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Visual Tracking Psychological Quality Prediction of Multimedia Robot Images based on Analyzing Color Composition

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Abstract
So far, there have been many examples of color composition visualization techniques combined with robot recognition. On this basis, this paper proposes a design method of visual tracking mental quality prediction system for visual processing and robots. Firstly, the system is analyzed and modeled. The SYSTEM uses a six-axis industrial robot AS an experimental platform, and uses exponential multiplication to model mental quality prediction. Through the correlation between rotation and pose matrix, the Jacobian matrix is derived, and the corresponding relationship between the robot terminal and the rotation speed composed of color is given. Then, according to the mathematical modeling of color composition and the selection of appropriate image characteristics, a kind of robot visual tracking psychological quality prediction control system based on positioning and image is constructed. Thus, the corresponding relationship between the feature points in the image and the rate of the color forming terminal can be determined. By using the method of differential mental quality prediction and speed transformation, the corresponding relation of each coordinate system in the mental quality prediction control of visual tracking is derived, and the motion rate in the color frame is transformed into the motion rate of each joint. At the same time, the visual servo system is analyzed in detail, and the visual servo control is developed. On this basis, the position based vision follow up and image tracking are studied, and a vision follow up controller for fast motion is proposed. The experimental results show that the fast feedforward control based on the fast feedback property of fast image proposed in this paper, and the experimental research on this basis, has strong practical significance.

Keywords: Color composition; Multimedia robot; Image vision; Tracking technology; Psychological quality prediction

1. Introduction

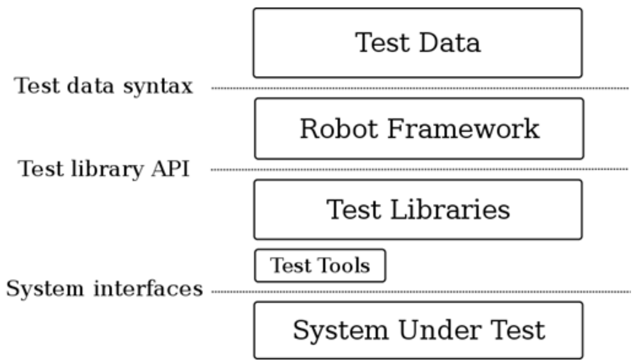
In the early stage of robot development, most industrial robots rely on a variety of different sensing signals to complete tasks under certain working conditions, but cannot meet different working conditions.One of the most important factors is the lack of sensitivity to the surrounding environment, so that the perception of the outside world is not strong.With the progress of science and technology and the expansion of the scope of use of robots, human beings are becoming more and more intelligent and adaptable to external conditions.Many experts and scholars in the field of robotics are increasing the perception and adaptive ability of robots in order to better adapt to the purpose of flexible manufacturing and human-robot interaction.

The follow-through approach to visualization has a number of advantages.With the help of a camera, the visual-tracking psychic-quality prediction robot has eyes compared to ordinary machines.This method reduces the need for the environment, reduces the sensitivity to parameters, and improves the stability at work.At the same time, the system can monitor the robot and the surrounding environment, provide safe, reliable and accurate guidance for the robot to work, make better decisions, and further improve the degree of intelligence to achieve a wider range of operations [1-3].

However, the conventional robot visual tracking psychological quality prediction control has a large amount of data acquisition and a large amount of data, and the required image processing cycle is relatively large, which leads to the delay of the tracking psychological quality prediction system.At the same time, due to the need to obtain the pose, pose and other related information of the object from the image, the required operation time is very much, and the operation time is also relatively long, which makes the conventional tracking mental quality prediction system difficult to meet the requirements [4-7].

