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Countermeasures for Improving Rural Living Environments under the Background of a Rural Revitalization Strategy Based on Computer Virtualization Technology

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Abstract: The all around construction and development of rural areas not only promotes the economic promotion of rural areas and the optimization and adjustment of various industrial structures, but also leads to the deterioration of rural living environments. There is a close relationship between the planning and design of residential buildings and the living environment, which can integrate human life and architecture into a whole. Virtualization technology is a new technology developed in recent years, which integrates computer graphics, multimedia, digital image processing, and other technologies. In this paper, a virtual building model of a rural residential environment based on a convolutional neural network (CNN) is constructed, and the virtual reconstruction of the residential environment is realized by extracting the bottom features of images. The experimental results show that, compared with the support vector machine (SVM) algorithm, the accuracy of the proposed human settlements modeling method is improved by 27.85%. This model can effectively solve the problem of unclear and not stereo images, and at the same time keep the clarity of the virtual reconstruction images of buildings, which can provide theoretical support for the improvement of the rural living environment under the background of a rural revitalization strategy.

Keywords: human settlement environment; rural revitalization; virtualization technology; convolutional neural network

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1. Introduction

The effective implementation of the rural revitalization strategy plays a crucial role in promoting the long-term and stable development of China's market economy. However, in the actual development of rural economic construction, we still face a series of problems, which hinder the steady implementation of the rural revitalization strategy [1]. Along with the development of the Chinese rural economy, ecological environmental pollution is becoming more and more serious. Ecological environmental protection and sustainable development of the rural economy are the key to improving China's rural environmental governance system and improving rural economic benefits [2]. The rural ecological environment affects the rural economic development to a great extent, so we must clearly understand the relationship between the two and help the sustainable development of the rural economy by optimizing the rural ecological environment [3]. Information technology has become the main driving factor of economic and social development, and network organization has become a new form of social spatial organization with diversification and multi-center characteristics. People's production and life, as well as the organization form and structure of the whole society, are moving towards the network. The so-called living environment is a sustainable living environment that ensures the harmonious coexistence between houses and nature while satisfying people's living conditions [4]. The purpose of architectural design is to provide a place for people to dwell and live. The so-called human settlement environment is the living environment of people, so it has a close relationship

with the planning and design of residential buildings [5]. Virtual technology breaks down the geographical isolation, blurring the boundary between global and local, virtual and real, and the living environment will also show new characteristics to suit it. We need systematic combing and exploration and to strive to complete the transformation and upgrading of environmental design in the new era through professional analysis and research [4].

Due to the continuous progress of computer software and hardware technology, computer image and graphics processing ability has also made a qualitative leap, making it possible to reconstruct complex scenes in real time. Among them, the three-dimensional reconstruction technology of architectural scenes is of great significance because it has broad application prospects [6]. The rural revitalization strategy clearly points out that in rural construction, we should take a beautiful and livable environment as the guide and do a good job with the management of common environmental problems in rural areas [7]. Strengthening the overall improvement of rural human settlements and promoting the construction and development of a beautiful countryside are important measures to promote the effective implementation of China's rural revitalization strategic plan. The information society makes the environment an important carrier and medium of information [8]. This shifts the environment from the container of people's basic material life to the carrier of people's higher spiritual life. People hope that in the same environment, multi-level and multi-type needs can be met, and the function of the original living environment can present the characteristics of compound transcendence [9]. Image-based three-dimensional reconstruction technology focuses on reconstructing three-dimensional object models from two-dimensional images with good technology, which is the key research field in computer vision technology. In this paper, a virtual model of a rural residential environment based on a convolutional neural network is constructed, and the virtual reconstruction of the rural residential environment is realized by extracting the underlying features of images, thus providing theoretical support for the improvement of rural residential environments under the background of the rural revitalization strategy.

Sustainable development is the primary issue facing the world today in the field of environment and society, and housing is an important part of both the environment and society [10]. The main purpose of sustainable housing design is to realize the goal of ecological civilization construction and the sustainable development of society from many angles. Sustainable housing design is of great significance to resolve the contradiction between the economy and the environment. Therefore, in residential planning and design, green sustainability is an important factor [11]. Image-based 3D reconstruction technology extracts the underlying features of multi-view images, matches the image features, and establishes 3D models by using the technology to restore structures in motion, which are the methods adopted by many computer reconstruction technologies at present. Among them, the extraction and matching of the underlying features of the image is particularly important, which is the basis of understanding images, analysis, and image matching [12]. In the process of 3D reconstruction of natural scenes, there are often no rules to follow in the reconstructed images, so there are no specific restrictions on feature selection. The planning and design of residential buildings have a close relationship with the living environment, which can work to integrate people's lives with architecture.

This paper puts forward the visualization strategy of rural human settlement environments based on computer virtualization technology that creates three-dimensional images. The main innovations and contributions of this research are as follows:

(1) In order to improve the quality of three-dimensional images, an image reconstruction system of rural human settlements based on computer virtualization technology is designed, point cloud information of three-dimensional images is extracted, and image noise is removed by median filtering technology.
(2) The model uses the information of corner structure in the image to construct an undirected graph with the corner as the node, and the weight of the edge in the graph is measured by the geometric relationship between the corners, and the corresponding

surface features in the image are obtained by searching the simple ring structure in the undirected graph.

