Computer Vision Based Method for Identifying Grouting Defects of Prefabricated Building Sleeves

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Abstract. In order to accurately detect the grouting defects of construction sleeves, a method for identifying the grouting defects of prefabricated construction sleeves based on computer vision is proposed. The 3D target detection algorithm is used for feature point detection, and the corner detection model of assembled building is constructed to obtain the feature angle detection results and match the feature angles. The constraint relationship is extracted from the data in the image sequence of the grouting defects of the prefabricated construction sleeve, and the parameters of the filling defects of the construction sleeve are calibrated. Finally, the defect identification is completed through the sleeve grouting scanning of computer vision. The experimental results show that the method based on computer vision to identify the grouting defects of prefabricated construction sleeve has strong recognition ability and can well complete the defect identification.

Keywords: Computer Vision · Fabricated Buildings · Construction Sleeve · Sleeve Grouting · Identification of Grouting Defects

1 Introduction

The modernization of the construction industry is the development trend of the future construction industry, and it is the fundamental change of the construction production mode from extensive production to intensive production. Compared with the traditional cast-in-place building model, which has large environmental pollution and long production cycle, the prefabricated component model of prefabricated building has the advantages of fast construction speed, reliable quality, energy saving and environmental protection, and labor saving [1].

The key of prefabricated structure is how to ensure the connection performance between prefabricated components and the overall performance of the structure. The quality of these performance is closely related to the connection between prefabricated building components. The working performance and durability of node connection will directly affect the reliability of connection and the safety of the overall structure. At present, the most commonly used connection method for the main reinforcement of prefabricated components in prefabricated concrete structures is the reinforcement sleeve

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grouting connection, that is, the connecting reinforcement is inserted into the metal sleeve, and then the high-strength grouting material is poured. The stress is transferred through the bonding of grouting material and sleeve wall and the bonding of grouting material and reinforcement [2].

The node connection is the key to the fabricated concrete structure, and it is an important guarantee that its overall performance is equivalent to that of the cast-in-place. Therefore, the quality of the grouting connection of the steel sleeve is very important. In my country, due to the short development time and fast development speed of steel bar sleeve grouting connection, insufficient training of on-site personnel, and the need to improve the precision of factory production, there are still some problems in grouting quality. Moreover, in actual engineering, due to the influence of various factors, the injected grouting material may return, coagulate, harden under the action of its own fluidity and gravity, or the air inside the sleeve cannot be effectively discharged, resulting in the sleeve. There is a hollow at the end or in the middle, which reduces the effective anchorage length of the steel bar in the sleeve. The grouting defect will lead to the decrease of the joint connection performance, which will seriously affect the overall performance of the prefabricated building, thus making the prefabricated building have greater safety hazards. Therefore, related research is very necessary and urgent [3, 4].

In recent years, with the continuous development of computer, big data network, aerospace and other high-tech, image rendering technology has been widely used in many research fields. The image drawing work is to use image processing technology to conduct professional operation and processing on the actual scene and screen through shooting, so as to form a scene information picture that meets the work requirements and standards [5, 6]. At present, image rendering technology faces great challenges in terms of operation. Due to the expensive and complex image capturing equipment, the common camera hardware facilities can not meet the standard requirements, and the captured images are poor in terms of pixels. For some scenes that require comprehensive and detailed image rendering, high-end equipment has to be used to complete the operation, which increases the complexity of the shooting process. When there are obvious light changes, noise effects and size changes in the real scene, the traditional methods have different degrees of error. Therefore, the current image mosaic technology has adopted a lot of research on how to further improve the image accuracy and simplify the image matching process, and the image adoption and other factors in the mosaic process have also been focused on.

To sum up, this paper uses computer vision to identify the grouting defects of prefabricated construction sleeves. Computer vision can identify, track and measure the targets by using cameras and computers. It is an effective image processing method. After the detection image obtained by computer vision is transmitted to the computer, it can effectively improve the information processing ability and speed up the information processing speed. The accuracy and effectiveness of defect identification can be effectively improved by three-dimensional scanning of sleeve filling defects.

2 Feature Recognition of Grouting Defects in Prefabricated Building Sleeves Based on Computer Vision

2.1 Feature Point Detection

There are a large number of key feature points in the prefabricated building that need to be displayed externally, but the distribution position of the key feature points cannot be directly displayed through the 3D model, and each key feature point in the prefabricated building needs to be detected before display [7, 8]. The 3D target detection algorithm of computer vision can detect and identify key feature points in a targeted depth, especially for the key feature points that are deeply hidden inside the prefabricated building. The 3D target detection algorithm can even track the key feature points in real time.

