

Guide for 360 ° VR Video Production

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Abstract : 360° virtual reality (VR) is a medium that can experience reality directly or indirectly in a virtual space created by a computer. A type of 360° VR videos is various as many as that in generally watched videos. 360° VR videos have various types as many as general 2D videos such as daily living, travels, sports, leports (leisure + sports), and movies but they can make realistic feeling as if watchers were present in the real place. Oculus or smart devices-mounted card boards can be used to enable realistic views.

A large number of contents for 360° VR that are categorized to daily living and travel are created in video streaming sites. However, few guide videos for 360° VR are available up until now. One of the available guide videos is “How NOT to shoot in 360” created by “YouTube Creator Academy”. This guide video contains some 360° VR shooting methods and some tips about not shooting in 360° VR. In the present paper, a guide video is produced to help 360° VR shooting by referring “How NOT to shoot in 360”.

Keywords - VR, 360° VR, Video Shooting Method, Video Shooting Tool, Editing Method

I. INTRODUCTION

VR refers to an object or event that seems something in essence or effect, though not actually or in fact [1]. 360° VR is one of the user interface technologies through which users feel similar experiences of reality that is possible internally in software programs through human senses such as vision and hearing by wearing specialized glasses [2]. There are a number of sectors that employ VR video contents usefully such as medical, military, sport, education, and entertainment sectors [3]. In the medical field, VR video contents are used in simulation virtual endoscope and simulation surgery for practice of anatomy. In the military field, VR is used to train a pilot in simulations of operation for jet fighters or helicopters. In the education field, it is utilized as simulations for vehicle driving and shooting training. In the entertainment field, it is utilized variably in games, exhibitions, and performances. In the sport field, it can be used as first person viewpoint of athletes. As described in the above, VR has been used in a variety of fields in our daily living [4].

Among 360° VR videos uploaded through YouTube, video contents in the entertainment field are overwhelmingly plentiful. In other portal sites, a large portion of VR contents belong to the entertainment sector similar to that in YouTube. However, those sites show only contents created via 360° VR simply but few contents are available for shooting and utilization method of 360° VR. Figure 1 shows the chart that displays VR-related software profits in main sectors, in which games and entertainment sectors account for most profits proportionally [5].

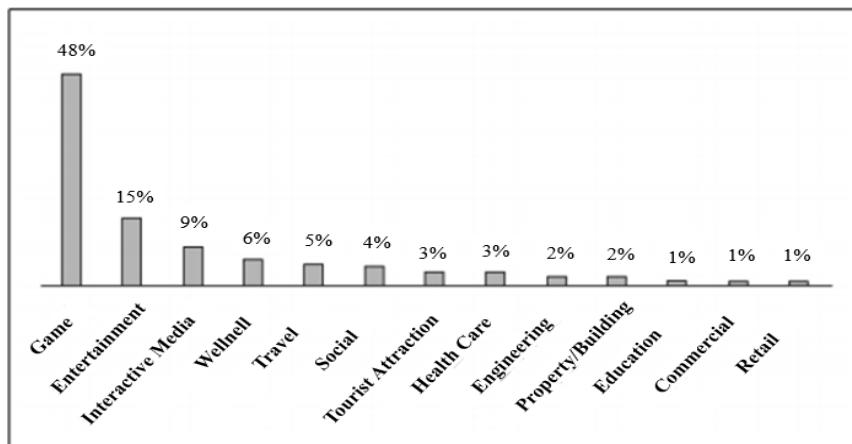


Fig. 1. Profits of VR-Related Software

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Accordingly, the present paper manufactured a 360° VR guide image according to the need of the content that instructs shooting and utilization method of 360° VR. The 360° VR guide image manufactured in the present paper is expected to contribute to production of content using 360° VR in many ways.

II. RELATED RESEARCH

2.1 shooting Tool

At least two or more cameras are needed to shoot 360° VR video. There are two shooting methods of 360° VR: one device shooting 360° and a rig consisting of a number of virtual reality cameras for shooting. The former method employs a product consisting of a single device with two lenses and the latter method employs a product that shoots videos with a rig that combines three or more cameras [6]. In particular, a product inserted into a rig employs a small size of device for portability and easy shooting.

The 360° VR device used in the present paper is the “Gear 360” manufactured by Samsung. Figure 2 shows the “Gear 360” product.



