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Construction of an Intelligent System for Computer Interactive Electric Piano Training Based on a High-Resolution Camera Positioning Algorithm

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Abstract:Design and implement a high-resolution iris image acquisition hardware system using 10-megapixel high-resolution CMOS digital camera MT9J003 and USB3.0 bus interface. Through the Cyclone III series high-performance FPGA, the collected high-resolution iris image is displayed on the liquid crystal in real time, and different calibration methods are analyzed and studied. Internal and external parameters of the camera. A music teaching form composed of a music-assisted teaching system and music production software. It integrates viewing, listening, and practicing, changing the traditional one-to-one teaching mode. Its core composition adopts professional audio processing chip and processor to realize controllable digital audio communication channel, which solves the problem of interference well.

Keywords: Intelligent System, Computer Interactive, Electric Piano Training, High-Resolution Camera Positioning

1. INTRODUCTION

With the continuous improvement of people's living standards, piano teaching has become an important part of music teaching. It can not only enhance students' personality development [1], but also cultivate their sentiments, improve their musical aesthetic ability and their own comprehensive quality. The electric piano is the main teaching equipment of the piano group class. Its variety of timbres, rhythms, convenient and fast use methods and face-to-face communication with students make it an indispensable teaching method for piano group class teaching. Digital piano group class [2].

In a sense, the appearance of this new course has played a great role in promoting the cause of piano education in our country and improving the current situation of piano teaching in our country, which is "the number of piano learners is increasing rapidly and the professional teachers are lacking in Yan Lei" [3]. No matter how hard or hard, flicking or replaying, the sound volume is the same. When playing, the sound is not strong or weak. Although the electronic piano using MF modulation simulation technology has initially solved the problem of dynamic force, there are strong and weak sounds, but the level of strength and weakness is far less rich than that of mechanical pianos [4].

When I first came into contact with the digital piano, I felt that the touch feeling and sound effects of the traditional piano could not be found on the digital piano, and I always felt that the practice of the digital piano could not replace the practice of the traditional piano [5]. With the passage of time, the understanding has changed. The "New Generation Artificial Intelligence Development Plan" issued in 2017 further clarified the strategic goals of artificial intelligence development in various industries [6]. The construction of smart power plants has become an important part of the intelligent transformation of power generation enterprises. With the continuous development of big data and other technologies, the construction and management of computer experimental teaching centers in colleges and universities must be constantly reformed and innovated [7].

The traditional multi-camera human positioning idea comes from the three-dimensional reconstruction of objects. Although high-precision target positioning can be obtained, this method needs to calibrate many parameters [8], resulting in poor real-time performance of the algorithm. Therefore, human localization based on homography has been rapidly developed [9]. However, with the rapid development of network and communication technology and the continuous expansion of human physical and virtual activity space, how to quickly and accurately identify a person's identity to protect the security of personal property information has become an inevitable society. Question [10].

The positioning purpose is achieved by extracting the image positioning points captured by the visual sensing equipment, and then restoring the three-dimensional information of the positioning points through a series of spatial coordinate transformations [11]. Surveillance cameras that can be seen everywhere in industrial production and security monitoring provide suitable conditions for indoor visual positioning. Ideally, this kind of passive visual positioning can obtain high positioning accuracy, but in complex scenes, the accuracy of this positioning method will be poor. It is widely used in the scene of environment perception [12].

The multi-threaded radar realizes the ranging function by sending pulsed lasers, using the time difference between transmitting and receiving lasers and the speed of light. According to the working principle of multi-threaded lidar researched by Yang Haowei [13] and other scholars, for example, for some industrial measurement, biomedical image processing, unmanned driving and obstacle avoidance technology [14], etc., binocular vision technology is widely used. It can help human beings to complete some tasks that are impossible for human beings to accomplish more accurately and in real time when human eyes cannot accurately judge. Since 2009, the General Academy of the Royal Academy of Music has allowed the use of digital pianos to assess all piano grades [15].