The 3D object detection algorithm first extracts and identifies the three view photopigment features of the prefabricated building, and then searches for the detection points of the corresponding positions and features in the 3D model. The features of different photopigments are composed of different depth map codes. The arrangement of codes can be completely applicable in the exhibition space of prefabricated buildings, and the mapping of the external display phenomenon of photopigments is difficult to distinguish in the eyes of people. Therefore, the 3D object detection algorithm should define the coded structure through computer technology to facilitate the identification of all key feature points in the prefabricated buildings. The 3D object detection process is shown in Fig. 1 below:

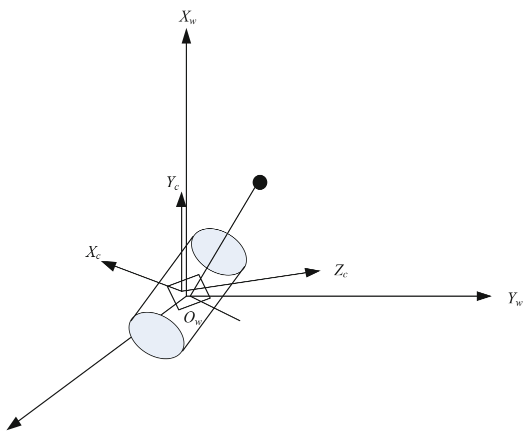


Fig. 1. 3D object detection process

As can be seen from the above figure, 3D coordinate points are established, and target detection is realized through 3D coordinate points. The key feature points identified by the 3D target detection algorithm enter the candidate area frame and wait for verification. The multi-feature energy loss function is used to convert the light of the key feature points. Contents such as pigment characteristics, semantic information and point cloud density are added to the computational model to obtain the feature extraction frame and pose information of key feature points [9, 10].

The expression of the multi-feature energy loss function is shown in formula (1):

$$L(y, f(x)) = \max(0, -f(x)) \tag{1}$$

wherein, x and y represent the horizontal and vertical coordinates of key feature points in the 3D model respectively; $f(x)$ represents the model boundary of prefabricated buildings; L represents the characteristic energy value of key characteristic points of prefabricated buildings [11]. After the feature extraction of key feature points and the confirmation of attitude information are completed, all detection information will be transmitted to the dedicated network of the prefabricated building display platform. The computer vision information preprocessing system will redefine the specification of the 3D object detection algorithm according to the amount of information transmission, so that the detection target of the algorithm is associated with the camera monocular detection target of computer vision, the key feature points detected are highlighted in the prefabricated building display platform.

The key feature points of the prefabricated building in the prefabricated building display platform are in a static state, while the actual prefabricated building displayed is in a moving state, so it is necessary to plan the movement trajectory of the feature points in the prefabricated building display platform. The process of planning the trajectory is the preprocessing process of key feature points. On the basis of computer vision, a motion data sequence with defects is established, and key feature points, data preprocessing packages and motion compression frames are added to the motion data sequence. Then, the motion data sequences at different positions are segmented and identified to ensure that each motion data sequence is continuously discovered and processed in the prefabricated building display platform [12]. In order to standardize the display of motion data series only in the prefabricated building display platform, it is also necessary to establish a low dimensional local linear model. There are a large number of missing marker points in the model. Each missing marker point has the reconstruction function to guide the movement of key feature points. The steps to guide the motion of key feature points by losing marker points are shown in Fig. 2 below:

(1) PCA calculation is carried out for the set of missing marker points, and a representative marker point is selected as the "main marker point" among many missing marker points. The PCA calculation matrix equation is as follows:

$$Z = (a_1, a_2, \cdots, a_m; b_1 b_2 \cdots b_m) \tag{2}$$

In the formula, Z represents the "main marker"; a and b represent lost markers of different categories.