Fig. 2. Gear 360 Device of Samsung

The Gear 360 is a structure with two lenses in a single device. Thus, the front, rear, left, right, upper and lower sides can be expressed through the two lenses. A single 360° VR image is produced by combining images shot by the two lenses. A stitch line (overlapped portion of two or more images shot by multiple cameras) must be processed to create 360° VR video. To do this, a software program is needed and “Gear 360 Action Director” can do the job. Using this program, a stitch line of overlapped images is processed. Simultaneously, a single 360° VR image is created. This image is edited through CC version of After Effect and Premiere Pro in Adobe to insert the effect.

2.2 Editing Method

There are several editing methods for 360° VR videos. In the present paper, Premiere Pro CC version of Adobe was used. A size and capacity of VR video is normally larger than that of general 2D video. Thus, it is necessary to edit a VR video with good specifications of computer and the up-to-date version of Premiere Pro CC.

360° VR video after stitching is brought for editing. The video is put in the time line and a sequence with the same attribute with that in the VR video is created. After this, the editing process is the same as that in 2D videos.

However, a preview screen during the editing process of 360° VR displays a long extended screen like a panorama photo. There is a VR mode in the up-to-date version of Premiere Pro CC (as of November in 2016) so realistic 360° VR image can be previewed. If no VR mode is available in the program, GoPro Player is needed to be installed. During the installation process, Premiere Pro plug-in should be checked so that 360° VR video can be previewed through GoPro Player in the Premiere Pro.

360° VR image consists of front and rear parts. The more the view is located in the center of the image, the closer the view to the front of the VR image. The both ends in the image represent the rear in the VR image. When shooting is done using Gear 360, editing is difficult because it is difficult to differentiate the front and rear. To overcome this drawback, an embedded plug-in called “offset” in Premiere Pro is used. The location can be adjusted while moving into the right and left direction using the “offset”. The front and rear of VR image can be modified through the plug-in.

A size of most VR images is 4096 x 2048 pixels. However, a maximum size that can be shot via Gear 360 is 3072 x 1728 pixels, which is smaller than a size of most VR image. Thus, it is necessary to check whether no error of size is found after editing on VR image is complete prior to rendering process.

2.3 VR Related Research

The market size of VR is now highly large and expected to increase further nationally and internationally. Digi-Capital, an investment bank in the United Kingdom, predicted that the VR market in the world will grow rapidly from USD 200 million in 2016 to USD 150 billion in 2019 [7]. In Korea, a size of the VR market is projected from KRW 963.6 billion in 2015 to KRW 5.7 trillion in 2020 according to the data in the Korea VR Industry Association [8]. That is, the VR sector has grown significantly annually and related and utilized technologies are expected to increase further.

The number of projected sales of VR equipment is also expected to increase from 14 million devices in 2016 to 38 million devices in 2020. The market of hardware and software in the global VR market is expected to increase exponentially to more than USD 70 billion by 2020 [7].

Accordingly, the government has chosen the VR sector as one of the nine growth engine industries, and projected that headset and entertainment markets in relation to the VR industry will increase to USD 11.2 billion (approximately KRW 12.5 trillion) by 2020 [9].

2.4 VR Related Search

To produce the 360° VR guide video in the present paper, a keyword search using “360 VR” was done in a number of video streaming sites. The search result showed that only VR videos in fields of amusement parks, daily living, performance, and surfing were found. Accurate search results were not obtained when using a keyword “360 VR Guide”, which will be implemented in the present paper, and only videos related to recreational activities were found using related keywords. Thus, the need to produce a “360° VR guide” video that instructs shooting of 360° VR video, operation, and utilization methods has increased as intended in the present paper.

III. VIDEO SHOOTING AND EXPLANATION

Figure 3 shows the introduction scene of the video. At first, a head-mounted display (HMD) was used so that entire video screen cannot be seen. Thus, the video let the user know what scene had to be watched through arrows to instruct the intention of the producer.



Fig. 3. Introduction Scene of the Video

Figure 4 shows a scene with the overall explanation about VR and HMD. Images and subtitles were inserted using Premiere Pro during the editing.



Fig. 4. Explanation of VR and HMD

Figure 5 shows a scene that contains VR video after smart device is mounted with VR video in the HMD. Since the video is looked like the real field of vision, a user should move his/her body turning rather than watching at one side as shown in Figure 5.