The focus of this paper is on the implementation of vision-based motion tracking and fast tracking of motion tracking.In the vision system, high-speed vision hardware is used to increase the acquisition speed.Using effective image operation method, the speed of image operation is greatly shortened.In the controller part, a new control method is proposed according to the vision and speed, and the stable calculation is carried out.A good dynamic effect can be achieved by using a vision-based high-speed tracking mental quality prediction system.The visual optimization process of multimedia robot based on color analysis is shown in Figure 1 below:

Figure 1: Visual optimization of multimedia robots based on analyzed colors



With the rapid development of image processing, machine learning and other technologies, the application of visual tracking psychological quality prediction system in control system is increasingly popular.In the industry, visual tracking psychological quality prediction technology has replaced the traditional optical sensor, and visual tracking psychological quality prediction technology can effectively improve the accuracy and stability of the work, so it is adopted by many manufacturers and manufacturers.In certain newly built automatic production lines, people have begun to use the randomness of visualization to work and work.

First, Machine vision is a non-contact inspection method that surpasses conventional measurement technology. Machine vision simulates the human eyes to obtain the surrounding environment, using the combination of camera

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and computer, using the camera to capture images, and then send back to the computer for further processing and analysis, so as to obtain the required environmental information, so as to guide the robot to the next action.The closed-loop control is realized in a visual way, it is realized in a visual way, it is detected and processed by the external data by the visual sensor, and then the useful data in the acquired data is fed back to realize the control of the attitude action of the robot.With the rapid development of science and technology, the impact on the visual system is more and more important.

Secondly, the imaging system for predicting the psychological quality of robot visual tracking based on high-speed motion is established.Using EoSensMC1362 high speed industrial camera and Xilinx KinteX UltraScale+ high performance FPGA application card, a set of image processing platform based on CameraLink Full format is constructed.Based on SDSoC, the Pipeline, Unroll, Dataflow commands supported by HLS are used to complete the work of data pipelining, and the row buffer and window buffer technology are used to speed up the convolution calculation of the image.Taking the ArUco label as the object, the outer shape of the mark is obtained by using the edge tracking method of four or eight adjacent regions. Different shape angles are used to determine the quadrangle Angle of each shape.A pose estimation method based on four corners is proposed, which can be easily carried out using FPGA, and a theoretical phase pose is obtained. On this basis, a new method is used to improve the speed of the data [8-10].

2. Research methods

2.1 Development status of visual tracking psychological quality prediction technology

Visual follow-through technology originated in 1970, when Dr. Feldman of Stanford University invented a device equipped with color components, a robot and a computer to perform simple actions and solve problems. During this time, the target is located using the color composition in an open-loop manner, and the positioning information is transmitted to the robot so that it can operate. Shirai and Inoue first introduced the idea of visual feedback in 1973 and successfully boxed objects in a way. In 1979, Hill and Park first proposed visual control based on closed-loop, thus solving vision-based uncertainties. Because it has double closed loop of outer image loop and inner robot joint position, its structure is relatively simple, so it has great practical value.On this basis, some representative articles by Hutchinson and Chaumette et al., systematically summarize the psychological quality prediction system of visual tracking and provide guidance for the development of the field of visual tracking psychological quality prediction [11-13].

According to the type of feedback, the existing visual follow-up can be divided into three types: image-based visual follow-up (IBVS), location-based visual follow-up (PBVS), and a compound visual follow-up (2.5D) which combines the two.

If I multiply it by the left, I get$(\mathbf{T}_b^s)^{-1}\dot{\mathbf{T}}_b^s$

$$\begin{aligned}(\mathbf{T}_b^s)^{-1}\mathbf{T}_b^s \quad &= \begin{bmatrix} (\mathbf{R}_b^s)^{\mathrm{T}} & -(\mathbf{R}_b^s)^{\mathrm{T}}\mathbf{p}_{sb}^s \\ \mathbf{0} & 1 \end{bmatrix} \begin{bmatrix} \dot{\mathbf{R}}_b^s & \dot{\mathbf{p}}_{sb}^s \\ \mathbf{0} & 0 \end{bmatrix} \\ &= \begin{bmatrix} (\mathbf{R}_b^s\ \mathrm{T}^{\mathrm{T}}\mathbf{R}_b^s & (\mathbf{R}_b^s)^{\mathrm{T}}\mathbf{p}_{sb}^s \\ \mathbf{0} & 0 \end{bmatrix} \\ &= \begin{bmatrix} [\omega_b] & \mathbf{v_b} \\ \mathbf{0} & 0 \end{bmatrix}\end{aligned}$$