(2) Segment and disperse the marker point group except the main marker point into a low-dimensional linear model;

(3) A feature extractor is installed in the linear model, which can reflect the mapping relationship between the marker points other than the main marker point and the motion data, and transmit this mapping relationship to the main marker point to enrich the feature recognition range of the main marker point;

(4) Then, a large amount of motion data will be transmitted to the main marker point, and the main marker point will establish a new model according to the feature position of the feature points of the motion data, so that the motion data will move in an

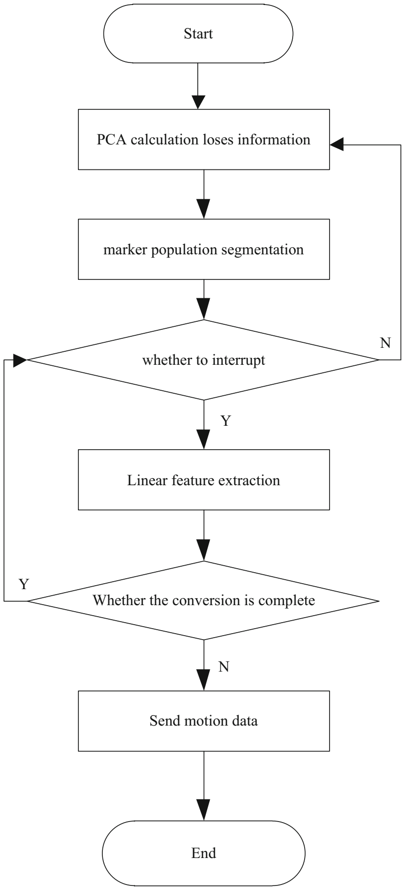


Fig. 2. Lost marker points guide the movement process of key feature points

infinite cycle in the new model according to the provisions. When the key feature points can circulate infinitely in the prefabricated building display platform, it is the basis for real-time display of 3D prefabricated buildings [13].

2.2 Feature Corner Detection and Extraction

Detect the characteristic corners of prefabricated buildings, take the circular template as the object template, and take the center of the template as the core. The corner detection model of the prefabricated building is shown in Fig. 3:

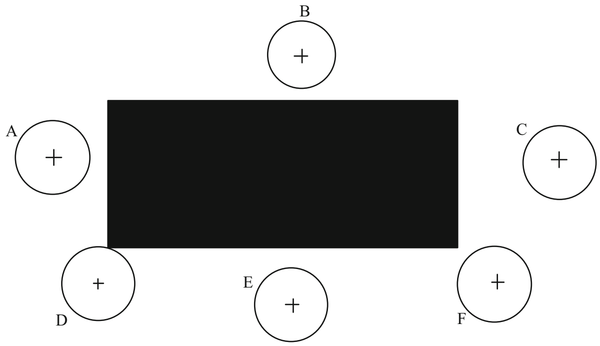


Fig. 3. Prefabricated building corner detection model

Observing Fig. 3, it can be seen that the detection moves within the scope of the basic template of the circular template, observes the photosensitive area of the template, and records the changes between the prefabricated building area and the original data [14].

The area distribution of prefabricated buildings is shown in Fig. 4 below:

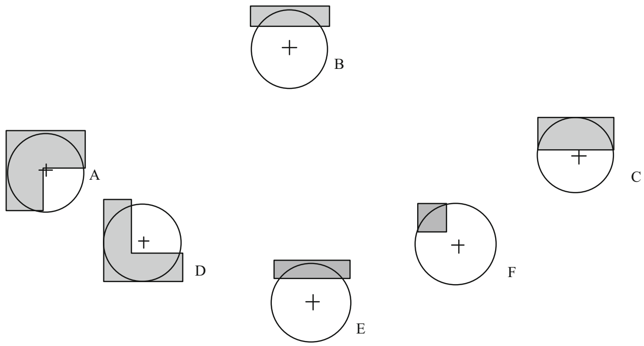


Fig. 4. Area distribution of prefabricated buildings

According to Fig. 4, the larger the prefabricated building area contacted at the edge of the image, the smaller the area near the corner, and the area at the core corner is the smallest. Through the detection of the area of the prefabricated building area, the corner position can be identified, the change and contrast of the corner can be monitored, and the more accurate monitoring results can be obtained finally.

2.3 Prefabricated Building Algorithm Feature Corner Extraction and Matching

The parallel movement of the template in the image range, the pixel change of the photosensitive area and the change of brightness can be calculated and expressed by the following formula:

$$c(a,b) = \begin{cases} 1, \mathit{if}\,|Ia - Ib| \leq th \\ 0, \mathit{if}\,|Ia - Ib| \geq th \end{cases} \tag{3}$$

In formula (3), b is the location of the core feature corner of the two-dimensional image, and a is any point in the image except the core feature corner; Ia represents the brightness of the location of point a, and Ib represents the brightness of the location of core point b; th represents the luminance range of the total number of generated corners. From this formula, the brightness value of the characteristic corner can be calculated, laying the foundation for the accuracy of the homography matrix operation.

$$R = \begin{cases} g - n(a), n(a) \leq g \\ g = 0 \end{cases} \tag{4}$$

As shown in formula (4), in order to find as many special points as possible, it is assumed that the total number of feature corner points is R, the maximum value in the template value range is n, and g is used to represent the corner points after eliminating the influence of noise. Generate positions so that all possible feature corners can be found with the greatest probability after the operation [15].

