1. Introduction

Machine vision has broad application prospects in different fields: graph optimization processing [1], sensors [2], sound source reconstruction [3], visual prediction [4], and pollution monitoring [5]. In view of a series of problems existing in the process of maize species analysis based on machine vision theory, the authenticity analysis method was introduced to obtain an optimized machine vision analysis model [6]. The optimization model checks the relevant laws of the corresponding species by extracting, analyzing, and optimizing corn data. In order to further analyze and predict the accuracy of corn-related parameters, the model was used to calculate the extracted data and obtain the corresponding prediction results. The accuracy of the model can also be verified by the results. This research can provide a reference for machine vision model in other fields of prediction. Tractor slippage and other related problems exist in the driving process. Through the introduction of optimized machine vision analysis theory and combined with relevant data analysis method, the slippage process of tractor was analyzed [7]. Relevant studies show that the model can predict and analyze the sliding process, and the analysis results can well reflect the actual situation of the tractor. This shows that the machine vision analysis model can well represent and study the tractor slip and other problems, so as
to provide theoretical support for the application of machine vision in other fields.

The above research mainly analyzes the application of machine vision in graphic processing and other aspects. In order to further improve the accuracy of art education communication platform, relevant theories of machine vision model were introduced, and the model of the relevant coordinate calibration, so that the results can be very good to meet the actual requirements. By using this model, the experimental results can be studied, and the model calculation and prediction show that the optimization model has a high application prospect. The model could play an important role in other areas.

2. Machine Vision

Machine vision is a rapidly developing branch of artificial intelligence. Machine vision is to use machines instead of human eyes to make measurements and judgments [8, 9]. Machine vision system uses machine vision products to convert the target to image signals and send them to a dedicated image processing system. The main features of machine vision are as follows: (1) The system selects workpiece of different sizes according to the operator, calls the corresponding visual program for size detection, and outputs the results; (2) the system can monitor the detection process by displaying images or dynamically view the detection results through the detection data displayed on the interface; (3) it has the function of timely and accurately sending out control signals and eliminating waste products to the wrong workpiece; (4) the model can display the detection screen in real time, and has the function of storing and viewing the image of the error workpiece in real time. The morphological information of the target is obtained and converted into digital signal according to the pixel distribution, brightness, color, and other information [10, 11]. The image system performs various operations on these signals to extract the characteristics of the target, and then controls the action of the equipment on-site according to the discriminant results.

Machine vision system has a wide range of applications in different fields, such as industry, agriculture, and biology. In order to analyze the relevant working principles and processes of the machine vision system, the working principle diagram of the machine vision system is obtained by summarizing and analyzing as shown in Figure 1. It can be seen from the figure that, firstly, the corresponding light source should be imported into the detected object, and the corresponding characteristic parameters can be obtained by analyzing the parameters of the detected object. Then the characteristic parameters are imported into the sensor of machine vision, and the corresponding data and parameters are obtained through the analysis of detection software such as camera and computer. Through further processing of data and parameters, it is imported into the control unit and finally returned to the detected data. Through such a cycle, the optimized results are finally obtained. Then the optimization results in accordance with the relevant criteria are derived.

2.1. Machine Vision Model Calibration. In the process of coordinate calibration, machine vision model is mainly analyzed from two aspects: coordinate transformation and corresponding coordinate optimization [12, 13].

2.1.1. Coordinate Conversion. Since the position of the camera is not fixed, the position and posture of 3d objects in the camera coordinate system may change. Because the error is mainly caused by the camera itself, the error parameter belongs to the internal parameter of camera calibration. To sum up, the parameters in the camera calibration solution model mentioned above include linear parameters and variable parameters, which are mainly affected by the camera itself. The external parameters are mainly determined by the \{Hu\} selection. Therefore, it is necessary to establish the absolute coordinate system as a unified standard to describe the position and posture of objects in the objective world [14, 15]. Therefore, the absolute coordinate \{Hw\} needs to be transformed into the camera coordinate \{Hc\} by rotation and translation, and the corresponding specific change formula is as follows:

\[
\begin{pmatrix}
X_c \\
Y_c \\
Z_c
\end{pmatrix} = \begin{pmatrix} R & t \\ 0^T & 1 \end{pmatrix} \begin{pmatrix} X_w \\
Y_w \\
Z_w
\end{pmatrix},
\]

where \(R\) is the rotation matrix; \(t\) is the translation vector; \(x, y,\) and \(z\) are the corresponding coordinates. Where the specific coordinate of \{Hc\} is \(p_c = (x_c, y_c, z_c)^T\).

Through the above analysis, it can be seen that coordinate change has an impact on the calculation method, and then leads to the change of corresponding transformation results. Therefore, in order to further analyze the influences of three different coordinate transformations on specific transformation values, the influence curves of coordinate changes on transformation values are drawn as shown in Figure 2. It can be seen from Figure 2 that three different coordinates have different change curves, and the overall change trend is gradually rising. It can be seen from the transformation of parameter \(x\) coordinate that the transformation value corresponding to this curve is the largest among the three curves. With the increase of calculation time, the corresponding curve shows a gradually increasing trend, but when the corresponding time continues to increase, the curve will gradually tend to gentle. This shows that low time has a relatively large impact on the transformation value of parameters, while high time has a relatively small impact on the transformation value. It can be seen from the coordinate transformation curve of parameter \(y\) that when the time is low, its curve is basically consistent with the transformation value curve corresponding to \(x\). With the gradual increase of time, the corresponding curve shows an approximate linear change trend, and the slope of the corresponding curve is constant. However, when the corresponding time reaches 460, the curve reaches the maximum value, while when the corresponding time exceeds 460, the curve gradually decreases. This shows that the
different time will have different influence on the coordinate transformation value. As can be seen from the coordinate transformation curve of parameter $z$, the corresponding curve transformation value gradually increases with the gradual increase of time. It is worth explaining that before the time is 450, the change value of the curve is relatively small and approximately a constant change trend. When the time exceeds 450, the corresponding curve increases rapidly. The research shows that the higher the time, the greater the influence on the coordinate transformation value. Therefore, it can be seen from the analysis that the influence of parameter time on parameters has different forms. The corresponding rotation matrix change formula is as follows:

\[
R(\alpha, \beta, \gamma) = \begin{pmatrix}
1 & 0 & 0 \\
0 & \cos \alpha & -\sin \alpha \\
0 & \sin \alpha & \cos \alpha
\end{pmatrix} \times \begin{pmatrix}
\cos \beta & 0 & \sin \beta \\
0 & 1 & 0 \\
-\sin \beta & 0 & \cos \beta
\end{pmatrix} \times \begin{pmatrix}
\cos \gamma & -\sin \gamma & 0 \\
\sin \gamma & \cos \gamma & 0 \\
0 & 0 & 1
\end{pmatrix}.
\]

(2)

$\alpha$ is the rotation of $\{Hu\}$ to $\{Hc\}$ about the X-axis; $\beta$ is the rotation angle of $\{Hu\}$ to $\{Hc\}$ about the Y-axis; $\gamma$ is the rotation of $\{Hu\}$ to $\{Hc\}$ about the Z-axis. The above parameters can be solved iteratively by the correlation algorithm, so as to obtain the corresponding model parameters. To sum up, the conversion relationship between absolute coordinates $\{Hu\}$ and camera coordinates $\{Hc\}$ can be obtained.

