model objects. If the object is large and close to the eye, the model needs to be refined. In the current detailed description of spatial modeling, LOD model is a common model. This algorithm is based on the triangular network algorithm. First locate different vertices and classify them, then sort the importance, delete the unimportant vertex coordinates, and complete the design [18].

It is inevitable to encounter model construction with boundary in landscape 3D modeling. In simplified design, it is necessary to maintain the clarity and information of the boundary model. Generally, a virtual plane will be formed to maintain the triangular vertical space angle with the edge interface, and the weight of the quadratic error matrix is set through the plane, and then, the matrix at the end point is added to the virtual plane. This method can well maintain the information integrity of the folded area [19]. The specific process is shown in Figure 1. In the analysis, all folding costs need to be calculated first and sorted according to the size; delete the folding operation with the lowest cost, calculate the new vertex folding cost, and reorder until the requirements are met.

In the three-dimensional construction of the model with boundary, it is necessary to keep the boundary information as much as possible. The quadratic error measurement simplification algorithm has great advantages in both quality and complexity in the model simplification information, but this algorithm itself also has some shortcomings [20]. The distance parameter is considered in the design of quadratic error measurement, so the grid distribution is uniform, especially in large-scale model construction, this uniform distribution will lose a lot of typical edge information. During model construction, some unimportant features will be deleted first. For example, in platform area model construction, it will be directly combined and simplified. Therefore, it is necessary to optimize the quadratic error algorithm. In describing the characteristics of the object, the curvature reflects the surface details of the model, which is an important feature. The curvature of the sharp area is large, and the value of the flat area is very small. Therefore, in the simplification, it is considered to establish a new matrix by using the product of quadratic error matrix and absolute curvature. In the quadratic error measurement algorithm, multiplying the quadratic error matrix by the adaptive weight will not affect the basic form of the matrix. The bending degree of adjacent patches is expressed by the average curvature, and the formula can be expressed as follows:

$$H = \frac{(\sum M(e_i))}{A}, \tag{4}$$

where $A$ represents the sum of triangle areas associated with vertices and $m$ represents the included angle of normal vectors of adjacent triangular patches. The included angle of two adjacent triangular patches can be expressed as follows:

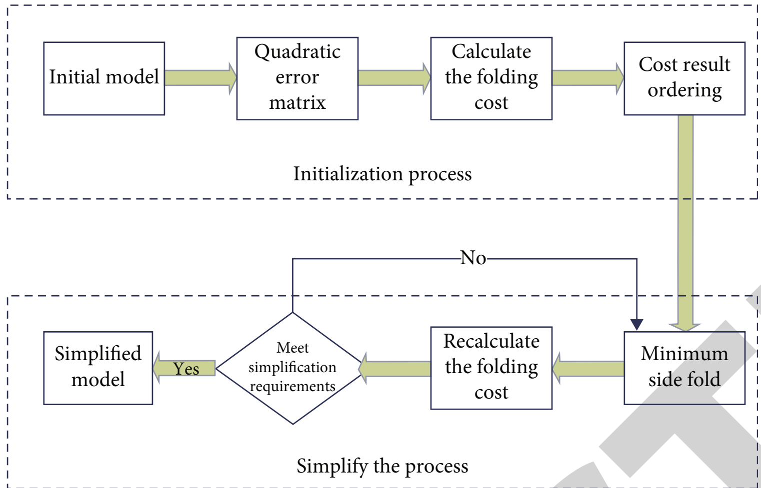


Figure 1: The flow of the edge folding algorithm.



$$\cos \varphi = \cos < n_1, n_2 > = \frac{n_1 n_2}{|n_1||n_2|}. \quad (5)$$

The degree of curvature of a surface is Gaussian curvature, and its absolute value is of great significance. Assuming that the small surface on the surface is $\Delta\delta$, translate the normal vectors of all points on the small surface to the origin, and you can get the unit spherical area centered on the origin, with the area unchanged. The absolute value of Gaussian curvature of a surface is the limit value of the shrinkage of a small surface. The bending degree of the grid surface needs to be calculated by discrete differentiation, and the formula is as follows:

$$K = \frac{\left(2\pi - \sum_{i=1}^{k} \theta_i\right)}{A}, \quad (6)$$

where $\theta_i$ represents the vertex angle related to the vertex. Assuming that the edge is folded to a new vertex, the improved folding cost can be expressed as follows:

$$\Delta^{//}(\bar{v}) = \left\| V_i V_j \right\| \bar{v} T \left( K_{iabs} Q_i^{/} + K_{jabs} Q_i^{/} \right) \bar{v}, \quad (7)$$

where $\| V_i V_j \|$ represents the distance of the vertex, $K$ represents the absolute curvature, and $Q$ represents the error matrix.