2. Related Work

Ackerman et al. used the knowledge of computer vision technology to calculate the normal vector by using geometric constraints, and then used back projection technology to calculate the corresponding error [13]. The technical method is easy in its calculation process and simple in technique. However, it is only suitable for the vanishing point coordinates with limited distance, and the modeling error is a little too large. Chong et al. took into account the principles of proximity, similarity, closure, and directionality in the Gestalt principles; extracted the factors such as building size, shape, direction, and density as the shape description parameters of building planar elements; and calculated the homogeneity of the above factors between adjacent buildings by using the spatial proximity relationship obtained by Delaunay triangulation or Voronoi diagram [14]. Chen et al. conducted a cognitive experiment on the influence of building directionality, proximity, and similarity on building clustering, and clustered them by using the average distance of the rotating jam combined with the geometric characteristics of buildings [15]. Wang et al. considered using mathematical methods to optimize the process of 3D reconstruction and proposed a method of 3D reconstruction based on a single image in projective geometry, which is a new and simplified calculation method [16]. Jangra et al. extended the knowledge of projective geometry, and used an intersection fitting algorithm to calculate the alignment vector coordinates, thus realizing the reconstruction of a single image [17]. Lv et al. used the similarity of geometric features between buildings and the identification method of linear arrangement and curved arrangement in the linear arrangement mode of buildings [18]. Michailidis et al. extracted the linear arrangement of buildings according to the similarity of building description parameters determined by Gestalt visual perception theory and trimmed the neighborhood diagram of buildings generated by Delaunay triangulation. On this basis, they put forward the typification strategy of building linear arrangement in cartographic generalization [19]. Yu et al. put forward a multilevel classification method for building arrangement. Firstly, the building arrangement is divided into linear arrangement mode and non-linear arrangement mode, then the linear arrangement mode is divided into linear arrangement, curved arrangement, and road arrangement, and the non-linear arrangement mode is divided into grid arrangement and unstructured arrangement [20]. Zeng et al. divided the spatial distribution pattern of buildings into regular pattern and irregular pattern, and further divided the regular pattern into four patterns: linear pattern, curved pattern, parallel and vertical pattern, and grid pattern [21].

No matter which method or technology is adopted for 3D reconstruction of a single image, the influence of some uncertain factors on 3D reconstruction can be fundamentally eliminated only if the preconditions are already known. Convolutional neural networks have an obvious advantage in extracting features from large-scale images, which can automatically extract features of building targets without relying on human feature design. In this paper, aiming at the reconstruction work based on architectural scene images, the extraction and matching technology of the underlying topological features of architectural images is studied, and a virtual model of residential buildings in rural human settlements based on convolutional neural networks is proposed.

3. Visual Modeling of Rural Human Settlements Based on CNN

3.1. Application Value of Computer Virtualization Technology in Rural Residential Environment Construction

Due to the continuous progress of society, the real living environment is deteriorating, natural disasters and diseases are constantly appearing, and the industrial civilization and lifestyle of excessive production and consumption have led to a series of social problems, forcing people to actively seek more effective and new ways to deal with the contradiction between the environmental needs of human survival and development and the limited

real environment. Livability is mainly reflected in people's comfort in the process of living, and the planning and design of residential buildings is mainly intended to serve people. Therefore, in the design process, we should fully consider people's feelings in the process of living and improve the living environment and spatial layout so as to improve people's convenience in their daily lives.

The improvement of infrastructure and the soft environment is conducive to attracting social funds and outstanding talents to return to their hometowns to support rural development, dig deep and improve the effect of resource development and utilization, and promote the harmonious development of urban and rural areas. Every link of three-dimensional design has virtual characteristics, and they also all have valuable characteristics in the real world. The three-dimensional interactive model of rural residential environment buildings is shown in Figure 1.

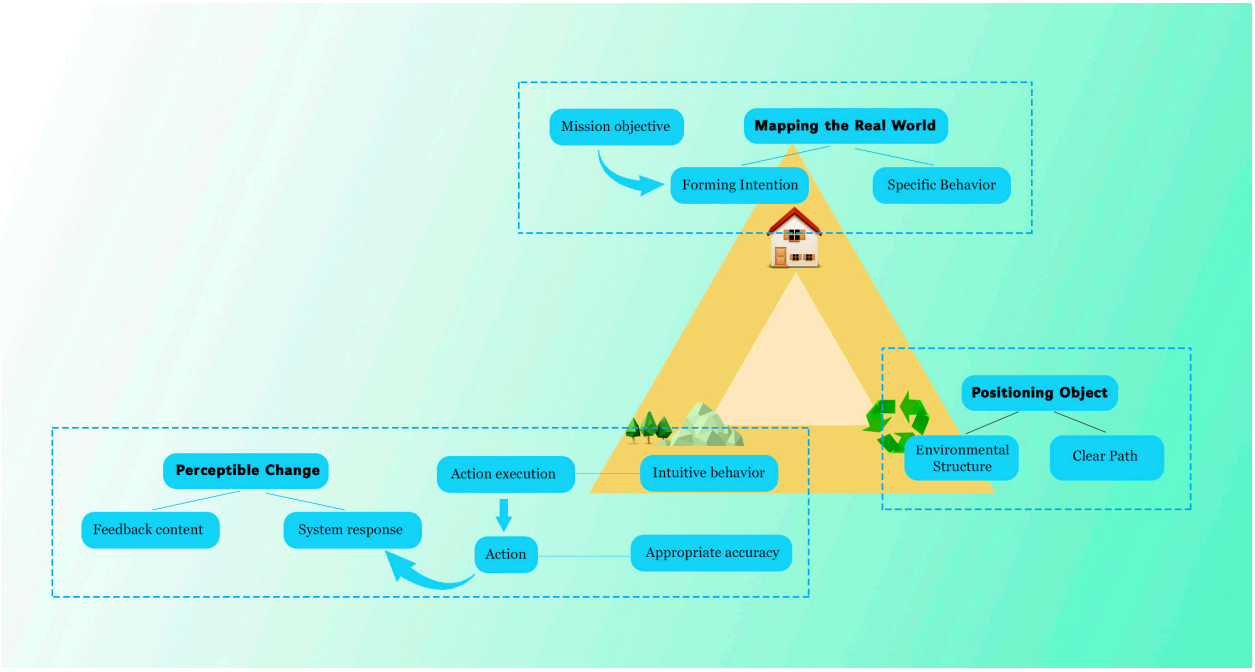

Figure 1. Three-dimensional interactive model of rural residential environment buildings.

Greening is a necessary factor in architectural design planning, especially for livability, therefore professional design guidance is required in this area. Compared with the initial stage of rural construction and development, remarkable results have been achieved, but from the social macro layer, the coordination and integration of urban and rural areas is still far off. The development of rural areas is still weak compared with cities, so the environmental planning and construction of rural livable space requires more support and guidance [22]. The phenomenon of environmental homogeneity symbolization is serious, and all environmental forms are limited to the laws of creation in the real world, which is difficult to achieve to meet the needs of the information age. Therefore, creating a unique, dynamic, and flexible living environments that meet different individual needs has become a lasting demand throughout the information age.