Through the corresponding image and data transformation formula we can see that different parameters have different effects on the transformation process and results. In order to quantitatively analyze the influence of three different parameters on coordinate indices, coordinate change curves under three different parameters were drawn through calculation and analysis as shown in Figure 3. It can be seen from the curves in the figure that the influences of the three parameters on the coordinate values have different trends. As the number of iterations increases, the parameter $\alpha$ shows a trend of gradual improvement, but its slope is relatively low. When the number of iterations exceeds 60, the slope of the corresponding curve is higher than that of the first stage. This indicates that the increase in the number of iterations will further increase the influence trend of parameter $\alpha$. It can be seen from the change curve corresponding to parameter $\beta$ that the change has a typical linear stage. As the number of iteration steps increases, the slope of the corresponding curve increases gradually, and when it exceeds the highest point, the curve falls rapidly, and the change trend of the falling curve is higher than that of the rising curve. This indicates that the coordinate value corresponding to the curve at this stage will produce a certain loss. As can be seen from the variation trend of parameter $\gamma$, the corresponding coordinate value of the curve decreases linearly as the number of iterations increases, and when it drops to the lowest point, the corresponding iteration number is about 6. As the number of iterations increases further, the slope of the curve increases rapidly at first and then slowly, indicating that in the process of increasing the number of iterations, the change of the curve will have a certain influence on the parameters. Therefore, in the application process, the proportion of the three parameters in different stages should be considered, so as to obtain the corresponding accurate coordinate value.

2.1.2. Coordinate Optimization. The transformation process of $\{Hc\}$ to $\{Hp\}$ can be described simply by small-hole imaging model [16, 17]. In the keyhole imaging model, point $p$ is the next point $\{Hc\}$, and point $p'$ is obtained by ray projection mapping with the optical center to the two-dimensional plane where $\{Hp\}$ is located. Therefore, the
coordinate of $P'$ can be quickly obtained from the coordinate of $P$ according to the simple similarity principle, and the corresponding calculation formula is as follows:

$$
\begin{align*}
  x_P &= \frac{f}{z_c} x_c, \\
  y_P &= \frac{f}{z_c} y_c.
\end{align*}
$$

(3)

The influence of parameter $f$ on the optimization result is mainly through changing the corresponding $x$ coordinate value and the corresponding $y$ coordinate value and then changing the corresponding projection data. In order to further analyze the optimization results of parameter $f$, the curves corresponding to the original results and optimization results of parameter $f$ are drawn through analysis as shown in Figure 4. It can be seen from the graph that the corresponding data shows a fluctuation trend with the increase of time, and its lowest point appears when the iteration time is about 50. When the iteration time exceeds 50, the slope of the corresponding curve gradually increases with the increase of iteration time, and then tends to be flat with the further increase of time, indicating that the corresponding curve data has a certain volatility. However, the curve corresponding to the original parameter $f$ gradually increases with the increase of iteration time, and then tends to be flat with the further increase of time, indicating that the corresponding curve data has a certain volatility. However, the curve corresponding to the original parameter $f$ can only better describe the data change trend of the parameter under the action of a lower time. The change curve under the action of higher time has an opposite change trend in morphology, which indicates that parameter $f$ can only describe the change pattern of curve under the action of lower time. As can be seen from the optimized parameter $f$ curve, this curve can not only better describe the curve variation trend of parameter $f$ under different time effects, but also better match the corresponding data at key nodes. This indicates that the optimized parameter can clearly describe the corresponding projection parameter and specific value, and can further illustrate the accuracy of the model corresponding to the optimized parameter $f$.

Transform the above formula into homogeneous coordinate and matrix form, the formula is as follows:

$$
\begin{pmatrix}
  x_P \\
  y_P \\
  1
\end{pmatrix}
= \begin{pmatrix}
  f & 0 & 0 & 0 \\
  0 & f & 0 & 0 \\
  0 & 0 & 1 & 0 \\
  1
\end{pmatrix}
\begin{pmatrix}
  x_c \\
  y_c \\
  z_c \\
  1
\end{pmatrix},
$$

(4)

where $f$ is the focal length of the camera. The corresponding relation between \{Hc\} and \{Hp\} is obtained.