*3.3. Model Compression Optimization Algorithm.* From the gardens of Ming and Qing Dynasties to the modern landscape of natural harmony, great changes have taken place in people's life and recreational space, which are inseparable from the artistic design of landscape architecture. Garden landscape renderings are composed of garden sketches, including rockeries, garden pavilions, flower racks, garden bridges, plant landscaping, and garden sculptures. Because 3DS max modeling is more complex, compared with the SketchUp software, especially in complex garden sketch modeling, such as garden pavilion, although the garden sketch is exquisite, the complex structure makes modeling extremely difficult. Generally speaking, the software involved in the process of making landscape renderings includes 3DS max. Generally, the size of this file will directly affect the superiority of 3D model. Excessive volume will affect storage and reduce rendering speed. Certain technologies need to be used to reduce complexity and compress the volume of 3D model [21]. Fractal algorithm is a common algorithm for optimizing model at present, such as multiple linear subdivision method and random midpoint iteration method, which can meet the requirements of landscape 3D modeling. This paper improves the fractal algorithm in the research and analysis.

Among fractal image compression algorithms, full search coding algorithm is the most basic algorithm, and other improved algorithms are basically based on this algorithm [22]. This algorithm assumes that there is scale redundancy in different regions of natural image and then uses different redundancy to realize compression. First, image segmentation is an important step that affects the compression ratio and the quality of the model. At present, the commonly used segmentation strategies are quadtree segmentation, fixed block segmentation, and so on [23]. Then, form the codebook, set the step size, and slide the original image according to the step size. This step allows overlap. Each block adopts the average value of four adjacent pixels and compress the word block to obtain the initial codebook. The process of calculating fractal code is to find the best matching block in each codebook, adjust brightness and contrast, minimize regional block differences, and find the best matching block. The formula is as follows:

$$d_i = \frac{1}{n} \sum_{i=1}^{n} \left( c_{kj} b_i + h_{k,l} - a_i \right)^2, \quad (8)$$

when the value range block is mapped to the corresponding defined area block position, it needs to be searched continuously. The error is minimized through continuous isometric transformation. The derivation of this formula is obtained:

$$c_{kj} = \frac{m\sum_{i=1}^{m} a_i b_i - \sum_{i=1}^{m} a_i \sum_{i=1}^{m} b_i}{m\sum_{i=1}^{m} b^2{}_i - \left(\sum_{i=1}^{m} b_i\right)^2}, \tag{9}$$

$$h_{kj} = \frac{1}{m}\left(\sum_{i=1}^{m} a_i - c_{kj}\sum_{i=1}^{m} b_i\right), \tag{10}$$

where $m$ represents the number of pixels, $h_{ki}$ represents the contrast coefficient, $b_i$ represents the pixel value of the definition domain, $k$ represents the abscissa of the best matching block, and $j$ represents the ordinate of the best matching block. When the following conditions are met $c_{kj} = 0$,

$$m\sum_{i=1}^{m} b^2{}_i - \left(\sum_{i=1}^{m} b_i\right)^2 = 0. \tag{11}$$

When the mean square error reaches the minimum, the area block position is stored, and the contrast factor and brightness parameters are obtained at the same time to complete the coding of the value range block. Fractal coding has some disadvantages, that is, the coding speed is slow. For each range block, it is necessary to search the matching range block, which takes time [24]. At present, fractal algorithms generally take reducing search time as an improvement idea, such as classification method and neighborhood search method. These algorithms still need search and matching to be realized [24].