Where, and denote, respectively, the angular velocity and the linear velocity of the origin of the rigid body coordinate system in the stationary coordinate system which instantaneously coincides with the moving rigid body coordinate system.$\omega_b\mathbf{v_b}$The angular and linear velocities of the rigid motion are combined into a 6-dimensional vector$\omega_b\mathbf{v_b}$

$$\mathcal{V}_b = \begin{bmatrix} \omega_b \\ \mathrm{v}_b \end{bmatrix} \in \mathbb{R}^6$$

$\mathcal{V}_b$ Is the motion of the rigid body, that is, the motion speed of the rigid body in the stationary coordinate system when the rigid body coordinate system is sleeping.The matrix form of the Tre quantity of motion is then$\boldsymbol{V}_b$

$$[\mathcal{V}_b] = (\mathbf{T}_b^s)^{-1}\mathbf{T}_b^s = \begin{bmatrix} [\omega_b] & \mathbf{v}_b \\ 0 & 0 \end{bmatrix}$$

The core of the pose-based vision-based control technology is to calculate the attitude of the robot in the global coordinate system according to the relative attitude between the color composition and the robot in the global coordinate system according to the image obtained by the vision sensor.Used for the attitude and described in the system Settings of the difference between the required profile, described for the visual tracking system error of psychological quality prediction system, described by visual tracking mental quality predictive controller corresponding control quantity, and then described the control values of position of robot joints, described to described in order to achieve the purpose of visual tracking mental quality prediction.However, its disadvantage is that the accuracy of its control mainly depends on the estimation of the robot pose from the acquired image [14-15].

At present, the main reasons restricting the improvement of the prediction efficiency of visual tracking psychological quality are as follows. The image acquisition rate (10~100 Hz) in the outer image loop is relatively small, and the image processing time is also relatively large (10~100 ms). Therefore, the frequency of image information feedback of the visual tracking psychological quality prediction device is very small, and the visual tracking psychological quality prediction device has problems such as delay.At the same time, the sampling frequency of the image loop is much lower than the sampling frequency of the position loop in the inner loop (above 1 kHz), so that the visual predictive control of the tracking psychological quality shows the multi-sampling rate characteristics.

In order to overcome this problem, researchers have given three methods. First, according to the characteristics of multi-sampling rate and delay, the method of combining observer and multi-sampling rate is used to realize motion.The second method is to use the distributed method to transmit the images collected by multiple sensors to the corresponding nodes for computing, so as to speed up the processing and collection of images.The third method is to use fast visual control technology to increase the acquisition speed, shorten the processing speed, increase the number of feedback and reduce the visual tracking psychological quality predictive control delay.Most of the existing literature focuses on the former.

2.2 Vision-based psychological quality prediction for high-speed visual tracking of robots

In large-scale work environments, complex human-machine interactions such as endpoint adjustment are required for dynamic targets with high accuracy, both because of difficule-to-construct real-time feedback, and because of interference from mechanical failures (e.g., gaps) and nonlinear dynamics (especially moving at high speeds).To this end, Professor Huang of the University of Tokyo has introduced a high-speed visual feedback based on correlated coordinates and a high-speed and lightweight compensation actuator (for fine tuning) combined with a conventional robot (coarse tuning).The uncertainty is compensated by using the visual information of the relative coordinates of the target, the main device and the compensation device (here, the fast visualization refers to the image characteristics of 1000 Hz).On this basis, the robot control device, namely DCRS (Dynamic Response System), is developed.According to the characteristics of DCRS system, this paper presents a simple image-based servo control algorithm and a PD algorithm for compensation before PD.Aiming at the situation of large position and attitude uncertainty, an active gyroscope with high speed rotation and a fast visual feedback technology based on motion compensation are used to realize the positioning of the stereoscopic target with large position and attitude uncertainty.This study does not require large-scale calibration and does not require a dynamic model, which can achieve fast and accurate interactive operation.