In order to implement the concept of sustainable development, in the process of planning and designing residential buildings, it is necessary to actively introduce the design concepts of ecological buildings and green buildings to reduce energy consumption as much as possible. In the process of design, it is fundamentally necessary to protect the environment, reduce energy consumption in each step, and make good use of water resources, so as to realize the unity of human settlements and ecological environments they exist in [23]. The living environment in the information age should not only make people

feel comfortable, beautiful, and functional, but also allow users know their life and self as part of the environment, so that users can exert their full potential in this environment.

3.2. Visual Modeling of Rural Human Settlements

To study the rural human settlement environment systematically and accurately, it is necessary to reconstruct the environment layout into a 3D model. Under the framework of computer virtualization technology, we propose a method suitable for rural human settlements based on CNN. The input data is an image, while the expected output of the algorithm is a 3D mesh model. The images taken by monocular cameras can be interpreted by human beings, but it is difficult to reflect the accurate spatial structure. The 3D mesh model is composed of a large amount of mesh, which depicts the overall layout and details of the environment comprehensively. The output model can be interpreted through computer virtualization technology, which enables researchers to view the model from multiple perspectives, thus facilitating further research and iterations.

The algorithm can be divided into several stages. Firstly, the input image is preprocessed and converted into a binary matrix. It is also required to estimate the depth of each pixel in the original image based on CNN. Combining the intrinsic matrix of the camera and the depth data, the non-zero positions of the binary matrix are projected into the canonical coordinate system to form a point cloud. The point cloud data is then smoothed and transformed into the normal vectors of the point cloud surface to obtain a 3D mesh model. The rest of this section introduces the details of each stage in the algorithm.

The process of converting a normal image to a monochrome image is called binarization. After this process, the information in the image is simplified, and only important features such as contours and edges in the scene are retained, which is crucial for subsequent image analysis and processing. Let the input image I have a size of $h \times w$, and let the pixel value in channel c at position (i, j) be a_{ijc} $(1 \le i \le h,\ 1 \le j \le w, c \in \{R, G, B\})$. Let T be the threshold value to detect the significant pixels, and the binary matrix $B = \{b_{ij}\}$ can be calculated as follows:

$$b_{ij} = \left[T \le \frac{1}{3} \sum\nolimits_{c} a_{ijc} \right] \tag{1}$$

The pixels corresponding to the non-zero positions in the matrix B reflect the structural parts of the rural human settlements, such as building contours and object edges, while the remaining pixels will be ignored in the subsequent process.

Since the images taken by an ordinary camera do not contain information about the distance from the object to the camera, it is hard to calculate the spatial coordinates of each pixel in the image. Therefore, depth estimation is the key preparation work for transforming planar data into 3D models.

Specifically, we need to extract image features and estimate the matrix $D = \{d_{ij}\}$, where d_{ij} represents the depth value of the pixel at position (i, j). In the field of computer vision, CNNs are widely used for various image processing tasks, and we can train a CNN to predict the depth of pixels in an image. Generally, this model can be represented as a mapping $\mathcal{F}$, where:

$$D = \mathcal{F}(I;\ \theta) \tag{2}$$

θ is the network parameter updated through training, and the input image I is passed through the network to obtain the depth matrix D. The CNN model used for this task mainly consists of a backbone network and a regression network, as shown in Figure 2.

The backbone network consists of multiple convolutional and pooling layers and is used to extract low-level features and semantic information from the input image. The regression network adopts a fully connected structure to map the extracted features to the depth values and predict the matrix D. Assuming the input vector is $x \in \mathbb{R}^{h \times w}$, the convolution kernel is $\omega \in \mathbb{R}^{u \times v}$, the stride is s, and the zero-padding length is z, then the output feature is:

$$y = x * \omega \in \mathbb{R}^{p \times q} \tag{3}$$

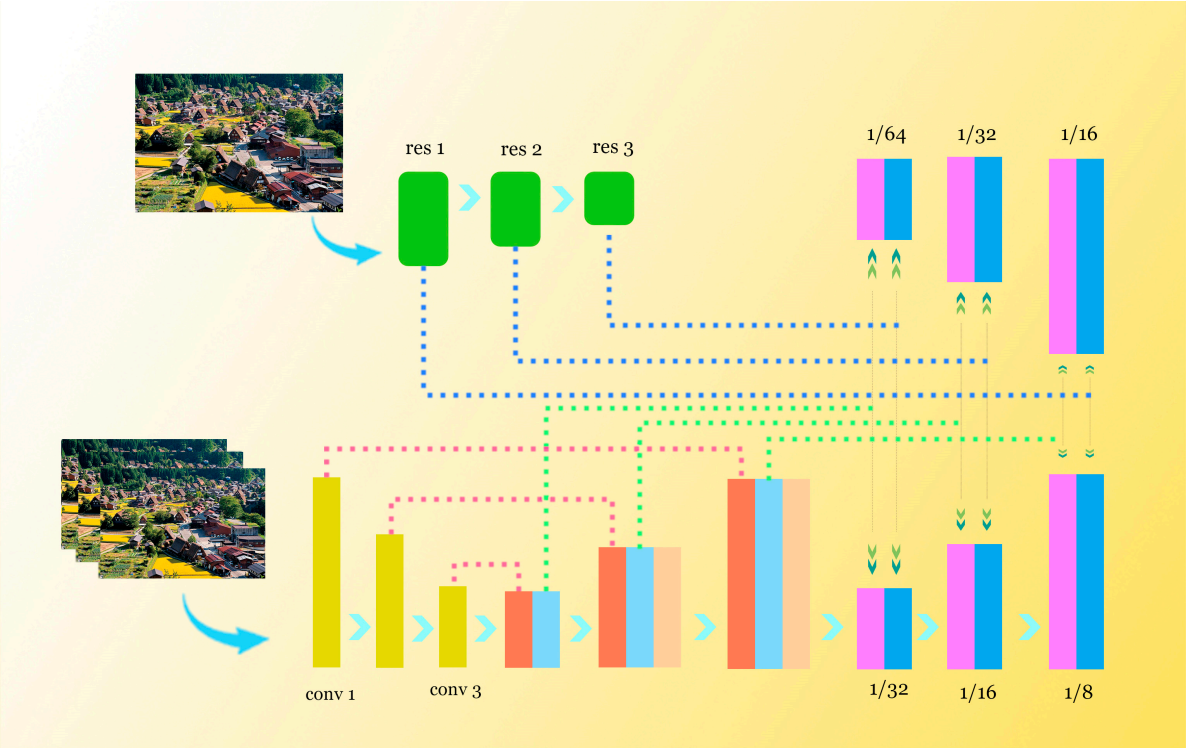

Figure 2. Building modeling of human settlements based on CNN.

The size of the output feature is calculated as follows:

$$p = 1 + \lfloor \frac{h - u + 2z}{s} \rfloor \tag{4}$$

$$q = 1 + \lfloor \frac{w - v + 2z}{s} \rfloor \tag{5}$$

The data to train the model can be taken from a publicly available dataset, e.g., Make3D. It can also be generated using virtualization techniques, where multiple images are taken at different angles of an existing 3D model, and the depth data can be obtained directly. To improve the accuracy and robustness of the model without significantly increasing the computational overhead, a CNF (convolutional neural field) is introduced to reflect the spatial correlation of pixels. This post-process leads to more accurate depth estimation results.

With depth information, the images can be converted into point clouds. Assuming the camera intrinsic matrix is known, then the camera's focal length (f_x, f_y) and its optical center (c_x, c_y) can be obtained. The spatial coordinates $P_{ij} = (x, y, z)$ projected from the position (i, j) in the original image can be calculated as:

$$x = \frac{(i - c_x)d_{ij}}{f_x} \tag{6}$$

$$y = \frac{(j - c_y)d_{ij}}{f_y} \tag{7}$$

$$z = d_{ij} \tag{8}$$

Using the binary matrix B obtained in the preprocessing stage, the point cloud C should be:

$$C = \{P_{ij} | b_{ij} \neq 0\} \tag{9}$$

Since the depth information of the image is estimated by the CNN model, there will inevitably be some errors. Therefore, before converting the image to a point cloud, we use a median filtering algorithm to smooth the point cloud. Median filtering is a commonly used algorithm that can effectively remove outliers while preserving edge information. For each position (i, j), we use the median value of the depth within its neighborhood to replace its original depth value.

$$d'_{ij} = \text{median}\{d_{kl} \mid \text{dist}((i,j), (k,l)) \leq \gamma\} \quad (10)$$

The depth data calculated by the above formula eliminates the noise in the original data, making the result more reliable. It is worth noting that the neighborhood radius γ and the point cloud density will affect the effectiveness of the median filter, which needs to be adjusted according to the characteristics of the scene to achieve the best performance.

In order to eliminate the registration noise in the image, the initial value is randomly selected and linearly transformed. Local linear approximation method and nonlinear least square method are used to achieve image iteration to convergence and maximum likelihood estimation. In order to obtain accurate 3D image reconstruction results after optimizing the image point cloud, it can be achieved by expanding the iterative convergence range of the image.

Adhering to the concept of the living environment, we must pay attention to the scientific and rational use of resources when planning and designing residential buildings. As far as residential buildings are concerned, most of the available resources should be designed to rely on and use natural resources, and people's visual tastes should be taken into account in the design process to avoid the heavy feeling caused by excessive natural landscapes. The main function of the outdoor environment is to serve the residents, including their living needs, communication needs, and leisure needs. In the process of outdoor environment planning and design, we should fully consider the climate and cultural factors of the place where the house is located and ensure that the outdoor environment can showcase the local characteristics. For example, the first condition that the selected green vegetation must meet is that it can grow in the local geographical climate.

4. Result Analysis and Discussion

4.1. Performance Simulation of Human Settlement Environment Virtualization Modeling

Labelme software is used as the dataset labeling tool. The outlines of buildings in training datasets and test datasets are drawn manually, and the positions of extreme points and intermediate points are selected manually. Labelme software is used to label the outline areas and points. When the E-DEXTR method and the DEXTR method are used for training, the model weights obtained by DEXTR network training on PASCAL2012 dataset are used as the initial parameters of the network, and then the required accurate segmentation model of the aerial photography of buildings is obtained through a training dataset. The following factors should be considered in the facade design of residential buildings: requirements for internal space for a residential building, the coordination of external natural climate and human environments for residential buildings, and the harmony between the two [24]. While breaking through the facade style of residential buildings, it is necessary to pay attention to the fact that there should be no chaotic collocation and blind patchwork of various styles, and the characteristics of nature and harmony should be highlighted. In order to verify the effectiveness and practicability of the virtual reconstruction model of human settlements in this paper, this section tests and analyzes the performance of the system. In the experiment, the time needed to retrieve the architectural images of human settlements with different numbers of pictures and different nodes was tested. The experimental results are shown in Figure 3.