No search fractal image algorithm means that it does not need to search each matching optimal region block, but to specify a specific defined region block, which can reduce a lot of search time. In the research and analysis of this paper, an adaptive search free fractal algorithm is proposed. In addition, the algorithm does not need to record the information of each defined area block, and it can reduce the typing code. There is no need to search, and the search time can be shortened on the basis of ensuring the quality. Compared with the traditional algorithm, the nonsearch algorithm reduces the search process when matching the best fixed block. Directly calculate according to the set threshold, which not only ensures the quality but also compresses the fractal time.

The core problem of no search algorithm is to determine the position relationship between the specially defined area block and the value range block and then carry out the corresponding mapping transformation to calculate the coding error. In the analysis, it is assumed that the value range block size is $B_1 \times B_2$, the coordinate of the center point is $(\text{row}_R, \text{col}_R)$, and the specified optimal area block size is $2B_1 \times 2B_2$. When performing search free coding, first divide the original image into nonoverlapping area blocks, expressed as follows:

$$\begin{cases} T = UR_i, \\ R_i \cup R_j = \varphi(i \neq j), \end{cases} \tag{12}$$

where $R_i$ represents a value range block, and a definition area block is specified for each value range block. No search algorithm can greatly reduce the coding time, but this algorithm needs to determine the best matching area block. How to define the best matching block is a key problem, which is also one of the key indicators to determine the performance of no search algorithm. In this paper, the matching error between the value range block and the specified area block is described by mean square deviation. The smaller the error is, the closer the value range block is to the specified area block. The formula is expressed as follows:

$$d_i = \frac{1}{n}\sum_{i=1}^{n} \left(\text{st}b_i + \text{ot}_i - a_i\right)^2, \tag{13}$$

where $n$ refers to the number of pixels in the value range block, st represents the contrast parameter of the value range block, ot represents the brightness parameter of the defined area block, $b$ represents the pixel gray value of the defined area block, and $a$ represents the pixel gray value of the value range block. From the analysis, we can see that the definition area block of nonsearch fractal image coding is not the cause of coding error, but the error existing in advance. Therefore, there is bound to be a mismatch between the definition area block and the value area block, that is, the mean square error is very large, which shows that they are not similar.

When the nonsearch fractal compression ratio is not high, the adaptive combination method is adopted to solve it. For the value range blocks that meet the error matching conditions, they are combined with the surrounding area blocks that cannot meet the error requirements to form large area blocks, reduce the number of storage and transmission, and improve the compression ratio. This combination method needs to calculate the basic value range blocks that meet the error matching conditions. In this paper, the matrix composed of basic value range blocks is coded in the design, and the abscissa and ordinate of the matrix where the value range block is located are defined. Multiple value range blocks are combined to form a new value range block, and the initial value is the basic value range block. Continue to carry out adaptive combination, as shown in Figure 2.

The optimization of model compression algorithm needs to be evaluated to see the difference between the decoding model and the original image and explain the compression quality of the model. At present, there are two evaluation criteria for model compression. One is subjective evaluation, which evaluates the modeling status through the eyes. The other is the objective standard, which compares and analyzes the data error between images. The objective evaluation is simple and more persuasive. Therefore, in the evaluation model compression algorithm, the objective evaluation method is used. The objective evaluation index is required to reflect the change of gray level as a whole [25]. At present, the coding algorithm is generally evaluated by coding time, compression ratio, and peak signal-to-noise ratio. Model compression algorithm can effectively reduce parameter redundancy, thereby reducing storage occupation, communication bandwidth, and computational complexity. The

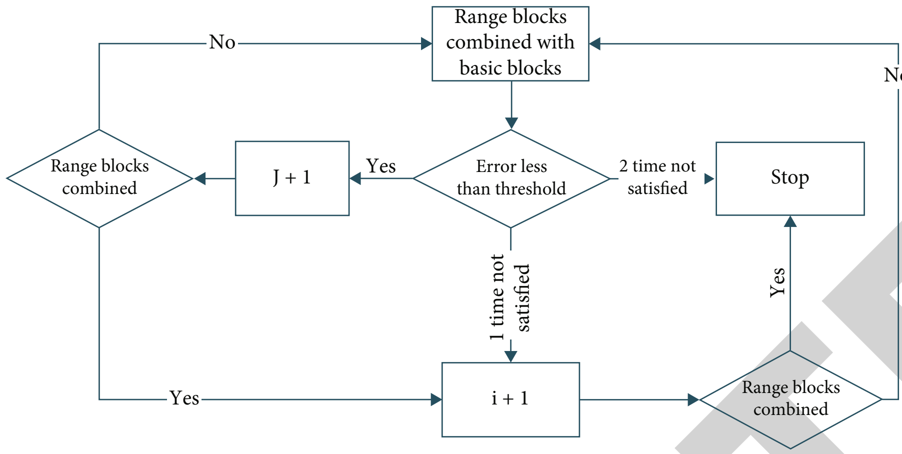


FIGURE 2: Adaptive combination process of range blocks.

