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A Study On: Panoramic Image Processing Tool Based on Virtual Reality in Real Life

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***Abstract*—Virtual reality technology is a modern advanced computer simulation technology, which can build a super-compelling virtual environment and let users experience these virtual environments. Moreover, in this scenario, the simulation system of entity behavior can also make users feel really immersed in the virtual world. At the same time, the application of virtual reality technology has studied and developed a variety of technologies, such as computer image processing, computer simulation, sensors, etc. The feeling of freely communicating with things in a virtual environment. This topic mainly studies the important panoramic image processing technology in virtual reality technology, and elaborates and analyses the current mainstream panoramic processing algorithms in detail, and discusses the effect of these panoramic processing algorithms, hoping to give other experts and scholars who study virtual reality technology a little bit. Reference resources.**

Keywords-Virtual reality technology; Panoramic image; Network technology

I. Panoramic Picture Generation Technology

The basic idea of generating two-dimensional images consists of three steps: first, selecting a fixed viewpoint, then taking it as the central point, then rotating it, then taking pictures, arranging and arranging the sequence of pictures, so as to locate the overlapping images of those boundary parts, and then locating these pictures. The image is proofread in many ways so as to maximize the seamless visual experience of the image. Each stitching results in a 360-degree stereo image. In other words, this is exactly what the viewer sees when he stands at any point in an image environment and rotates his body 360 degrees.

A. Photo Sequence

The quality of the original image is directly related to the effect of the image environment generated by the final stitching. In other words, the higher the quality of the original image, the better the image environment produced by the final stitching. On the contrary, the worse the quality of the original image is, the worse the effect of the final mosaic will be. Therefore, people put forward a higher standard for the original image, that is, the shooting position not only needs to find the central point of the scene and the best shooting angle, but also needs to keep the horizontal line of each original image on the same horizontal line, and minimize the multiple factors of different original images. Differences in color, contrast, brightness, etc. In addition, the number of photographs taken is directly related to the focal length of the lens. In addition, it is worth noting that the two adjacent original images must have overlapping parts, so as to facilitate the later stitching work.

B. Image Mosaic

The most important step in panoramic image generation is mosaic image. It can be said that the quality of mosaic image is directly related to the quality of panoramic image generation. The higher the quality of mosaic image is, the higher the quality of panoramic image is. At present, there are many mosaic algorithms for panoramic images, including mosaic algorithm based on region correlation and mosaic algorithm based on feature correlation.

II. Current Situation and Development of Panoramic Image Processing in China

At present, the development of network technology in our country is more and more rapid. Virtual reality panoramic technology presents a high-quality sense of three-dimensional and immersion, which also makes the effect of virtual reality panoramic technology warmly welcomed and widely used by the society. In the current three-dimensional images, panoramic technology is undoubtedly the most practical technology, but also can produce high economic benefits. However, after investigation and research, panoramic technology still has a series of shortcomings.

A. Product Lacks Virtual Tour Guide Function

The result of panoramic virtual reproduction in a scene is very important for users. It can not only get the basic visual information that people want, but also let people know the geographical and spatial position information of the surrounding scene. Moreover, most panorama technologies deal with scenarios separately, but rarely install the navigation function of the whole geographic environment.

B. Low Integration of Virtual Reality Technology

The panoramic technology of virtual reality technology is not only affected by its own factors, but also by the development of other technologies. Due to the slow development of technology popularization and application, the development of virtual reality technology in some industries lags behind. It is not only unable to research and develop more application functions, but also unable to further innovate on the basis of existing ones. Moreover, the technology application maturity and promotion degree are also constrained by many factors.

III. Panoramic Image Processing and Related Contents

A. Scenario Building

To create a virtual reality world, it needs to meet three requirements: visualization, interaction and script-driven functions.

B. Stereo Rendering

Two cameras render scenes instead of the user's left eye and right eye respectively. They can also overlap the two images through lenses in helmet-mounted glasses, thus forming a clear scene and making the user seem to be in it.