After the feature corners are extracted, the rest of each image loses its use value. Without processing, it will occupy more storage space, resulting in jumbled data in memory. Therefore, this paper uses the gray detection method to calculate the redundant feature corners and match the related images or feature corners again. After the second screening, the unqualified feature points can be directly excluded, The reserved feature corners can be used as standby data.

It should be specially pointed out that there will also be unreal matching corner points in these matched feature points. Therefore, you must choose carefully in the process of matching focus image selection.

3 Recognition of Grouting Defects in Prefabricated Building Sleeves Based on Computer Vision

3.1 Calibration of Grouting Defects of Prefabricated Building Sleeves

Calibrate the grouting defects of prefabricated building sleeves based on computer vision. In an ideal situation, the conventional prefabricated building sleeve grouting defects use a standard reference to constrain the image of the prefabricated building sleeve grouting defects, so as to determine the parameters of the prefabricated building sleeve grouting defect model. The parameter matrix calibration method can obtain higher calibration accuracy, but it captures more parameters, which needs to be applied to the functional equation set, so that the computer calibration equipment increases the amount of calculation, which is easy to cause unstable operation.

Under natural visual conditions, when the optical parameters change in terms of focal length, multiple, etc., it is difficult to select the standard reference object. The method proposed in this paper does not need to establish a standard 3D coordinate system of the reference object, but directly through the assembly. The motion of the grouting defect of the prefabricated building sleeve is used to obtain the image sequence of the grouting defect of the prefabricated building sleeve, and the constraint relationship is extracted from the data in the image sequence of the grouting defect of the prefabricated building sleeve to calculate the calibration parameters of the grouting defect of the prefabricated building sleeve. The image sequence of the grouting defect of the prefabricated building sleeve is shown in Fig. 5:

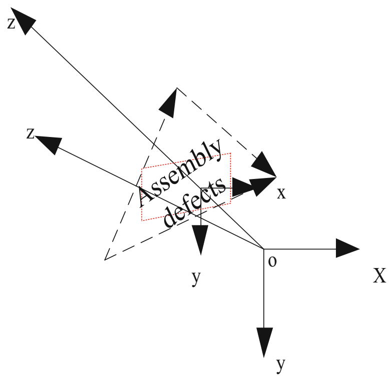


Fig. 5. Image sequence of prefabricated building sleeve grouting defects

The calibration method of prefabricated building sleeve grouting defects applied in this paper also combines the chessboard calibration method. First, the chess board is used as the calibration plate, and the mobile prefabricated building sleeve grouting defects are photographed and scanned from different angles to detect all angle points in each picture. Without considering the angle change, the matrix interactivity is used to obtain the internal parameters of the prefabricated building sleeve grouting defect through the parameter linear equation, and then the least square method is used to calculate the radial coefficient of the parameters. Finally, the error range is narrowed by using the projection error principle of the prefabricated building sleeve grouting defect, and the calibration information is optimized. As shown in Fig. 6, the simulation template of chessboard calibration method is:

3.2 Three-Light-Band Laser Stereo Vision Scanning Based on Computer Vision

The three-band laser stereo vision scanning method based on computer vision used in this paper is mainly composed of multiple three-band laser stereo vision sensors. The angle deviation method is used to capture and calculate the animation data in three-dimensional space. At the same time, the three-dimensional scanning simplified image is also used to carry out three-dimensional three-dimensional point tracing on the grouting

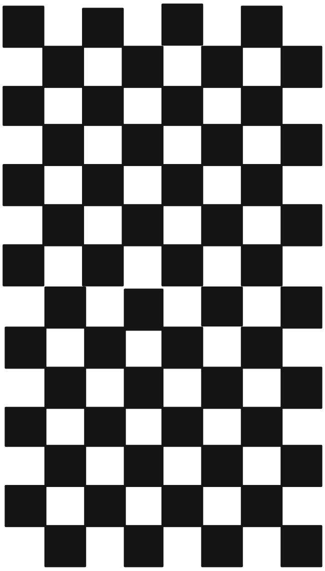


Fig. 6. Simulation template of chessboard calibration method

defect image of the prefabricated construction sleeve. The scanning of sleeve grouting defects in prefabricated buildings by the three-band laser stereo vision scanning method in computer vision can obtain more accurate scanning results, provide effective support for the identification of sleeve grouting defects, and help to improve the accuracy of sleeve grouting defect identification.