more the quantization level is, the richer the image level is, the higher the gray resolution is, the better the image quality is, but the amount of data is large. The less the quantization level is, the less the image level is, the lower the gray resolution is, the false contour phenomenon will appear, and the image quality will become worse, but the amount of data is small.

Peak signal-to-noise ratio refers to the ratio of the maximum possible power of a signal to the noise function affecting accuracy, expressed in logarithm decibels. The formula can be expressed as follows:

$$\mathrm{MSE} = \frac{1}{mn}\sum_{i=1}^{m}\sum_{j=1}^{n}\left(f(i,j) - \widehat{f}(i,j)\right)^2 \tag{14}$$

MSE is the mean square error, $f(i,j)$ represents the mean square of the compressed image, and $\widehat{f}(i,j)$ represents the mean square of the original image. The gray image has a precision of 8 bits, the maximum value is 255, and the peak signal-to-noise ratio can be expressed as follows:

$$\mathrm{PSNR} = 10 \times \log\left[\frac{255^2}{\mathrm{MSE}}\right], \tag{15}$$

where PSNR represents the peak signal-to-noise ratio, in decibels. The larger the value, the clearer the image. This index does not need human participation, can be evaluated directly, and has stronger stability. Compression ratio refers to the ratio of the ratio of the data occupied by the image after compression to that before compression. It is generally believed that the larger the compression ratio, the smaller the storage quantity and the higher the application value. The reciprocal of the compression ratio is the compression efficiency. Coding time refers to the time spent from the beginning to the end of coding. The shorter the time, the better the performance of the algorithm.

## 4. Result Analysis and Discussion

*4.1. Simulation of Folding Region Model Optimization Algorithm.* In the simulation analysis, Visual Studio development platform and OpenGL are used for graphic rendering, and different simplified models are compared and analyzed, including geometric error, intuitive quality, and grid distribution. In the graphic simulation, the vehicle pictures and animal pictures are used for simulation analysis. The original model covers 10544 and 5804 triangular pictures, respectively. When the model is simplified to 1200 triangular patches, the geometric features of the animal can be saved successfully, which is very close to the original model. When it continues to be simplified to 5%, the overall contour can still be seen. However, the algorithm used in this paper can well retain all kinds of sharp features of the animal, and the original algorithm loses these effective features. The same conclusion can be obtained in the simplification of vehicle simulation. When the simplification is 15%, many feature information in the traditional algorithm disappears. It shows that the algorithm used in this paper can retain more geometric features on the basis of maintaining the shape of the whole model after large-scale simplification; especially in the case of large curvature, the geometric features of the picture will not be lost. The traditional algorithm is easy to lose the characteristics of sharp areas after simplification, because it adopts uniform grid distribution. The algorithm used in this paper is more reasonable in the distribution. It distributes according to the change of curvature. The distribution with large curvature has more meshes. In addition, the time quadratic error measurement algorithm used in the analysis of traditional algorithms only considers the distance factor and has no other surface features.

Compare and analyze the error variation characteristics under different models, as shown in Figures 3 and 4. From the data in the figure, it can be seen that the average error of the algorithm used in this paper is significantly reduced. Although QEM algorithm has certain advantages, the error is almost the same. Moreover, in terms of geometric error, the algorithm proposed in this paper has higher advantages and can meet the needs of large-scale 3D modeling.