C. Head Tracking

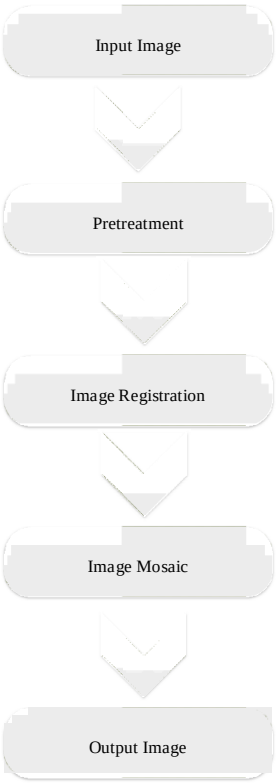

Figure 1. Panoramic Image Processing

The orientation and steering of camera in virtual environment can be changed by positioning and steering of helmet-mounted glasses. The above steps have three main parts. First, all data need to be represented in three-dimensional coordinate system. Second, all images will be placed in two-dimensional maps. In addition, virtual reality technology will be divided into two parts drawn on two drawings, according to the left eye and the right eye. Thirdly, all images are rendered in real time. When some animation or user's operation results in the change of 3D data, the images rendered by them will be updated in real time. Users can not feel the update frequency with the naked eye. Among these three points, the most important one is the third one, which can ensure the interaction of virtual reality technology. At the same time, we can see that 3D image rendering technology has created billions of dollars in profits, it is very important. In addition, many companies have begun to focus on research and development of 3D image rendering technology, they hope to achieve higher economic benefits.

IV. Panoramic Processing Related Algorithms

A. Panoramic Image Mosaic Algorithms

Now, the development of panoramic image technology is faster and faster, and this technology is also widely used in people's production and life. In the process of panoramic image production, the mosaic of panoramic images is a necessary step. In addition, panoramic image mosaic algorithm has become one of the hot topics for scientists to study and discuss. Next, this paper will introduce the types of panoramic image mosaic algorithms.

1) Region-based Mosaic Algorithms

The mosaic algorithm based on region correlation is the most traditional and common algorithm, which is based on the gray value of the image to be mosaic. The specific algorithm flow is to calculate the difference of gray value between a region in the image to be matched and the region of the same size in the image, and compare these differences, so as to judge the similarity of overlapping regions in the mosaic image. In addition, the range and exact position of the overlapping area of the image to be stitched can be obtained, which ensures the perfect realization of image stitching, as shown in Figure 2.

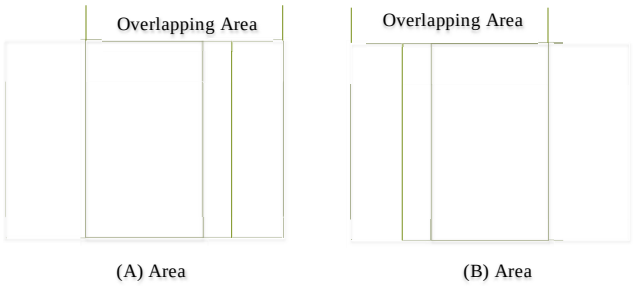

Figure 2. Mosaic algorithm based on region correlation

2) Mosaic Algorithm Based on Feature Correlation

The mosaic algorithm based on feature correlation does not directly use the pixel value of the image, but derives the features of the image through the way of pixels, and takes the features of the image as the standard, so as to search and match the corresponding feature areas of the overlapping part of the image. In feature-based algorithm, the image must be processed strictly first, then the feature that meets the specific application needs must be selected, and then the model parameters can be determined by the feature correspondence relationship. The main difficulty of this stitching algorithm lies in the selection of feature types and the process of feature matching and tracking. Usually, points, lines and curves are often used as image features. These

panoramic image mosaic algorithms can select the corresponding relationship between images to the greatest extent, which is very convenient.

3) Image Seam Smoothing

Image samples are images of real scenes. If viewed carefully, these images contain very rich and diverse details. However, the shooting of digital images and some other factors, such as folding transformation, instantaneous noise, make the overlapping parts of adjacent samples inconsistent in details. Therefore, most of the vertical edges used as matching features are contours or other edges. The edges in detail texture often cause various additional errors in the process of processing, which also requires the smoothing of gray-scale images.

4) Principle Based on Similar Curve Matching

Assuming that the height and width of two adjacent images are the same, according to the principle of similar curve matching, the following steps should be followed.

It is necessary to calculate the maximum gradient point in each column for each image from left to right, and record the coordinates of this point. Maximum gradient means that this point has the highest gray jump value compared with other points. Therefore, it is necessary to take out the gray value of each point in the color image first, and calculate their gray value by using RGB to transform YIQ chroma space.

B. Panoramic Image Segmentation Algorithms

The task of panoramic segmentation points out that every pixel in an image must be assigned a semantic label and an instance ID. The former refers to the category of objects, while the latter refers to the corresponding different numbers of similar objects. At present, most of the segmentation tasks are separated according to two types, which are uncountable and countable, respectively. However, this also leads to the two tasks can not be unified under the same segmentation task. The main reason is the lack of appropriate measurement matrix. In addition, panoramic segmentation also has other problems, such as, it is difficult to optimize the design of full-connected network, and it is easy to overlap in case segmentation.

1) Requirements for Specific Segmentation Forms of Panoramic Segmentation

In the image, each pixel has its corresponding semantic category and instance ID. At the same time, if the semantic category and instance ID of the pixel can not be determined, it will be null labeled. Moreover, all the semantic categories are either uncountable or uncountable. They can not belong to both types, nor can they all belong to the same category. In addition, the instance IDs of these pixels are the same among countless types.