For any two quantity and motion, as well as arbitrary homogeneous transformation matrix, if satisfied$V_\alpha V_\beta \mathbf{T} = (\mathbf{R}, \mathbf{p}) \in SE(3)$

$$[V_\alpha] = \mathrm{T}\left[\,{}^{*}V_\beta\right]\mathrm{T}^{-1}$$

The adjoint transformation matrix of the intersection degree transformation matrix can be defined as$\mathbf{T}[\mathrm{Ad}_\mathbf{T}]$

$$[\mathrm{Ad}_\mathbf{T}] = \begin{bmatrix} \mathbf{R} & \mathbf{0} \\ [\mathbf{p}]\mathbf{R} & \mathbf{R} \end{bmatrix} \in \mathbb{R}^{6\times 6}$$

Using the jam-follow transformation matrix, the relation of the moving spinors and can be expressed as$[\mathrm{Ad}_\mathbf{T}]\boldsymbol{V}_\alpha\boldsymbol{V}_\beta$

$$V_\alpha = [\mathrm{Ad}_\mathbf{T}]V_\beta$$

You can also write it as

$$\mathcal{V}_\alpha = \mathrm{Ad}_\mathbf{T}(V_\beta)$$

2.3 Prediction of psychological quality of visual tracking for multimedia robots

Before carrying out the subjective psychological load analysis, the reliability and validity of the NASA-TLX and SWAT scales were first tested. The reliability of the NASA-TLX (Cronbach 's = 0.882) and content validity (KMO = 0.815, Bartlett = 189.539, p = 0.000), the reliability of the SWAT scale (Cronbach's a = 0.817) and content validity (KMO = 0.635, Bartlett = 74.705, p = 0.000) were good, and the Cronbachα and KMO values were greater than 0.6, the dimensions could be retained, and the correlation between the dimensions was good.

The so-called "mental quality prediction" is a kind of video imaging technology with 100M/s/s, which is mainly based on the resolution of image and frame rate. The current industrial color composition can usually complete 500 frames/s data acquisition under 1280x1024, its acquisition rate can reach 655.36M/s, which meets the needs of high-speed video surveillance. In high-speed imaging, in addition to the pixel sampling rate, there are two main problems to be considered: transmitting a large amount of image data from the color composition to the processor and the transfer protocol. The RNN model shown in Figure 2 is the mental quality prediction process of the visual

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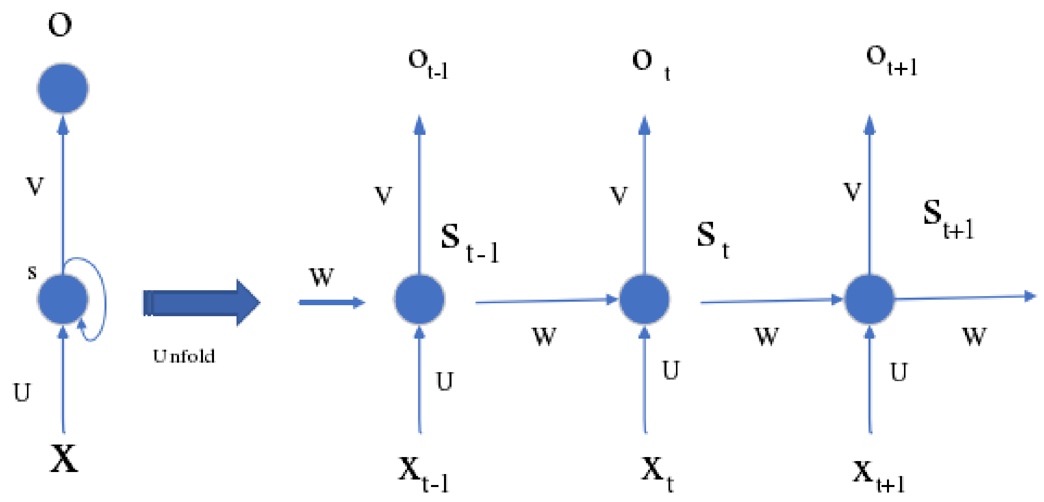
robot:

Figure 2: The design process of mental quality prediction for image vision robots



In the past two decades, more and more scientific research institutions began to pay attention to the development of psychological quality prediction. Masatoshi Ishikawa of the University of Tokyo, Japan, was the first person to study the prediction of psychological quality. In 2000, Ishikawa’s lab developed a fast visualization system called “1ms Column Parallel Vision System,” which includes 128x128 image detectors and a processor array connected in parallel to a processing unit array, reducing the time it takes to transmit images to 1ms. On this basis, the usual methods such as blanking and boundary extraction are used in image preprocessing, and the orientation information of the object is extracted from the geometric center of the object by filtering and self-window technology, and the object is located in 1 millisecond.

In this part, an industrial robot mental quality prediction model is presented. Under the existing conditions of joint coordinates, the position in the end point coordinate system of the robot can be solved by this method. Parameter modeling method based on mental quality prediction and exponential product expression modeling method are the most common methods at present. Mental quality prediction model is one of the earliest models in the past twenty years. It has been widely used in many fields of robotics. The model based on coefficient multiplication is shorter and less common than parameterized mental quality prediction model, but it combines classical rotational theory with other mathematical models and is better than mental quality prediction model in many aspects. By analyzing and comparing the advantages and disadvantages of the two models, a new motion model based on exponential multiplication is selected.

$$\mathbf{T}_e^s = \mathbf{T}_0 e^{[\varepsilon_1]\theta_1}$$

Where, is the new pose of the terminal coordinate system, is the spinor coordinate of joint 1 expressed in the terminal coordinate system, is the unit vector of forward rotation along the axis of joint 1, is any point on the axis of rotation of joint 1, and the coordinate value is expressed in the terminal coordinate system. $\mathbf{T}_e^s \in SE(3) \mathcal{E}_1 = (\omega_1, \mathbf{v}_1) \omega_1 \in \mathbb{R}^3 \mathbf{v}_1 = -\omega_1 \times \mathbf{q}_1, \mathbf{q}_1$ The above process is carried out for the Guan joint and 6 in turn, and the pose of the end coordinate system with respect to the base coordinate system can be obtained when the six joint angles of the robot are changed relative to the initial pose2、3、4、5

$$\mathbf{T}_e^s = \mathbf{T}_0 e^{[\varepsilon_1]\theta_1} e^{[\varepsilon_2]\theta_2} e^{[\varepsilon_3]\theta_3} e^{[\varepsilon_4]\theta_4} e^{[\varepsilon_5]\theta_5} e^{[\varepsilon_0]\theta_0}$$

3. Result analysis

Using the index multiplication, the motion model of the robot is established by using the index multiplication, and the Jacobi equation can be easily derived by using this method.This will be proved in the following.