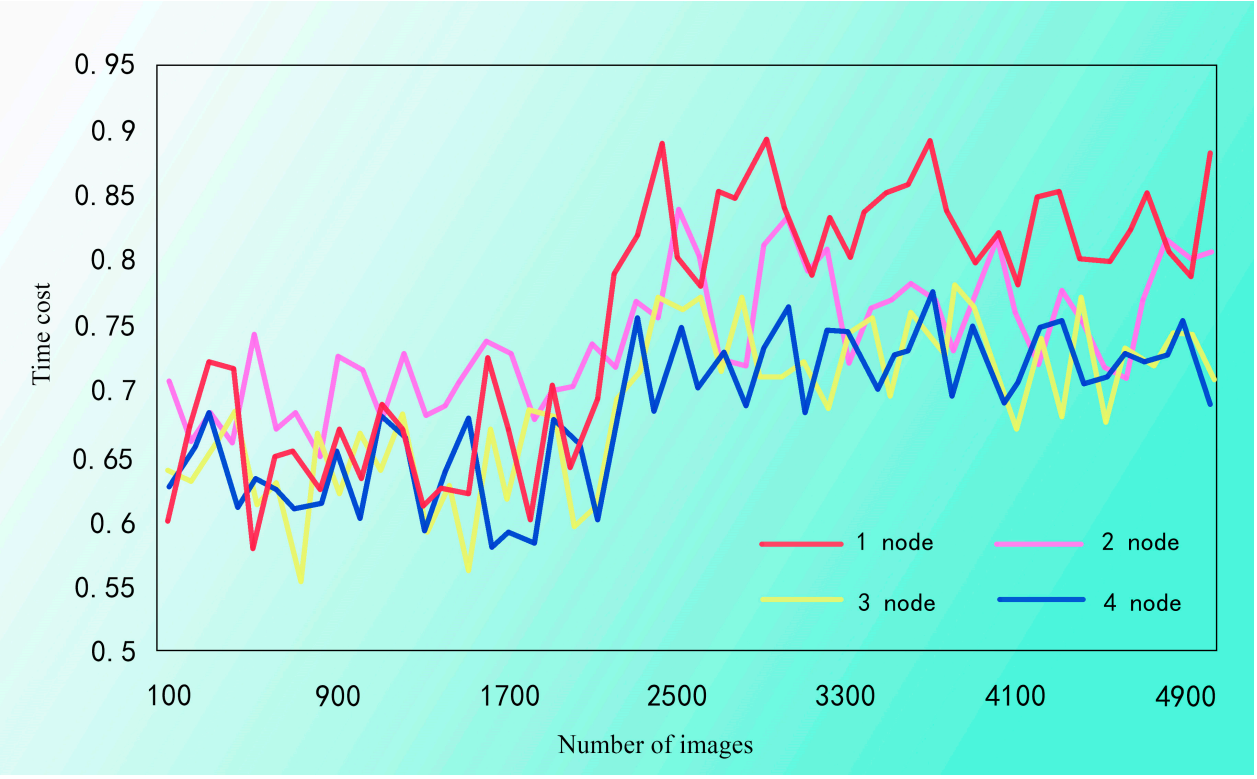

Figure 3. Time consumption of image retrieval.

It can be seen from Figure 3 that when the number of architectural images is small, the more nodes there are, and the more time it takes for image retrieval. With the increasing number, the advantages of multiple nodes can be revealed. Therefore, when the number of architectural images is large, the proposed virtual visualization scheme can obviously improve the retrieval efficiency. An effective way to solve the problem of model generalization caused by insufficient data volume and data diversity is to adopt data enhancement method, aimed at obtaining a network model with a stronger generalization ability by transforming the training pictures. The commonly used data enhancement methods include image rotation, flipping, scaling, and translation, and more complex methods include adding noise disturbance to the pictures and blackening a randomly selected area in the input images.

In the design of the house facade, from the point of view of the surrounding residential facade, the objective environment must first be considered, and then considerations can be made according to the residential needs for planning and design. The planning and design process should give full consideration to the concept of a sustainable living environment that is people-oriented, energy saving, and supports environmental protection, thus shaping the humanistic connotation and sustainability of residential buildings. Through the establishment of an experiential interactive platform, human settlement architecture will be transformed into a digital cultural form. With a click of the mouse, the audience can feel the three-dimensional animation demonstration simulating the real environment, which not only provides a strong sense of experience in the architecture of human settlements but can also deepen people's understanding of the project through the simulation production process. The interactive scoring results of the constructed virtual visualization system are shown in Table 1 and Figure 4.

Table 1. Temperature and wildlife count in the three areas covered by the study.

Sample Set	CNN	SVM
100	68.8	59.3
120	67.1	57.2
140	68	57.9
160	66.6	66.3
180	73.2	65.7
200	72.9	62.3
220	81	66.4
240	77.3	69.1
260	80.1	65.7
280	77.1	67
300	82.5	71