In the United States, the Bethel Conservatory of Music in Kansas, the Eastman Conservatory of Music in Rochester,

New York, Indiana University, and the University of Michigan have all offered group piano lessons. Traditional electric piano teaching mainly adopts one-to-one teaching or small class teaching mode [16], which cannot achieve large class teaching. If an independent piano room is built in order to eliminate interference, the investment cost is too high, and the teaching intensity of teachers is increased. It is difficult for schools to promote quality education in this area on a large scale. It is bound to bring some difficulties to teaching. The original one-to-one teaching mode and the teaching method of oral teaching have been greatly impacted. The reform of piano lessons is imperative [17].

2. THE PROPOSED METHODOLOGY

2.1 The High-Resolution Camera Positioning Algorithm

In this paper, the method of combining Adaboost and circumferential radial symmetry is used to determine whether the image contains a qualified iris area, and at the same time, the iris area is roughly positioned. The fine positioning of the iris adopts the method of circular difference proposed by Daugman. The chapter introduces the principle of the typical occlusion localization algorithm binocular vision localization algorithm. This localization algorithm can obtain high localization accuracy in most cases, but the real-time performance is poor.

This section first analyzes the occlusion scene, and then analyzes the accuracy and real-time performance of the binocular vision localization algorithm proposed in the literature and the monocular vision localization algorithm of the basic algorithm in this paper. Through a large number of references, a static monocular visual ranging method is proposed in the invention patent of "A Monocular Vision Ranging Method". The monocular vision ranging method has the advantages of fast speed, accurate measurement and low cost. According to the current situation, it cannot combine the camera angle data and video data in real time. In the process of camera imaging, due to u f, then v ≈ f , indicating that the image distance is the same size as the focal length. Assuming that the camera is in an ideal imaging state, the light passing through the object can be reflected on the imaging plane through the small hole, the target point and the imaging point are in a straight line, and the target point is projected to the imaging plane through the pinhole connection. The point is the imaging point. Iris feature extraction is the key technology in iris recognition. Different extraction algorithms use different encoding methods for iris regions, resulting in different iris feature codes, resulting in different recognition effects. The pros and cons of an iris recognition product It often depends on the feature extraction method used.

It can be seen that the contour of the human body has changed significantly at the position of the head and shoulders contour points. Taking the vertex of the head as the starting point, the two sides of the contour are scanned from top to bottom respectively. It can be seen that the contour point A has the trend of first downward and then to the left; the contour point B has the first downward trend. , the back-to-right trend change feature. This time, the data extraction and processing of the camera and attitude sensor use the Python language. The main packages used in the program are: cv2 and serial. cv2, or OpenCV, is a cross-platform computer vision library released under the BSD license (open source).

2.2 The Computer Interactive Electric Piano Training

In the teaching of digital piano group lessons, in addition to the accurate teaching of piano skills, more attention should be paid to the training of willingness to play. Rhythm is the life of music. Only by mastering accurate rhythm and proper speed can you express music more deeply and vividly. In digital piano teaching, the sound should change in intensity according to the needs of the music, and the finger touches the keys. . First of all, the sound to be discussed here refers to the sound that is strong and full. That is, the sound of "going down" is usually said. Personal guidance is mainly used to simulate when a student has a problem with the teacher or the teacher needs to communicate with the student.

In this mode, other students in the class can practice freely according to the content assigned by the teacher. When solving these problems, all students use their brains to think of ways, thus accumulating a wealth of rational knowledge and being able to talk about the truth. It has the ability to use the knowledge learned to popularize music education. In the course of teaching, the author mainly adopts the method of group teaching first, teaching the theory and techniques of performance step by step and focusing on it, and repeatedly strengthens the basic concepts and essentials to different degrees. Focusing on improving students' learning ability is also the ability that piano group teachers should learn and possess. Teachers must have the ability to organize teaching, mobilize all students to actively participate in classroom performance, but be able to retract freely, keep students quiet and focused when teachers are teaching, and conduct good discussions and interactions with students, so as to ensure group lessons. teaching quality and effectiveness.