In the process of projecting the grouting defects of the prefabricated building sleeve by the three-light belt laser stereo vision scanning, the parameter matrix projection method was mainly used in the early stage, and the parameter sequence was set to a matrix form in the form of 3*4, and the parameters were determined. The influencing factors of the internal environment are placed in the positioning system of the relative world coordinate system of the grouting defect of the 3D laser stereo assembled building sleeve, and the parameters in the system are called the external parameters of the stereo scan matrix. Combining the characteristics of internal and external parameters, and using the parameter equations of relevant 3D parameters, the equations are expressed in a linear form to form different types of line segments, so that the specific details of the 3D human body animation in space in the world coordinate system can be better obtained. Coordinate position, this paper also adds coordinate constraints to the precise coordinate system of grouting defects in prefabricated building sleeves, and directly uses computer vision three-light belt laser stereoscopic grouting defects in prefabricated building sleeves to obtain more accurate coordinate positions. For the three light band laser stereo vision scanning and projection of the scanning site of the grouting defects in the 3D fabricated building sleeve, the position relationship between the two devices is solved by using the matrix algorithm. In the process of solving, the main left and right coordinates of the 3D human body coordinates are expressed in the form of a 3 * 3 grid projection matrix.

The limit geometry method of stereo vision is an important stereo vision relationship in the stereo vision scanning method of 3D prefabricated building sleeve grouting defects based on computer vision. The limit geometry relationship diagram for the stereo vision scanning of prefabricated building sleeve grouting defects is shown in Fig. 7:

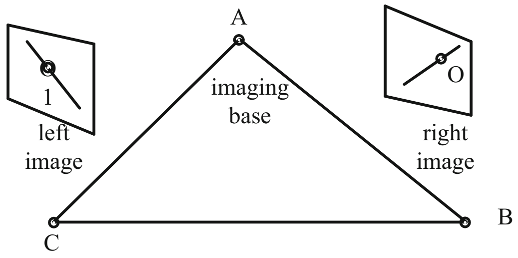


Fig. 7. Limit geometric relationship diagram of defect stereo vision scanning

According to the relevant definition description of limit geometry, in the process of scanning grouting defects of prefabricated building sleeves, the search for image matching points in the 3D image does not need to be carried out in the overall 3D image space of grouting defects of prefabricated building sleeves, but Use the geometric relationship to find the geometric limit point of the image in the 3D image, find the conjugate ray, and define the matrix parameters of the ray to find the geometric common focus on the 3D human body features along the geometric linear relationship, and find the deformed light to judge the three-band laser The stereo vision scanning relationship.

The grouting defect of the sleeve of the three band laser assembled building moves from top to bottom together with the laser under the working state. The binocular stereo conscious scanning system is controlled and fixed by the camera, which can comprehensively apply the 3D scanning technology on the basis of the mechanical structure.

4 Data Processing of Grouting Defects in 3D Prefabricated Building Sleeves

Data capture of grouting defects in prefabricated building sleeves is one of the important ways to synthesize human motion animation. Under normal circumstances, the original data captured by motion capture equipment will be scattered due to noise and other environmental factors. Due to the lack of data and other factors, this paper mainly focuses on post-processing and collection of the grouting defect data of the 3D scattered assembled building sleeves obtained by the motion capture device.

In this paper, in the process of collecting the data of grouting defects of 3D prefabricated building sleeves, the noise reduction processing of the data is first carried out. Because the grouting defects of prefabricated building sleeves have a certain degree of fixation, resulting in a certain error in the acquired 3D defect data. All the data with errors belong to noise data, so the noise reduction processing of the data in this paper is an inevitable means. In the noise data space, stereo matching is carried out for the projection retained at a specific time point in the process of collecting the grouting defect data of prefabricated building sleeves. The matched data is called temporal pulse noise data. This data will often appear in the overlapping motion database, and will be marked or overlapped. In most cases, this data will lead to the loss of acquired defect data, Therefore, it is impossible to collect the grouting defect data of the three band laser 3D fabricated building sleeve.