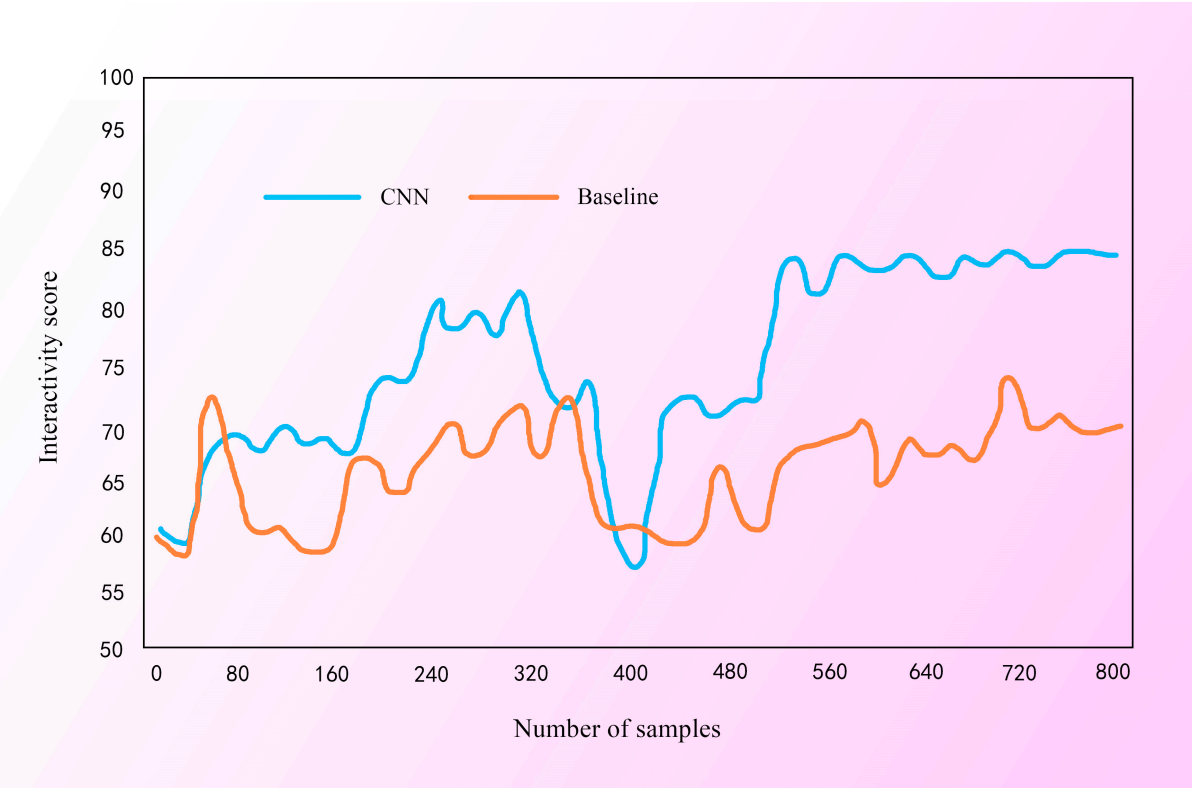

Figure 4. System interactivity score.

As can be seen from Figure 4, compared with other systems, this system has higher interactivity and better user experience. In this paper, a dynamically generated data entry method is designed. Every time you enter the data entry interface, the system can generate the data entry interface according to the metadata that has been defined at present.

In view of the insufficient participation of the main body in the renovation of the rural human settlement environment, it is suggested that rural workers encourage villagers to participate in the renovation work, clarify the main position of rural residents, and strengthen publicity and education, so that rural residents can realize their responsibilities and enjoy benefits in the renovation and maintenance of rural human settlement envi-

ronments [25]. Table 2 and Figure 5 show the subjective assessment test results given by observers on the virtual reconstruction model of human settlements.

Table 2. Subjective assessment given by observers on the reconstruction image of the building virtualization.

Sample Set	CNN	SVM
1	9.4	8.2
2	9.6	7.9
3	9.2	8.1
4	9.4	8.8
5	9.2	7.8
6	9.5	7.9
7	9.1	8.2
8	8.8	7.9
9	8.9	7.8
10	9.1	7.9

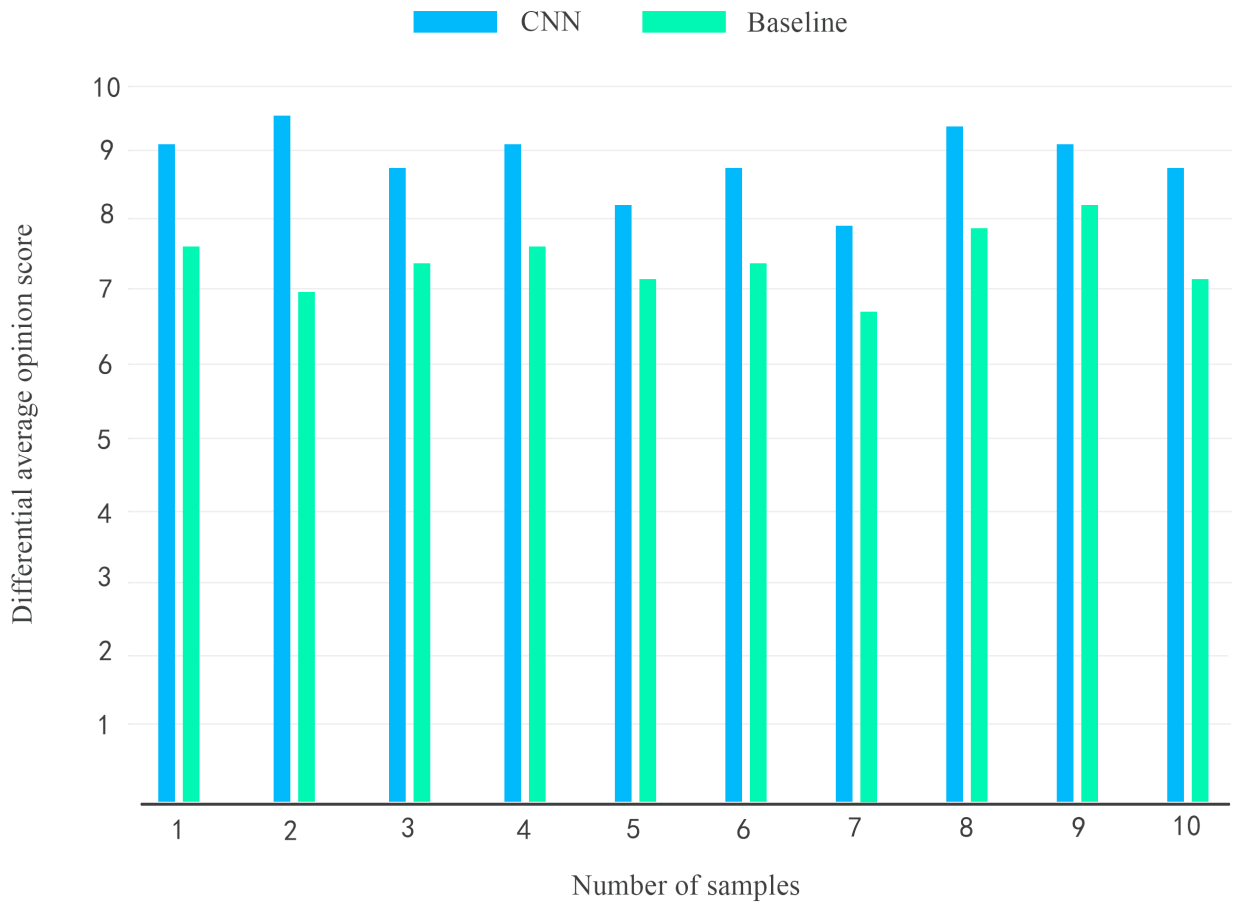

Figure 5. Subjective assessment given by observers on the virtual reconstruction image of the building.