According to the above analysis, it can be seen that different parameter $f$ will have certain influence on the result of coordinate index. In order to more specifically analyze the influence of the change of parameter $f$ on the coordinate index, the corresponding data of coordinate change under different parameter $f$ are obtained through the calculation of the above formula, and the corresponding change curve is drawn as shown in Figure 5. It can be seen from the figure that the corresponding coordinate values of different parameter $f$ have different trends. When the parameter $f = 1$, the corresponding curve shows a gradually increasing trend as the number of iterations gradually increases. And the increase between different data is basically the same, indicating that the curve approximately presents a linear change. When the parameter $f = 2$, with the gradual increase of the number of iterations, the corresponding coordinate data shows a gradual downward trend. However, when the number of iterations reaches 18, the curve increases suddenly, indicating that the influence of parameter $f$ on the coordinate index shows different changes at this stage. When parameter $f = 3$, the corresponding coordinate data shows a trend of gradual decline as the number of iterations increases gradually.

![Graph of coordinate transformation under different parameters.](#)

**Figure 3:** Graph of coordinate transformation under different parameters.

![Optimization results of parameter p.](#)

**Figure 4:** Optimization results of parameter $p$.
However, when the number of iterations exceeds 8, the corresponding curve gradually tends to be stable. This indicates that the increase in the number of iterations has a relatively small impact on parameter $f = 3$. However, when parameter $f = 4$, the corresponding curve shows a gradual increase trend with the gradual increase in the number of iterations, and its overall increase trend is basically consistent with that of parameter $f = 1$. The change of camera focal length will lead to the difference between homogeneous coordinate and matrix coordinate, so that the result of coordinate optimization will change according to the difference of focal length. Further, the calculation results of rotation matrix are different, and finally different coordinate forms appear.

2.2. Graph and Pixel Coordinate Transformation. There is some deviation between the origin and coordinate axes of $\{Hp\}$ and $\{Hi\}$, but they are generally considered to be in the same plane [18, 19]. Because the origin of $\{Hp\}$ is in the center of the projected imaging image, and $\{Hi\}$ is in pixels, it is used to read the picture in pixels into the computer for image processing.

In order to further analyze the specific process of graph processing under the effect of machine vision, we draw the graph processing process under different types as shown in Figure 6. Figure 6 shows that graph processing based on machine vision theory has a typical iterative effect. Firstly, the image is collected and the corresponding characteristic parameters are processed, and the specific data features are obtained through data processing. Then it is imported into the graphic size module, through which the image size is analyzed and optimized, and then it is imported into the dimension inspection module to check the defects of the graphic size. If it does not meet the requirements, it needs to be back to the image acquisition for further analysis. If it meets the requirements, the corresponding results will be imported into the defect detection; if the curve detection does not meet the requirements, it needs to continue the back generation. If it meets the requirements of defect detection and size detection, the image that meets the detection will be exported.

Assuming that the width of the pixel in the $x$ direction is $w$ and the height of the pixel in the $y$ direction is $h$ in the pixel coordinate system, the following formula can be obtained:

$$
\begin{align*}
    u &= u_0 \frac{x_p}{w} \\
    v &= v_0 \frac{y_p}{h}
\end{align*}
$$

The homogeneous matrix of the above formula is expressed as follows:

$$
\begin{pmatrix}
    u \\
    v \\
    1
\end{pmatrix}
= \begin{pmatrix}
    1 & 0 & u_0 \\
    0 & 1 & v_0 \\
    0 & 0 & 1
\end{pmatrix}
\begin{pmatrix}
    x_p \\
    y_p \\
    1
\end{pmatrix}
$$

thus, the transformation relation between $\{Hp\}$ and $\{Hi\}$ is deduced. Finally, the relationship between $\{Hw\}$ and $\{Hi\}$ is obtained, and the formula is as follows:

$$
\begin{pmatrix}
    x_w \\
    y_w \\
    z_w
\end{pmatrix}
= M_1 M_2 \bar{p} = M_3 \bar{p},
$$

where $M_1$ is the internal parameter matrix of the camera; $M_2$ is the external parameter matrix; The coordinates of the origin $op$ in $\{Hi\}$ are $(u_0, v_0)$; $M_3$ is the comprehensive matrix. After the camera calibration, the internal parameter is only related to the camera and has nothing to do with the world coordinate system. The external parameter matrix is related to the elements outside the camera, mainly related to the selected world coordinate system.