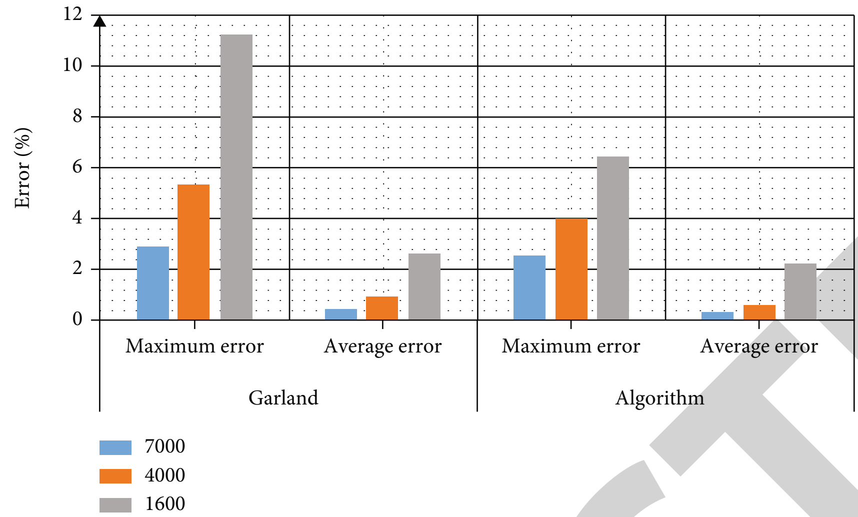


Figure 3: Comparative analysis of vehicle model errors.

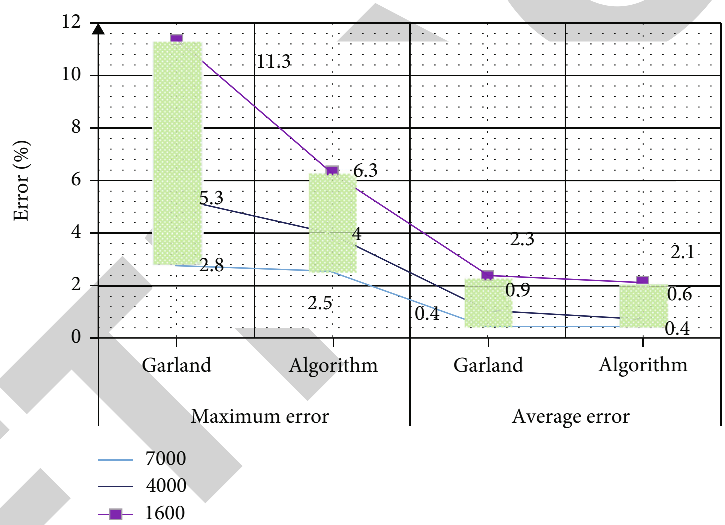


Figure 4: Comparative analysis of animal model errors.

*4.2. Model Compression Simulation Analysis.* In 3D model compression, the coding quality is affected by the coding error. Only by controlling the error can we ensure the similarity of block simulation and the quality of the model. Therefore, the nonsearch fractal compression coding designed in this paper needs to set a threshold. Only when the error value is less than this threshold can the model matching be guaranteed. If the error is greater than the threshold, the model is considered to be mismatched and the image needs to be re divided.

The threshold is not a fixed value and varies within a range. Generally speaking, the smaller the threshold, the more details can be retained. A large threshold is more suitable for flat image compression and improves the compression ratio. Combined with the previous data, the threshold range is set at 80~200 to achieve a balance, which will not reduce the image quality or have a great impact on the compression ratio. In the application, the threshold also needs to be adjusted. If the quality requirements are relatively high, the value can be 80 to ensure that the value range block is decomposed into small modules for rematching and improve the coding quality. If the compression ratio is required, and the value is 200, more value range blocks must be required to realize decomposition and improve the compression ratio. As shown in Figure 5, combined with the actual requirement of threshold 130, the compression ratio is improved on the basis of meeting the image quality.

The threshold value is selected in combination with the demand in the adaptive nonsearch image compression coding of the image. Figure 6 shows the proportion of combined range blocks under different threshold values, taking into account the image quality and compression ratio, and the threshold range is located at 120~150.