After obtaining the data source of the grouting defect of the prefabricated building sleeve, first preprocess the data source of the grouting defect of the prefabricated building sleeve, and then use the template data to plan the preprocessed data, and the planned data forms a matching state. The data of the matching state is put into the prefabricated building sleeve grouting defect data topology. If the matching is successful, it will be displayed to the 3D simulation-driven graphics. If the matching is not successful, the data will be tracked, the topological structure of the data that has not been successfully matched will be checked and the frame number of the data will be replaced, and finally the prefabricated building will be set. Central processing of barrel grouting defect data.

5 Identification of Grouting Defects

There are three main steps to apply computer vision to image mosaic in computer system.

The precise homography matrix algorithm is needed as the operation basis in computer system program. In the process of image transformation and mosaic, it is necessary to estimate the linear motion change of feature points. Assuming that two images are $A(x, y)$ and $B(x', y')$, the process of image mosaic and transformation can be expressed as:

$$k = \begin{pmatrix} x' \\ y' \\ w' \end{pmatrix} = \begin{pmatrix} h0, h1, h2 \\ h3, h4, h5 \\ h6, h7, h8 \end{pmatrix} \begin{pmatrix} x \\ y \\ w \end{pmatrix} \tag{5}$$

Among them, k represents the scale element of the image; $X = (x, y, w)$ is the coordinate of the image feature point; h is the independent parameter of the two images as a whole, there are a total of 8 independent parameters, as long as 4 independent parameters are arbitrarily selected, the matching can be performed, and the h value can be estimated. However, this algorithm may also generate operational errors due to the uncertainty of the position of the feature points. Therefore, in the process of selecting any feature point, it is necessary to pay attention to whether the four points are repeated. If so, the answer of the linear equation is uncertain. Sex will increase accordingly.

In order to get more accurate results, the selected matching points must be nonlinear optimized.

The feature points obtained through the previous process still have the possibility of data uncertainty or missing feature points. This paper uses computer vision to randomly extract different feature points for filtering. This algorithm is the most widely used estimation algorithm in the computer system. Its operation power is very high, and it can still efficiently complete the matching when the data matching failure rate is high.

At the same time, It can also filter the data set on a large scale under the condition that the probability of the operation result is almost unchanged. It is precisely the application of computer vision that enables feature corners to maintain a high level of accuracy and integrity.

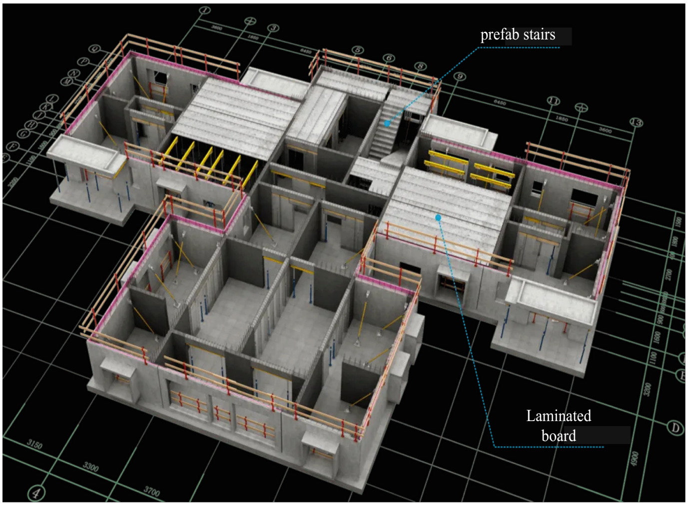
While computer vision ensures the authenticity and accuracy of feature points, it cannot reduce the interference of noise factors on feature point extraction. Noise interference often leads to inaccurate results obtained by homography matrix. This paper is based on computer vision to ensure that the homography matrix pair The accuracy of image matching feature point evaluation.

Under the same environmental background, KLT can track dynamic objects with very high accuracy and efficiency. When the movement position of key points in the stitched image changes greatly, the KLT tracking algorithm can be used to stitch the matching images into one more accurately. Full panorama image.

6 Experimental Studies

In order to verify the effectiveness of the method proposed in this paper for identifying the grouting defects of prefabricated building sleeves based on computer vision, comparative experiments are designed to compare the method proposed in this paper for identifying the grouting defects of prefabricated building sleeves with the traditional method for identifying the grouting defects of prefabricated building sleeves based on SURF and the method for identifying the grouting defects of prefabricated building sleeves based on edge fusion, The model effect is analyzed by comparing the results.