It can be seen from the above analysis that different matrix parameters will have an impact on specific matrix transformation data. Therefore, we summarize the influence of three different matrix parameters $M_1$, $M_2$, and $M_3$ on matrix change to obtain the change curve of corresponding matrix data as shown in Figure 7. It can be seen from Figure 7 that the matrix transformation value under three different parameters have different forms of
change. As can be seen from the corresponding change results of parameters of $M_1$ matrix, with the gradual increase of the number of samples, the corresponding curve data shows a trend of gradual decline, and according to the change slope, it conforms to the change characteristics of linear. It can be seen from the transformation matrix data corresponding to parameter $M_2$ that, with the increase of the number of samples, the corresponding data shows a relatively gentle change trend, which indicates that the increase of samples does not have a great impact on the transformation matrix data. As can be seen from parameter $M_3$, with the increase of matrix samples, the corresponding matrix data shows a trend of gradual increase. Therefore, it can be seen from the variation trend of three different parameters $M_3 > M_2 > M_1$, and it can be divided into three different trends according to the number of different variation samples.

2.3. Machine Vision Model Optimization. The distortion of the central position of the imaging plane of the machine vision model is 0, and the distortion degree gradually increases with the outward direction of the optical center [20, 21]. The machine vision model is an ideal linear imaging model, while the keyhole imaging model only considers the ideal linear case, but the original image will be distorted excessively due to the calculation deviation and other reasons. In order to reduce the distortion of the image, it needs to be corrected in the original linear model. The mathematical model of radial distortion can be expressed by
Taylor’s formula, and its specific mathematical distortion formula is as follows:

\[
\begin{align*}
x_0 &= x(1 + k_1 r^2 + k_2 r^4 + k_3 r^6), \\
y_0 &= y(1 + k_1 r^2 + k_2 r^4 + k_3 r^6).
\end{align*}
\]

(8)

In the above formula, \((x, y)\) is the coordinate of the original image, \((x_0, y_0)\) is the coordinate position of the optimized image, and \(r\) is the coordinate distance.

\[r^2 = x^2 + y^2.\]

(9)

The original machine vision model could not well represent the change process of test data, but the advantage of the optimized machine vision model is to improve the flexibility and automation degree of production. At the same time, in the process of mass calculation, using artificial vision to check product quality is inefficient and precision is not high, using machine vision detection method can greatly improve production efficiency and production automation degree. By using the above analysis and formula solution, the relationship between parameters \(x\) and \(y\) and the corresponding center radius \(r\) can be obtained. In order to further analyze the influence of \(x\) and \(y\) on the center radius \(r\), we draw the change curve of the center radius under different parameters as shown in Figure 8. It can be seen from Figure 8 that parameters \(x\) and \(y\) show opposite variation trends, leading to different changes in corresponding results. Specifically, we can see that with the gradual increase of iteration time, the corresponding curve shows a typical two-stage change, and its change shows an obvious linear change. As the iteration time gradually increases, the curve first presents a trend of gradual decline, and when the iteration time exceeds 10, the corresponding curve presents a trend of gradual rise. The parameter \(y\) firstly rises slowly with the increase of time, and when it reaches the maximum value, it gradually decreases slowly with the increase of time, showing obvious symmetry. The curve corresponding to the calculated parameter center radius \(R\) shows a slow nonlinear increase at first, and then when it reaches the maximum value, the corresponding curve gradually decreases with the increase of iteration time, and the slope of the corresponding curve also shows a gentle decline. This shows that the curve corresponding to the center parameter radius \(R\) has obvious nonlinear characteristics. Therefore, the center radius corresponding to different parameters \(x\) and \(y\) has different changing trends. We should make targeted selection according to specific machine vision results.