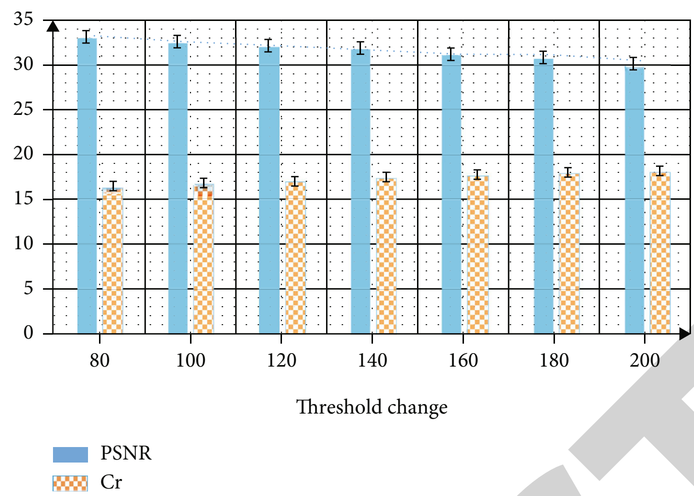


Figure 5: Changes of peak signal-to-noise ratio and compression ratio under different thresholds.

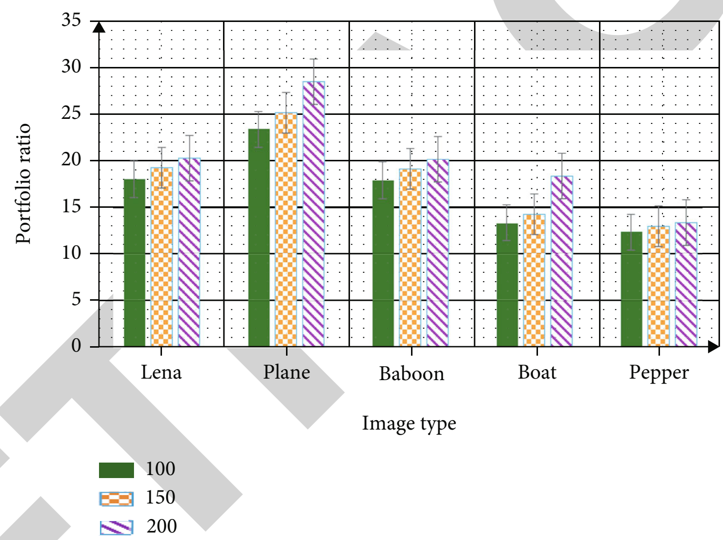


Figure 6: Combined range block proportions under different thresholds.

In order to facilitate the experimental analysis, four images are selected for fractal compression analysis. The algorithm, standard algorithm, and quadtree fractal image coding algorithm are used for analysis, respectively. The coding compression ratio results are shown in Figure 7. From the data in the figure, it can be seen that the compression ratio of value domain block of the algorithm used in this paper is greatly improved, because the adaptive decomposition and combination of value domain block reduces the classification code.

Comparing and analyzing the coding time, the measurement results are shown in Figure 8. From the data in the figure, it can be seen that the algorithm used in this paper saves a lot of time, because each value range block does not need to be matched.

The comparative analysis results of coding peak signal-to-noise ratio are shown in Figure 9. From the data in the figure, it can be seen that the peak signal-to-noise ratio of this algorithm is significantly lower than that of the other two algorithms.

In the optimization and improvement design of the folded region, the product of the quadratic error matrix of the vertex and the absolute curvature of the vertex is used as a new error matrix to improve the modeling quality and retain more geometric features. Based on the basic value range block, the value range block that does not meet the threshold adopts the improved adaptive decomposition and combination algorithm and directly adopts the adaptive combination method to meet the threshold. Simulation results show that compared with standard algorithm and quadtree algorithm, this algorithm can not only improve the compression ratio but also reduce the peak signal-to-noise ratio and save search time.

