Intelligent Production Function Assistance System

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Abstract

In the process of production control module, in order to improve the accuracy of manufacturing and debugging, reduce manual operation errors, improve the accuracy and efficiency of production. Through integration and application, adding multiple identification points to expand the tracking signature database, and drawing related module models on the cloud identification map platform, we finally realized the augmented reality software design with module identification function, so that the machine can automatically identify the corresponding module and cooperate to complete the debugging task.

Keywords

AR; Intelligent; System; Software.

1. Design background

Bright Wind platform, a representative enterprise in the AR field, was established in 2012. It launched a complete AR industrial solution HiARIndustry, through real-time interconnection AR clouds and intelligent terminal, for industrial users with remote collaboration based on AR technology, training, guidance, inspection, maintenance, operation control and other services, improve the work efficiency, reduce the cost of manpower, time, etc. Now, this system have been verified in the field of industrial, AR technology, AR intelligent terminal with vertical Industry scene gradually merged, haier, gree, phoenix electric, schneider electric, saic, faw, state grid, many enterprises three first-class agency began deploying light wind of AR plan, step by step through the program, companies seek efficient way of digital production, AR is a computer that calculates the camera position and Angle in real time, and adds corresponding images to enhance the physical information that is missing or unable to be represented in the digital representation.

2. The overall design

In the process of production control module, in order to improve the accuracy of manufacturing and debugging, reduce manual operation errors, improve the accuracy and efficiency of production, write the corresponding program, so that the machine can automatically identify the corresponding module, cooperatively complete the debugging task.

AR software will be through the camera, such a machine vision system is to absorb the target into image signal, and then according to the image of a few big characteristics of the pixel distribution, color, brightness, etc is converted into digital signals, find these points through image recognition platform corresponding relationship with the target key points, you can simply by replacing the key point to achieve the purpose of dynamic identification model.

3. Partial design

Machine vision system is to use the machine instead of human eyes to make a variety of measurement and judgment. It is an important branch of computer science, it integrated optics, machinery, electronics, computer hardware and software and other aspects of technology, involving computer, image processing, pattern recognition, artificial intelligence, signal processing, optical-electromechanical integration and other fields. The rapid development of image processing and pattern recognition technology has greatly promoted the development of machine vision. The ingested content is converted into an image format, and sent to a dedicated image processing system for

analysis, abstraction, according to, brightness, color and pixel distribution information into a digital format; Through the operation of these signals, the characteristics of the captured target are analyzed, and then the relevant information is fed back to the user according to the analysis results.

3.1 Image feature extraction

3.1.1 Texture

In computer graphics, texture includes both normal sense even if an object's surface texture on the surface of the object appear uneven grooves, and is a kind of the visual characteristics of homogeneous reaction similar to the image, but also on the color design on the smooth surface of the object, reflect the surface slowly changing or periodic changes of surface structure properties, we usually call it more decorative pattern. Texture has three signs, namely: a certain local sequence is repeated; Non-random arrangement; Uneven patterns are usually irregular. Texture mapping is the drawing of colored patterns on the surface of objects. However, the texture is only the surface of the object characteristics, this characteristic is the most the most shallow the most intuitive features of the object, and cannot reflect the intrinsic attributes of the object, so only use surface information in an image texture feature is, in fact, fetching. Unlike color features, texture features cannot use pixels to abstract, need to include pixel area, using some algorithms for statistical computing.

3.1.2 Fractal model method

As an important feature and measure of fractal, the application of fractal dimension is based on the following two points:

1) Different kinds of morphological substances generally have different fractal dimensions;

2) There is a certain correspondence between the fractal in nature and the grayscale representation of the image.

Random field model method of typical method in Gibbs random field model method, the fractal model and autoregressive model method, markov random field model method, etc. These methods mainly through the model coefficient of texture feature, coefficient of difficulty of solving the model, and based on markov random field model method for texture image segmentation, is a process of iteration and optimization, Its convergence speed is slow from local to global iteration model (even if the conditions (Iterated Conditional Mode, ICM) can accelerate the search for solutions), usually iterative convergence, hundreds of times to accordingly It is necessary to use network cloud computing services to complex computation, this paper use is baidu cloud image recognition platform.

3.1.3 Map recognition platform

The steps for obtaining the target sampling map through the map recognition platform are as follows:

1) The spatial information of images and gray-level information together, so as to establish the fractal model to abstract texture feature of image regions. In this step application is more SIFT (Scale – Invariant Feature Transform) descriptor, fingerprint algorithm function, bundlingfeatures algorithm and hashfunction (hash function), etc. In addition, can design according to the different images of different algorithms, such as the local N order moment method to extract the image feature.

2) By the platform to encode image feature information, and according to the huge amounts of image coding make a lookup table. For the target image, for high resolution image sampling, the computation before image feature extraction and coding processing. 3) similarity matching algorithms in the application software, using code value of the target image, the image in the database for global or local in degrees; The threshold value is set according to the required robustness, and images or digital models with high similarity are found.

3.2 Map recognition management

The image recognition mechanism is: the server processes the uploaded images in gray scale, and the images turn into black and white images; Extracting feature points of black and white images; Package feature point data; Application runtime contrast feature points packets. The parameters of the camera is calculated in advance and project should in single sex matrix calculation of 84 Shanghai shipping institute of science journals in 2020, no. 4: after optimization matching points for calculation,

choose a few in opencv use find Homography function, divided into 2 steps, the first step is to directly calculate the single should be rough matrix, the second step is to perspective transformation of image distortion, measured again should a perspective of a single moment According to the homography matrix, the position of one picture in another picture can be obtained, which is also the way to determine the spatial coordinates. In this paper, the relevant feature points are processed by cloud map recognition, and it is not described in detail here.

4. To summarize

In the process of production control module, in order to improve the accuracy of manufacturing and debugging, reduce manual operation errors, improve the accuracy and efficiency of production. Through integration and application, adding multiple identification points to expand the tracking signature database, and drawing related module models on the cloud identification map platform, we finally realized the augmented reality software design with module identification function, so that the machine can automatically identify the corresponding module and cooperate to complete the debugging task.

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