The group practice is mainly used to simulate the class, when the teacher designates some students to form a group and perform an ensemble. In this mode, the specific operations are as follows: The teacher selects the students who need to join the group, and the background color of the selected student terminal changes to the selected color. Sports stars under the modern halo are more likely to make teenagers worship idols lose their way, so sports stars As a public figure concerned by society, you should always pay attention to your own image on any occasion, so that you can play a more positive role in the influence on young people. American educator John Dewey put forward the idea of cultivating creative talents at the beginning of the 20th century, and our country also realizes the importance of cultivating creative talents. Music has a very special role in cultivating people's creative thinking.

2.3 The Construction of Intelligent System for Electric Piano Training

Sports mass media should be restrained to reduce negative effects; at the same time, sports mass media should play a good role in supervising sports competitions, so that some bad sports phenomena can be demonstrated in groups under the supervision of sports mass media, mainly used to simulate classes. The teacher assigns certain students to ensemble for the whole class. In this mode, the specific operations are as follows: the teacher needs to select the student terminals for demonstration in the group respectively, and the background color of the selected student terminals will change to the strobe color. The training of rhythm can promote the development of the left brain. It plays a role in the balanced development of the left and right brains of students.

Ultimately, it will play a positive role in promoting the generation of students' creative consciousness and the cultivation of creative ability. Any substance that can make sounds can be used as a carrier of rhythm training. In teaching, language and movements are combined for rhythm training. Rhythm training can promote the development of the left brain. It plays a role in the balanced development of the left and right brains of students. Ultimately, it will play a positive role in promoting the generation of students' creative consciousness and the cultivation of creative ability. Any substance that can make sounds can be used as a carrier of rhythm training. In teaching, language and movements are combined for rhythm training. The selection of the fitness function is very important for designing a state feedback matrix that meets the performance of the control system. In general, the dynamic performance and static performance of the step response of the common system in the time domain are used to determine the stability of the control system. The dynamic performance of the step response includes the delay time.

In order to ensure the accuracy of this experiment, we use a high-precision infrared rangefinder to measure the distance between the vehicle camera and the object to be measured and the height of the camera from the ground. Figure 17 is a schematic diagram of the laser rangefinder used in this experiment. If the left image is taken as the target image, take a certain projection point (m,n) on the left image, the projection point is the target object mapped to a point on the imaging plane of the left camera, and set an M× For a window of size N, find the window of the corresponding size of the right imaging plane along the epipolar line on its right imaging plane. There are 100 search results for the search term "marketing" in the digital library, numbered from No. 1 to No. 100, which is called a search queue. In the existing mode, the system can only display the information titles of the retrieval queue by paging. There are 100 search results for the search term "marketing" in the digital library, numbered from No. 1 to No. 100, which is called a search queue. In the existing mode, the system can only display the information titles of the retrieval queue by paging. The retrieval engine mainly completes the retrieval of metadata, performs fast retrieval according to the input conditions, and sorts the output results according to the classification. The user interface is a systematic way, including simple search, advanced search, primary result interface, and secondary result interface. Intelligent search engine is a new generation product of search engine using advanced artificial intelligence technology (also known as the third generation search engine).

3. CONCLUSIONS

In this paper, a non-calibrated scene human body localization algorithm is redesigned. The algorithm idea is to use the detected human body rectangle frame to replace the human body foreground information, perform sampling homography projection on the upper and lower sides of the rectangular frame, obtain the human body candidate foot points, and carry out Latitude clustering. The digital electric piano teaching system is an emerging product formed based on the continuous development, progress and improvement of the current digital information technology. It is cheaper than traditional pianos, light in size and rich in functions, allowing more people to participate in a wider range of music experience. Some rules and methods are summarized and the software and hardware construction of piano group lessons in our school and the development of piano group lessons in the future are summarized. Prospects offer personal opinions and suggestions.

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