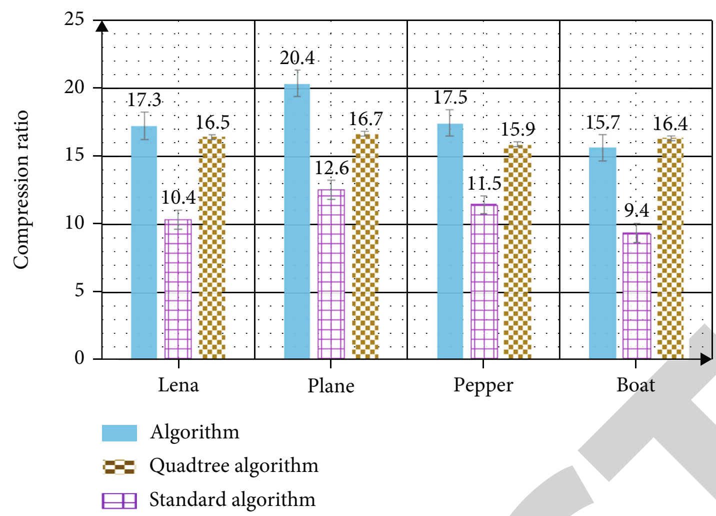


FIGURE 7: Comparative analysis of coding compression ratio.

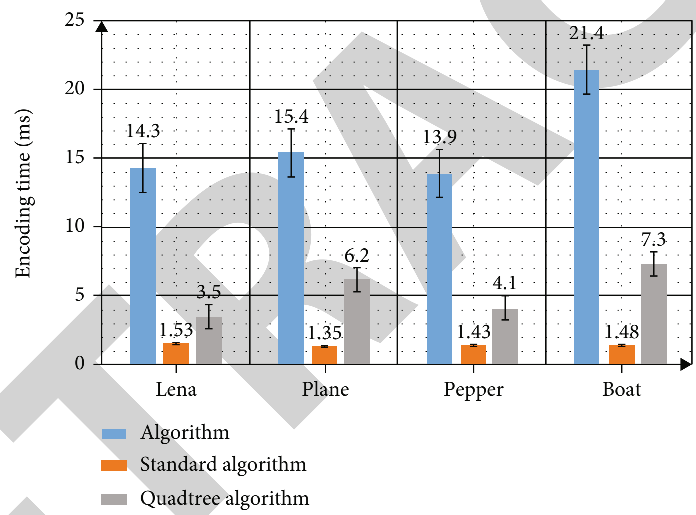


FIGURE 8: Comparative analysis of encoding time.

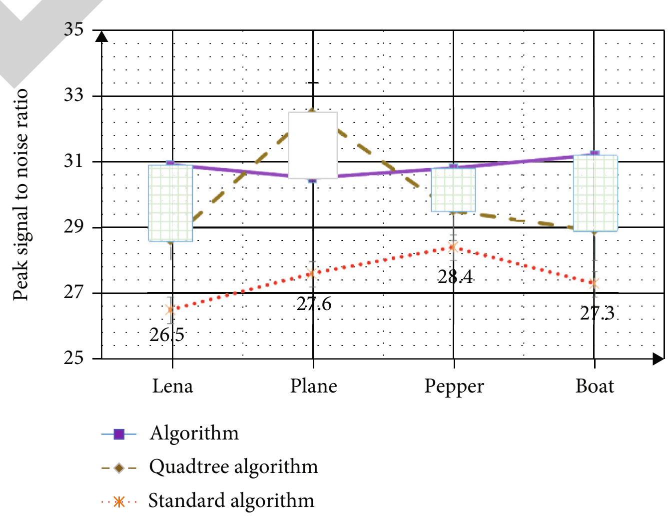


FIGURE 9: Coding peak signal-to-noise ratio comparison.

## 5. Conclusion

The construction of three-dimensional landscape is the expression form of map. It is one of the important research contents of geographic information to bring three-dimensional feeling to people with the help of computer-aided technology. Big data virtual landscape design can not only display the objects of landscape in a full range but also bring new challenges. Based on this, this paper studies the optimization of landscape 3D model based on big data analysis. In the optimization and improvement design of edge folding area, the quadratic error matrix of vertex and the product of absolute curvature of vertex are used as a new error matrix to improve the modeling quality while retaining more geometric features. Based on the basic value range block, the value range block that does not meet the threshold adopts an improved adaptive decomposition and combination algorithm. The method of adaptive combination is directly used to meet the threshold. The simulation results show that compared with the standard algorithm and quadtree algorithm, the proposed algorithm can not only improve the compression ratio but also reduce the peak signal-to-noise ratio and save the search time. It should be pointed out that although the geometric features are retained in the improvement of the quadratic error algorithm, the factor of viewpoint is not considered in the examination, which needs to be further studied.

## Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

## Conflicts of Interest

The author declares no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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