The experimental image sample is shown in Fig. 8 below:



Laminated board

Fig. 8. Tracking shot scene sample

According to Fig. 8, there are about 72 more accurate matching feature points in this paper. The test site is shown in Fig. 9 below:

Fig. 9. Test site

Using the computer vision-based grouting defect recognition method for prefabricated building sleeves proposed in this paper, the traditional SURF-based grouting defect recognition method for prefabricated building sleeves, and the edge fusion-based method for grouting defects in prefabricated building sleeves are used to simultaneously analyze the above images. After splicing, the experimental results of the feature point offset parameters obtained are shown in the following table:

It can be seen from the data in the above table that the offset change of the image feature points of the computer vision based prefabricated building sleeve grouting defect recognition method proposed in this paper is much more stable than that of the traditional SURF based prefabricated building sleeve grouting defect recognition method and the edge fusion based prefabricated building sleeve grouting defect recognition method. Because this model regards the feature points as dynamic observation targets. The KLT tracking method is used to calculate the dynamic changes of feature points, so the more accurate homography matrix operation result is finally obtained, so that the image stitching accuracy is effectively improved. The distribution of feature points in the tracking algorithm is in a stable symmetrical distribution state, which enables the homography matrix to obtain more accurate position data in the operation, thus improving the accuracy of image mosaic and the integrity of the panoramic image mosaic.

In order to verify the degree to which the grouting defect identification method for prefabricated building sleeves based on computer vision proposed in this paper is affected by external factors, this paper also designs three models for the same splicing under the influence of noise factors, size differences and image deformation. The matching degrees of the feature points of the objects are compared, and the comparison results obtained are shown in Fig. 10:

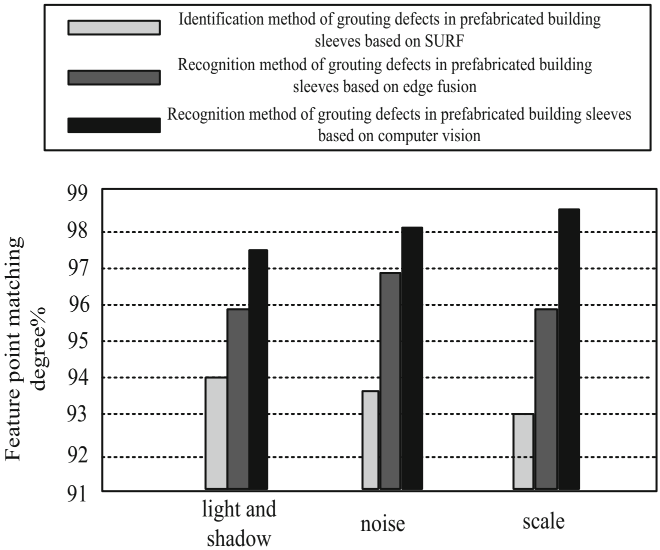
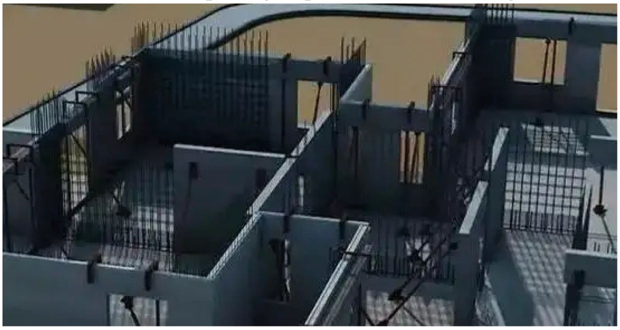


Fig. 10. Experimental results of feature point matching degree

According to the above experimental data, KLT algorithm has higher matching degree and faster processing speed than the traditional splicing algorithm. It has a strong ability to deal with overlapping parts of images, image size differences, deformation and rotation problems, light and shadow changes, and noise interference, and has a fast reaction speed, fast image mosaic and fusion speed, high efficiency, and stronger completion. In the face of the disorder of image sequence, it can also intelligently and automatically complete image sequence arrangement for more complete image mosaic. In the aspect of natural scene image mosaic, this mosaic algorithm can also properly handle the changes and transitions of light and shadow colors, so that the final product presents a perfect state of natural coordination.