The experimental results show that the modeling method of human settlements in this paper can effectively maintain the local structure of architectural images of human settlements and enhance the contrast and stereo of the images. In the practical design work, as the combination of residential buildings and the environment requires a process, the architectural design should be adjusted continuously according to the environmental conditions, so as to ensure the practicality of the building and promote the harmonious

development between man and nature. Figure 6 shows a comparison of the modeling accuracy of different algorithms.

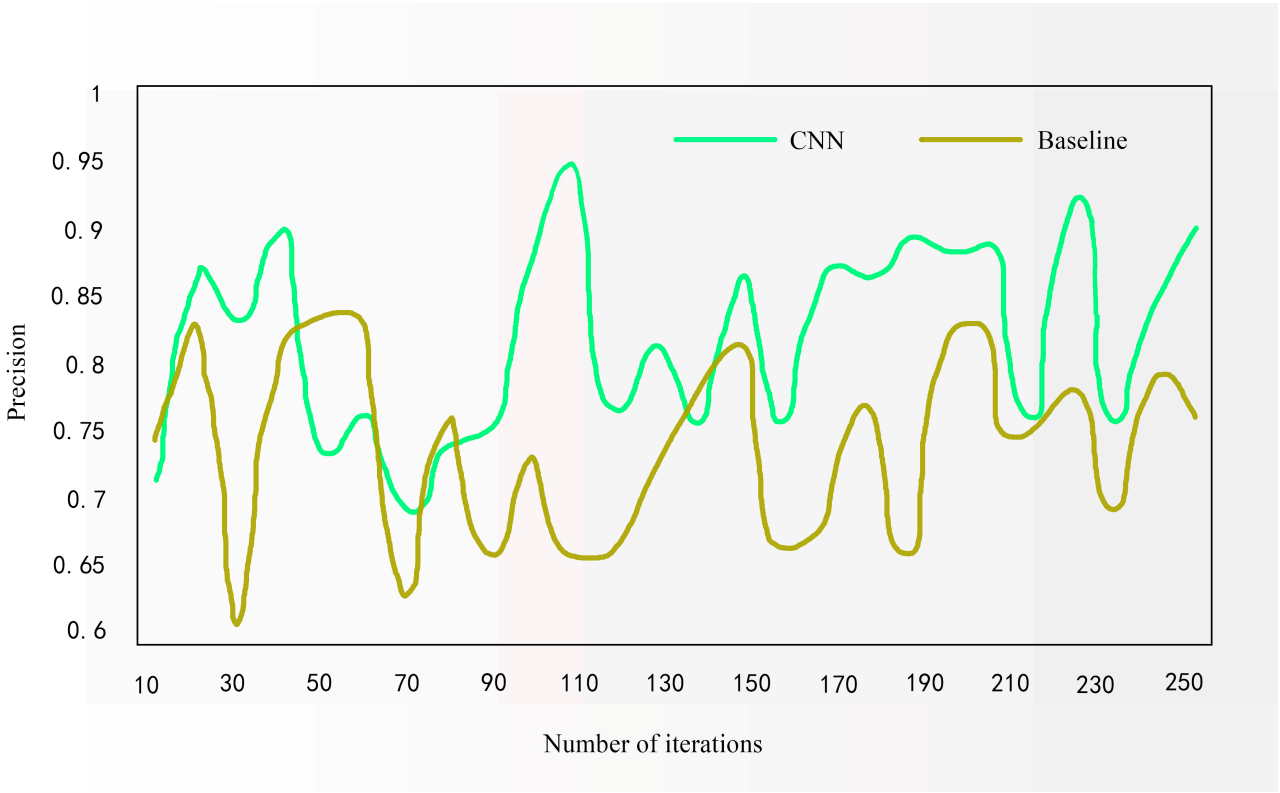

Figure 6. Accuracy results of different algorithms.

Compared with the contrast SVM algorithm, the precision of the proposed human settlements modeling method in this paper has increased by 27.85%. It can effectively solve the problems of unclear and non-stereoscopic images, while maintaining the clarity of the virtual reconstruction images of buildings. For designers, the interior design of the house needs to reflect comfort, so it is also necessary to ensure that the building has a good light environment, sound environment, and air environment. In practice, it is necessary to strengthen the understanding of the natural environmental conditions of the building, and complete the evaluation of the system based on the topography of the building, so as to realize the reasonable planning of the building, strengthen the lighting of the building in winter, keep the ventilation smooth in summer, and filter the noise with the help of green plants on the building facade, so as to provide residents with a suitable living environment [5].

In this paper, by limiting the total time of scene rendering, different levels of detail models are selected and loaded, which can satisfy the real-time effect and immersion of the scene and improve the quality of the models in the scene. Comparing and enhancing the image processing effect by different methods takes time for comparative analysis, as shown in Figure 7.

As can be seen from Figure 7, the processing time of the traditional virtual reconstruction image of buildings increases with the increase of the number of pixels of feature information, which takes a long time. However, the time-consuming effect of digital restoration of building virtualization reconstruction images proposed in this paper is on the rise, but it has obvious advantages over SVM.