3.1 Visual tracking of multimedia robot based on color composition

It is the same as the color symbol convention in the previous section, and is the pose of the end coordinate system with respect to the base coordinate system.$T_e^s \in SE(3)$In the terminal coordinate system, the terminal velocity is, and according to Equation (2-11), the relationship between the terminal velocity and is. $\boldsymbol{V}_e = (\omega_e^{\mathrm{T}}, \mathbf{v}_e^{\mathrm{T}})^{\mathrm{T}} \boldsymbol{V}_e \mathbf{T}_e^s [\mathcal{V}_e] = (\mathbf{T}_e^s)^{-1} \mathbf{T}_e^s$Calculation,$\mathbf{T}_e^s$

$$\begin{aligned} \dot{\mathbf{T}}_e^s = & \mathbf{T}_0 e^{[\varepsilon_1]\theta_1} \cdots e^{[\varepsilon_5]\theta_5} \left(\frac{d}{dt} e^{[\varepsilon_0]\theta_6}\right) + \mathbf{T}_0 e^{[\varepsilon_1]\theta_1} \cdots \left(\frac{d}{dt} e^{[\varepsilon_5]\theta_5}\right) e^{[\varepsilon_0]\theta_0} + \cdots \\ = & \mathbf{T}_0 e^{[\varepsilon_1]\theta_1} \cdots e^{[\varepsilon_5]\theta_5} e^{[\varepsilon_0]\theta_0} [\mathcal{E}_6] \dot{\theta}_6 + \mathbf{T}_0 e^{[\varepsilon_1\theta_1} \cdots e^{[\varepsilon_\varepsilon]\theta_5} [\mathcal{E}_5] e^{[\varepsilon_0]\theta_0} \dot{\theta}_5 + \cdots \\ & + \mathbf{T}_0 e^{[\varepsilon_1]\theta_1} [\mathcal{E}_1] e^{[\varepsilon_2]\theta_2} \cdots e^{[\varepsilon_0]\theta_0} \dot{\theta}_1 \end{aligned}$$

In addition

$$(\mathbf{T}_e^s)^{-1} = e^{-[\varepsilon_0]\theta_0} \cdots e^{-[\varepsilon_1]\theta_1} \mathbf{T}_0^{-1}$$

Calculate the available$(\mathbf{T}_e^s)^{-1}\mathbf{T}_e^s$

$$\begin{aligned} [\mathcal{V}_e] = & [\mathcal{E}_6]\dot{\theta}_6 + e^{-[\varepsilon_0]\theta_6} [\mathcal{E}_5] e^{[\varepsilon_0]\theta_0} \dot{\theta}_5 + \cdots \\ & + e^{-[\varepsilon_0]\theta_0} \cdots e^{-[\varepsilon_2]\theta_2} [\mathcal{E}_1] e^{[\varepsilon_2]\theta_2} \cdots e^{[\varepsilon_0]\theta_0} \dot{\theta}_1 \end{aligned}$$

Using the adjoint transformation matrix in the equation, the end velocity can be expressed in the form of a vector

$$\begin{aligned} V_e & = \mathcal{E}_6 \dot{\theta}_6 + \mathrm{Ad}_e - [\varepsilon_0] e_0 (\mathcal{E}_5) \dot{\theta}_5 + \cdots + \mathrm{Ad}_e - [\varepsilon_0] e_0 \ldots e - \{\varepsilon_2 \varepsilon_2 (\mathcal{E}_1) \dot{\theta}_1 \\ & = \mathbf{J}_{e6} \dot{\theta}_6 + \mathbf{J}_{es}(\boldsymbol{\theta}) \dot{\theta}_5 + \cdots + \mathbf{J}_{e1}(\boldsymbol{\theta}) \dot{\theta}_1 \end{aligned}$$

Write the above equation in matrix form, i.e

Table 1 Geometric parameters of the C60 robot

parameter	The length of the	parameter	The length of the
L_1	49.079 mm	L_4	270.537 mm
L_2	320.000 mm	L_5	69.887 mm
L_3	0.023 mm	L_6	299.097 mm

In the visual servoing system, the camera is generally fixed to the end of the robot through a connector, as shown in Figure 2-6. Thus, the camera coordinate system has a fixed pose with respect to the coordinate system in the robot person

$$\mathbf{T}_c^e = \begin{bmatrix} \mathbf{R}_c^c & \mathbf{p}_{e,c}^e \\ 0 & 1 \end{bmatrix}$$