The changes generated by the machine vision model can be expressed by two parameters \(p_1\) and \(p_2\) which are shown as follows:

\[
\begin{align*}
x_0 &= x + 2p_1 y + p_1(r^2 + 2x^2), \\
y_0 &= y + 2p_1 x + p_1(r^2 + 2y^2).
\end{align*}
\]

(10)

Finally, radial and tangential changes are added to the camera imaging model, and the specific formula is as follows:

\[
\begin{align*}
x_0 &= x + 2p_1 y + p_1(r^2 + 2x^2), \\
y_0 &= y + 2p_1 x + p_1(r^2 + 2y^2).
\end{align*}
\]

(11)

Internal parameters include linear parameters \(f_u, f_v, u_0\), and \(v_0\) and variation parameters \(k_1, k_2, k_3, p_1,\) and \(p_2\). External parameters include \(R\) and \(t\).

The coordinates corresponding to different parameters \(u\) and \(v\) show different changing trends, while the linear parameters \(f_u, f_v,\) and \(f\) have different changing forms. Therefore, in order to analyze the variation trend of parameter \(f\), we drew linear parameter variation curves under different coordinates as shown in Figure 9. As can be seen from the curve in the figure, with the gradual increase of parameter \(u\), the corresponding curve shows a gradual increase trend. The corresponding values are \(f > f > fu\). With the gradual increase of parameter \(v\), the corresponding curve also shows a linear increase trend, and the corresponding boundary and increased fluctuation range are relatively small. Therefore, we can select specific linear parameters when parameters \(u\) and \(v\) change, so as to describe the change of model coordinates pertinently.

3. Design and Application of Art Education Communication Platform Based on Machine Vision

3.1. Research Status of Art Education Exchange Platform. Art education exchange platform plays an important role in the field of culture, but with the development of culture, there are a series of problems in the field of art education: (1) Insufficient attention is paid to art education exchanges: with the rapid development of economy and society, the development of art education is relatively slow. As a result, art
education lags far behind the pace of economic development and social progress, so we need to strengthen the importance of art and design. (2) The platform of art education and design is relatively single, which fails to promote the exchange of art and culture.

Art education exchange platform has different forms of expression. In order to better analyze the problems existing in art education exchange, we find six different targeted indicators to analyze the art exchange platform: 1 - language; 2 - text; 3 - dance; 4 - vocal music; 5 - painting; 6 - the martial arts. Through statistics and analysis, we obtained the distribution diagram of different indicators under the effect of this model. From Figure 10, we can see that different indicators have different table proportions on the art education communication platform. Among them, Wushu accounts for 34.04%, painting 21.28%, vocal music 17.02%, and dance 12.7%. The corresponding characters accounted for only 8.51%, and the language accounted for the least, only 6.38%. Through the different proportion, it shows that the communication and influence of different indicators on art education are different. We should fully consider the impact of different indicators on the communication platform of art education, so as to obtain accurate description and analysis.

3.2. Design of Communication Platform for Art Education by Machine Vision. Machine vision model has obvious application in different fields. In order to study its design and application in art education communication platform, we calibrate and change the coordinates of machine vision model [22]. Thus, the corresponding optimized machine vision model is introduced and imported into the art education design platform, so as to obtain the corresponding art communication platform design process based on the machine vision model as shown in Figure 11. As can be seen from the calculation process in the figure, the corresponding machine vision model is first imported into the corresponding module, and the corresponding art exchange platform data is obtained through the collection of the camera. Then the data of the art platform are imported into the art criteria for targeted judgment. If the results do not meet the requirements, the art platform needs to be optimized and then brought back to the art platform. If it meets the requirements, it will be entered into the education platform plate, and the iteration results of the corresponding education platform will be obtained through the optimization of relative indicators and determination of corresponding indicators, and the calculation results will be imported into the communication criteria for discrimination, and if it meets the requirements, it will be exported. If it does not meet the requirements, further study should be carried out. It is worth noting that the data collected by the camera can also be used to judge the communication between art education platforms, and then be imported into the communication criteria for the output of results.