The image mosaic effect obtained by the computer vision based method for identifying the grouting defects of prefabricated building sleeves is shown in Fig. 11 below:

(a) Before splicing of prefabricated buildings



(b) After splicing of prefabricated buildings

Fig. 11. Image stitching effect obtained by the computer vision-based method for identifying grouting defects in prefabricated building sleeves

From the experimental results, the computer vision-based method for identifying grouting defects in prefabricated building sleeves proposed in this paper is more accurate and efficient than the traditional splicing model. However, there is still a certain degree of error under the interference of the external environment, and there are still some indistinguishable blurs on the stitched image. However, in view of the current application of image stitching, computer vision has strong stitching capabilities and can be used in a wider range of fields in the future. The results obtained after defect identification are shown in Fig. 12 below:

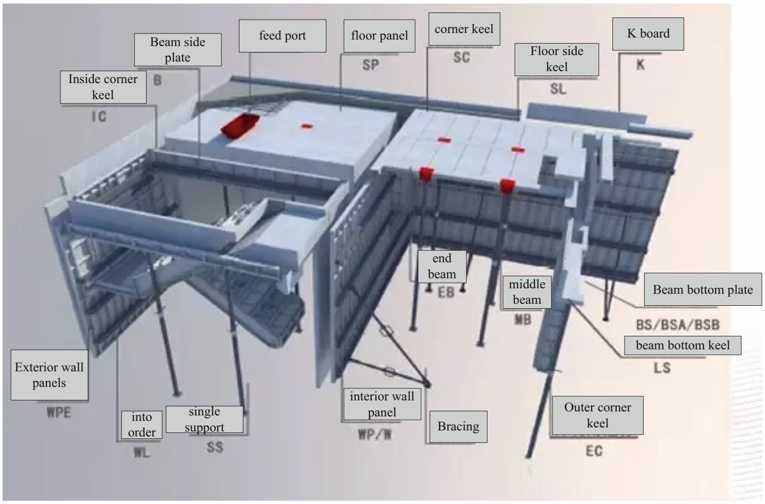


Fig. 12. Defect identification experimental results

In order to further verify the defect recognition performance of the method in this paper, taking the defect recognition accuracy as the index, the paper applies the computer vision-based prefabricated construction sleeve grouting defect recognition method, the SURF-based prefabricated construction sleeve grouting defect recognition method, and the edge fusion based prefabricated construction sleeve grouting defect recognition method for defect recognition, The higher the accuracy of defect identification, the stronger the defect identification performance of the method. The defect identification accuracy results of the three methods are shown in Table 4.

Table 1. Offset parameters of feature points based on SURF-based identification method for grouting defects in prefabricated building sleeves

Δx	Δy
−0.7065	−0.2876
0.2544	−0.2461
0.1123	0.0536
0.1196	0.3217
0.2236	−0.0415

From the results of defect identification accuracy shown in Table 4, we can see that the identification accuracy of this method is 99.62%, while the identification accuracy of the two traditional identification methods is 82.34% and 86.41% respectively. Therefore, it shows that this method can accurately identify the grouting defects of prefabricated construction sleeves (Tables 1, 2 and 3).

Table 2. Splicing model of the identification method of grouting defects in prefabricated building sleeves based on edge fusion

Δx	Δy
−0.2541	−0.2806
0.2683	−0.2982
0.1007	0.0985
0.1276	0.2817
0.2924	−0.0405

Table 3. Splicing model based on computer vision-based grouting defect identification method for prefabricated building sleeves

Δx	Δy
0.0527	−0.0549
0.3635	−0.2354
0.2105	0.2265
0.0842	−0.3314
0.0731	0.2179

Table 4. Results of defect identification accuracy

Defect identification accuracy/%		
Recognition method based on computer vision	SURF-based recognition method	Recognition method based on edge fusion
99.62	82.34	86.41

7 Conclusion

In order to improve the construction quality of prefabricated buildings, a method for identifying sleeve grouting defects in prefabricated buildings based on computer vision is proposed, and its performance is verified from both theoretical and experimental aspects. It has high defect identification accuracy when identifying sleeve grouting defects. Specifically, compared with the SURF-based recognition method and the edge fusion-based recognition method, the defect recognition accuracy of this method is significantly improved, and the recognition accuracy of this method is 99.62%. Therefore, it shows that the proposed defect identification method based on computer vision can better meet the requirements of grouting defect identification for prefabricated construction sleeves. In the future research work, the efficiency of defect identification will be further tested and studied to improve the practical application reliability of the defect identification method.

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