Through the pose of the robot end frame with respect to the base frame, the homogeneous transformation matrix of the pose of the camera frame with respect to the base frame is

$$\mathbf{T}_c^s = \mathbf{T}_e^s \mathbf{T}_c^e$$

Taking the derivative of the homogeneous transformation matrix of the pose of the camera coordinate system with respect to the base coordinate system, since the pose of the camera coordinate system with respect to the robot end coordinate system is fixed, we can obtain, and then conclude$\mathbf{T}_c^s \dot{\mathbf{T}}_c^e = 0$

$$\begin{aligned} \mathbf{T}_c^s \quad &= \mathbf{T}_e^s \mathbf{T}_c^e + \mathbf{T}_e^s \mathbf{T}_c^e \\ &= \mathbf{T}_e^s \mathbf{T}_c^e \end{aligned}$$

Referring to the formula, the matrix form for calculating the camera motion spinor is

$$\begin{aligned} [\mathcal{V}_c] \quad &= (\mathbf{T}_c^s)^{-1} \mathbf{T}_c^s \\ &= (\mathbf{T}_c^e)^{-1} (\mathbf{T}_c^s)^{-1} \mathbf{T}_e^s \mathbf{T}_c^e \\ &= (\mathbf{T}_c^c)^{-1} [\mathcal{V}_e] \mathbf{T}_c^e \end{aligned}$$

Type, export the camera motion spinor and end of the robot motion 淀 transformation relationship of the type into the row transform, get it

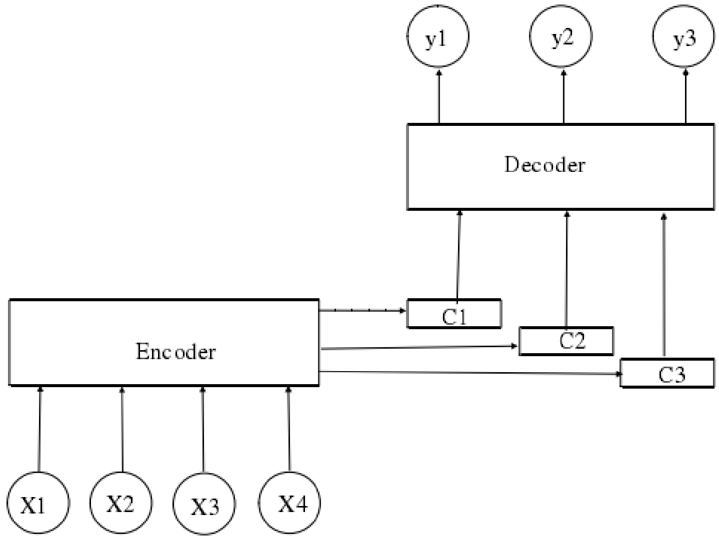
$$[V_e] = \mathbf{T}_c^e [\mathcal{V}_c] (\mathbf{T}_c^e)^{-1}$$

Use, said of the adjoint transformation matrix to get the east side of robot movement 淀 quantity and the relationship between the camera motion spinor vector.$\mathbf{T}_c^e$

$$\mathcal{V}_e = \mathrm{Ad}_{\mathbf{T}_c^e}(\boldsymbol{V}_c)$$

According to the above analysis, the required movement rate of the robot terminal frame can be calculated according to the formula. The expected movement rate of the color composition is the required speed of the color composition output by the visual tracking psychological quality prediction controller. The psychological framework of multimedia robot visual tracking combined with attention analysis is shown in Figure 3 below:

Figure 3: Analysis of an attention-based predictive framework for tracking mental quality



With the Pipeline command, a loop can be broken down into a pipeline, while in continuous operation, a cycle must be started after the end of a cycle.After the production line is completed, each cycle is independent, and the next cycle can complete several hours after the previous one, thus greatly improving the parallelism of the loop.Xilinx calls the beginning of these two cycles the initial interval, which is a single clock period where loop parallelism is best and pipeline utilization is highest.