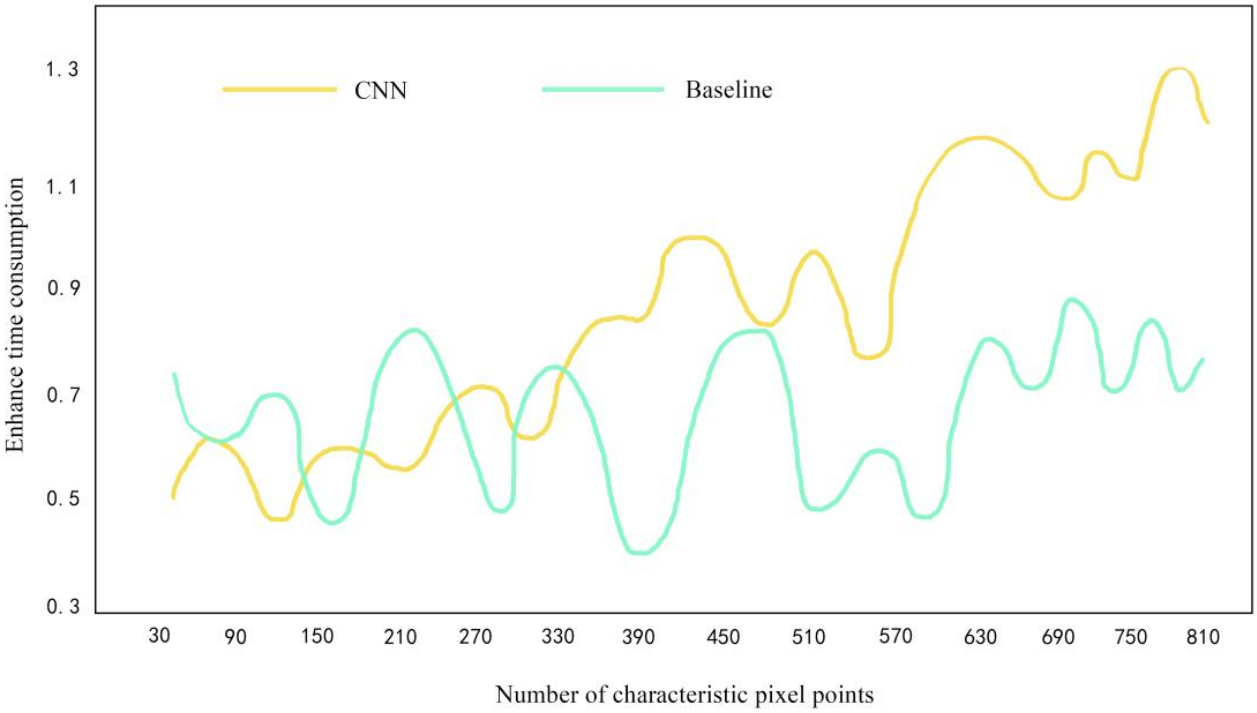

Figure 7. Time consumption comparison results of enhanced image processing effects of different methods.

4.2. Countermeasures for Improving the Rural Living Environment

Under the strategy of rural revitalization, we should learn from the experience and lessons of rural construction and development, establish a long-term working mechanism, and promote the effective development and upgrading of rural human settlements. To establish a long-term mechanism for rural environmental governance, we should start with the cultivation of farmers' living habits and restrain the villagers' garbage storage and garbage sorting habits through village rules and regulations. This can be done so that they can gradually develop good living habits and garbage disposal methods, thus reducing the pollution to the rural living environment. In view of the low ecological benefits of rural human settlements remediation, it is suggested that rural workers should optimize and improve the remediation concept, take green ecology and sustainable development as the guiding ideology of rural construction, and then improve the existing problems in resource utilization and pollution control, so as to effectively improve the ecological environment in rural areas. If we want to guide the masses to participate in the renovation activities of human settlements, we must establish a pragmatic development mechanism, strengthen the internal relationship between human settlements and farmers' interests, and then enhance farmers' sense of responsibility and mobilize farmers' participation. It is important to respect farmers' dominant position, strengthen their service awareness, carefully understand their real needs, establish a democratic decision-making mechanism to enhance farmers' sense of participation, and at the same time actively mobilize farmers' enthusiasm for management and maintenance and playing a supervisory role. Under the guidance of this principle, rural workers should make comprehensive use of all kinds of resources according to the actual situation of the areas under their jurisdiction, and through green transformation, realize the recycling of resources, reduce the waste of rural energy, and improve the ecological benefits of human settlements.

In view of the lack of innovation in the mechanism of rural residential environment remediation, it is suggested that rural workers should start from two aspects of energy and technology, increase the application of new energy and technology in agricultural production and life, reduce the pollution caused by agricultural production and life, and provide a guarantee for the construction of a good rural residential environment. In the

planning and design of the internal environment of the building, we should also pay attention to the regional cultural and historical atmosphere and reflect the local climate and geographical characteristics though the use of greening design. Therefore, in community environment planning, it is also necessary to understand the basic terrain of the surrounding area and make full use of the lot resources, so as to make the reasonable distribution of residential buildings. The overall level of rural economic development directly affects the progress of the improvement of the rural living environment. While absorbing external funds, we should actively tap into the potential of the local economy. All rural areas should combine their rural characteristics, fully utilize their comparative advantages, seek the meeting point of village characteristics and market demand, extend rural industrial and value chains, and promote the development of rural industries.

Realizing the reasonable planning and design of the external environment of residential buildings can extend the indoor space of buildings and promote the quality of life of residents. In external environment planning and design, we should also focus on the regional cultural and historical atmosphere, and in greening design, we should reflect the local climatic and geographical characteristics. Therefore, in the planning of community environments, we should also know the surrounding basic terrain, make full use of the resources of lots, and make the residential buildings reasonably distributed. Rural workers can combine the production and living needs of rural residents to carry out the construction of supporting facilities dedicated to business, culture, municipal administration, sports, and other fields. Through the construction of elderly activity centers, old-age apartments, gymnasiums, parking lots, public toilets, and other facilities, the planning and layout of villages will be optimized to improve the livability of rural areas.

5. Conclusions

The all around construction and development of rural areas not only promotes the economic promotion of rural areas and the optimization and adjustment of various industrial structures, but also leads to the deterioration of the rural living environment. Virtual technology has broken geographical limits, and the boundaries between global and local, virtual and reality have become blurred, and new living environments will also present new features that are compatible with this blurring. Compared with the baseline algorithm, the modeling method of human settlements proposed in this paper improves the accuracy by 27.85%. It can effectively solve problems of image clarity and stereoscopic issues, and at the same time keep the clarity of the reconstructed image of a virtualized building. CNN-based building virtualization reconstruction digital image restoration image processing effect shows an increasing trend, but it has obvious advantages over SVM. Therefore, this model can effectively solve the problem of the image being unclear and stereoscopic, and at the same time keep the clarity of the virtual reconstruction image of the building, which can provide theoretical support for the improvement of rural living environments under the guidelines of the rural revitalization strategy. For the planning and design of residential buildings, in the process of design, designers not only need to pay attention to the practicality of residential buildings, but also need to reasonably plan for residential buildings that are based on the living environment, which fully reflects the harmonious coexistence between man and nature.

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