The optimized machine vision model is used to analyze the art education exchange platform, and the histogram changes of the art education exchange platform under different factors are obtained, as shown in Figure 12. It can be seen from the changes in the figure that six different indicators have different manifestations under the calculation of machine vision model. As can be seen from indicator 1, with the gradual improvement of iterative steps, the proportion of language in art education is basically the same. This indicates that its influence on the art education communication platform under the machine vision model is relatively small, while index 2 decreases slowly at first and then increases gradually with the increase of iterations. This shows that the characters in art education have a relatively fluctuating trend under the action of machine vision model. With the increase of the number of iterations, index 3 firstly decreased rapidly and then increased slowly, and its fluctuation trend was higher than index 2. Index 4 remained
constant with the increase of iteration steps. This indicates that the proportion of vocal music in art education has a constant influence on the communication platform of art education. This parameter can be used to analyze the model. With the increase of iteration steps, index 5 showed a significantly improved trend, while index 6 showed a gradually decreased trend with the increase of iteration times. The main reason for the different proportions of different indicators in the calculation of optimized machine vision model is that the proportions of art platform and education platform are different. As a result, the corresponding artistic criteria and educational criteria are used for unified analysis of indicators, resulting in different trends of different indicators.

4. Discussion

In order to further analyze the accuracy of the calculation results of the art education exchange platform under the effect of machine vision model, we need to make targeted prediction of the results of the art education exchange platform under the effect of this model. The model prediction curve under the effect of machine vision was obtained through analysis as shown in Figure 13. It can be seen
from the curves in the figure that the communication data of art education increases gradually over time, showing an approximate linear increase trend at first, then gradually declining and then rising slowly. With the gradual increase of the number, it shows an obvious trend of fluctuation. This means that the increase in time can lead to varying degrees of fluctuation in the data. It can be seen from the original machine vision model that the corresponding curve can better analyze the initial stage of art education data, while the description of the subsequent stage of the curve cannot be better, especially in the wave stage, which can only show a linear trend of change. However, the optimized machine vision model can not only describe the initial stage, but also better describe the fluctuation stage. Therefore, we can use this machine model to conduct targeted analysis and prediction of the art education exchange platform, so as to obtain accurate results. The optimized model can better analyze the first stage, mainly because the model fully considers the characteristics of the data changes in the first stage, and the linear characteristics of the curve in the first stage are obvious. For the second stage, the description of the model is relatively poor, mainly because the model only considers the main factors in the graph and platform communication process, and fails to fully consider the secondary factors, resulting in relatively poor calculation results.

5. Conclusion

(1) With the gradual increase of iteration time, the corresponding curves of parameter $x$ and $y$ show a relatively consistent trend in the initial stage. The difference between the two curves gradually increases. The corresponding curve of parameter $z$ has a constant change in the initial stage and a rapid increase in the later stage of the curve.

(2) The parameter $p$ of the original model cannot well describe the change curve of coordinates at a higher time. The optimized model parameters under the calibration of machine vision model can not only better analyze the change trend of the data, but also carry out accurate quantitative analysis of the data.

(3) As the number of iterations gradually increases, the corresponding coordinate data of parameter $f=1$ gradually increases. When $f=2$, the corresponding curve shows a trend of gradual decline. When the parameter $f=3$, the curve has a certain fluctuation.

(4) The curves corresponding to parameters $x$, $y$ and center radius $r$ all have obvious two-stage changes, and the trends of these two stages are opposite. This indicates that the change of time will have a certain influence on the center radius $r$ value, and the specific characteristics of parameters should be considered comprehensively when selecting machine vision model parameters.

Data Availability

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

Conflicts of Interest

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

Acknowledgments

This work was supported by Henan Province Teaching Reform Project: Innovation and practice of talent training mode for new construction engineering majors in the digital age (NO.: 2021SJGLX529).

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