Using the Unroll command, the cycle can proceed according to the solution rotation factor set by the operator.For example, adding a dewining factor set to 5 will result in 5 cycles at the beginning of each cycle, and it is clear that the cycle has been sped up by a factor of 5.However, when it comes to speeding up loops, Unroll is much less useful than Pipeline.This is due to the fact that Unroll requires sufficient interdependence across cycles, which is not suitable for most cycles.At the same time, parallelization also means memory usage and repeated reading of RAM. Pipeline is better than Unroll in terms of efficiency and processing speed of processing resources.

These activities can be pipelined through the dataflow command.Data flow can make multiple loops or functions superimposed on each other, so that each component of the algorithm can operate in parallel, so that the whole algorithm can be pipelined in the whole system level.

3.2 Cache principles for predicting the psychological quality of multimedia robot tracking

In psychological quality prediction, convolution is a very common method, such as Sobel edge detection, mean filter, Harris corner detection, etc. The basic principle is to convolve the results of psychological quality prediction.The HLS algorithm has good performance in speeding up the convolution operation, and realizes real-time convolution in data processing through special line cache and window cache technology, thereby reducing the time consumption of data processing.A convolution method for predicting the psychological quality of a hologram composed of colors is implemented by FPGA.

Firstly, a mental quality prediction result map is scanned as a whole. By tracing the track of each line, the outer edge of Arco mark is selected, and the pixel coordinates in its right border are recorded.In the first image, a detection algorithm based on historical data is used.The outer profile of ArUco mark is used to track in the k+1 frame image information. In the KTH frame, ArUco produces a rectangular detection block with constant size at the upper left point of the outer profile. The size of the detection block should be consistent with the outer profile with only k ArUco marks.Then, when the k+1 image is processed, the edge points are swept in the detector, and the edge tracking is completed at this position.Thus, a closed psychological quality prediction profile is obtained, which is the external profile of the ArUco flag in frame k+1.If no end is found in the detector, THE WHOLE SCAN is performed to obtain the outer outline, and then it is reviewed again based on previous data.But more often than not, such things are rare.

Psychological quality prediction algorithm using the history data extraction, the psychological quality prediction image before, only for all the edges of the contour tracking, and in the subsequent a psychological quality forecast, only ArUco logo on the outer edge of contour tracking, which greatly improve the psychological quality prediction image operation rate and reduced the time delay of visual.

4. Conclusion

To sum up, this thesis completed a holographic visual tracking mental images based on the rapid feedback of predictive control of quality, first of all, the system modeling, and then carry out high-speed visual tracking, finally, according to the feature of fast image feedback controller, to achieve the goal of visual tracking mental quality predictive control. The forward and differential motion models of ER3A-C60 industrial robot are established for its visual follow-up control. In this paper, the motion of a rigid body in a space of three degrees of freedom is studied. The method of using the index coordinates to represent the rotational moment and the homogeneous transformation moment of the rigid body is presented. The rotational spinners of the moving rigid body are analyzed, and the associated transformations representing the relations between the various kinematic spinners are given. In this paper, the forward motion model of robot based on exponential multiplication is introduced first, and its superiority compared with the conventional parametric model of mental quality prediction is illustrated. By solving the motion of rigid body spinor method and positive psychological quality prediction equations of robot, the endpoint of the robot velocity is derived and the corresponding relationship between the speed of the joints, and through the movement of the endpoint with transformation rate is converted to vector, and the Jacobi matrix, and through to the endpoint color composition movement speed is analyzed, and the terminal The corresponding relationship between the two is obtained, and the mathematical model of multimedia robot predicting psychological quality is established. This direction has great potential for future development.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare no conflicts of interest

Funding Statement

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