If all types are uncountable, panoramic segmentation is identical except for the difference between metric and semantic segmentation. In addition, overlap is not allowed in panoramic segmentation, but instance segmentation can overlap. At the same time, case segmentation needs to investigate the confidence probability of each different segmentation, but panoramic segmentation does not need. However, panoramic segmentation is also capable of investigating the confidence probabilities of different segmentation for better machine recognition.

2) Comparison of Panoramic Segmentation and Existing Segmentation Metrics

Comparing the measurement of panoramic segmentation with that of semantic segmentation, it can be clearly found that the latter mainly focuses on the accuracy of pixel level, but does not fully consider the accuracy of instances, so it is difficult to adapt to the segmentation task of countable categories. At the same time, comparing panoramic segmentation with instance segmentation, the latter mainly considers the average accuracy, but it can not meet the standard of semantic segmentation and panoramic segmentation tasks.

C. Processing Method of Border

Usually, the aspect ratio of panorama produced by virtual reality technology is 2:1, and the left and right sides of panorama can be joined together. Generally speaking, the left and right sides of the image mosaic are closely seamed, so as to be able to view the panoramic image normally. However, sometimes, after Photoshop processing, due to the uneven processing on both sides, resulting in the viewing of panoramic images, there is a seam in the middle. However, this problem can be easily solved. In fact, as long as the image with boundary is located in the center of the panoramic image, there will be no seams. Therefore, only moving the image can solve the problem perfectly.

D. Google VR Isogonal Stereo Mapping Technology

Cartographers have been looking for ways to produce maps that accurately show the world. Among them, the biggest difficulty is to map the arc of the earth into flat paper. Over the centuries, various solutions have been emerging in society, but there is still no way to find a final unification. Moreover, different solutions require further analysis and trade-offs of intended uses. At present, with the emergence of virtual display technology, it is easier to map the 3D earth to the 2D plane, but it still faces many difficulties.

In order to map 3D image to 2D plane, it is necessary to use bandwidth efficiently and scientifically. However, in order to transmit high-quality video, we also need to break the limitation of network bandwidth. When transmitting virtual reality video, the bandwidth requirement is also greatly increased. The main reason is that the data of three-dimensional video is twice as high as that of plane video. Therefore, we must fully consider how to use bandwidth scientifically and efficiently.

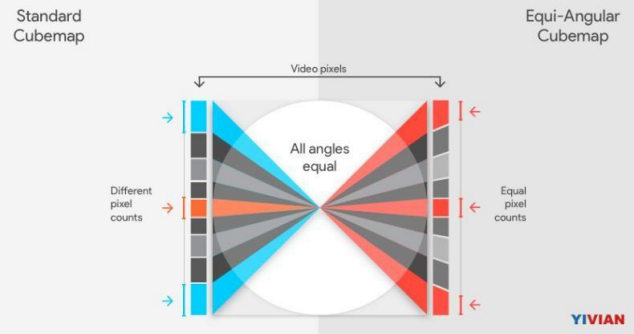

Figure 3. Isogonal stereo mapping technology

In Figure 3, the light emitted from the center can be regarded as the viewer's line of sight, which is distributed evenly according to the angle. According to the position of the sample in the cube, traditional cube mapping can show samples of different lengths. C can ensure uniform length and uniform distribution of pixels through special design. Moreover, because of many different factors, the drawing process is relatively cumbersome, and it is difficult for 2D images to extend perfectly into 3D. So, like anything, it has to learn to trade-offs and trade-offs. If you want to keep one thing, it also means you may need to lose another. In addition, after consulting the information, we can find that the mathematical calculation of EAC equation is very accurate in 2D images, but in 3D, it is only an approximation of the equiangular pixel distribution, but the approximation is very close.

V. CONCLUSION

Panoramic image processing technology based on virtual reality technology is more difficult and innovative than traditional 2D image. Panoramic image processing technology based on virtual reality technology needs to transform image into panoramic image, and then encode and transmit it. When panoramic image is played, panoramic image needs to be mapped to spherical veneer and then projected to visual plane again, which needs to undergo many transformations, and each conversion is all the same. It can lead to image distortion or image quality deterioration. Therefore, optimizing and adjusting various transformation methods and image processing algorithms have become the focus of scientists' thinking. With the continuous development of virtual reality technology, it appears in all aspects of people's production and life, such as entertainment, simulation, shopping, education and so on. Moreover, scientists will continue to research and develop related technologies, and let more and more high-quality virtual reality technology products appear in people's vision, so that virtual reality technology can be fully applied to all walks of life.

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