Fig. 5. Look Around using HMD

Figure 6 shows a scene that explains the viewpoint. In the produced video of the “360° VR guide”, viewpoints of eyes, upper head, and floor were divided for shooting. Figure 6 shows the viewpoint of eyes, which is the most-widely used viewpoint in the VR image.



Fig. 6. Explanation of Viewpoint

Figure 7 shows the movement of the field of vision. The field of vision can be moved through the movement of the subject, subtitle, and effect. In Figure 7, the field of vision of the watcher is induced while a person is running from the left to the right side.



Fig. 7. Movement of Field of Vision

Figure 8 shows a scene shot from the viewpoint above the head. The field of vision was induced to see the persons in the below using an arrow and subtitle since the persons were shot from the above.

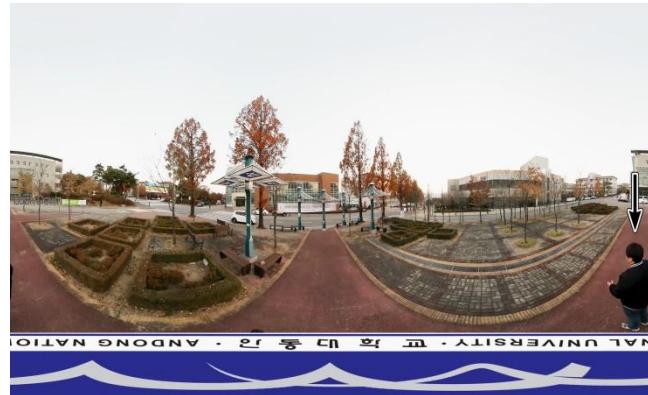
**Fig. 8.** Inducement of Viewpoint

Figure 9 shows a scene that explains the road view in map services as an example of watching scenes from the above, which is a viewpoint above the head.

**Fig. 9.** Explanation the Load View with VR

Figure 10 shows a scene shot from the floor. Since it is not a frequently-used viewpoint, it is an uncomfortable composition while watching and wearing the HMD.

**Fig. 10.** Explanation of Floor Point

Figure 11 shows shooting of scene that induces a viewpoint using subtitle or effect. The field of vision of human eyes is ranged from 90 degree up to 120 degree. However, the field of vision of 360° VR video is 360° so that induction of the field of vision is critically important. Since a user can see entire 360° field of vision rather than staying in a single viewpoint while watching the video. Thus, the present study employed subtitle or other effects to induce the field of vision.



Fig. 11. Inducement of Viewpoint using Subtitle or Effect

Figure 12 shows the induction of the field of vision through the moving subject. As mentioned in Figure 11, a user's eye followed the movement of the subject without staying in a single viewpoint in the VR image.



Fig. 12. Inducement of Viewpoint Change through Moving Subject

Figure 13 shows a scene that induces a user to find a specific building among many buildings. While finding the building, the video had the user to look around all buildings with 360° field of view.



Fig. 13. Inducement of Viewpoint Change through Subtitle

Figure 14 shows a scene that combines four VR images. In the figure, VR equipment was set at a single place and located within a range where persons were not overlapped and then masking effect was applied to have four persons in a single image. Such four-person reproduction can produce an interesting scene.

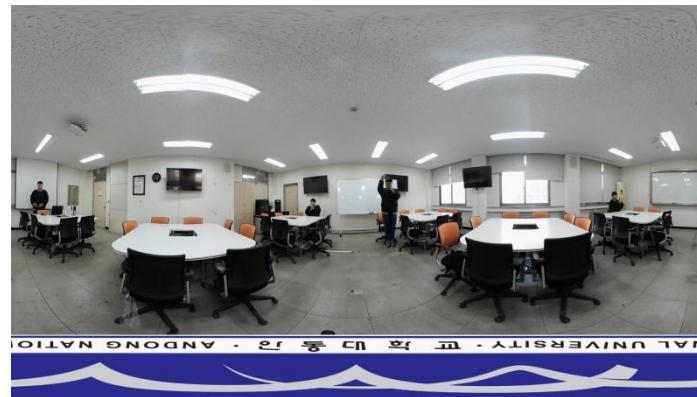


Fig. 14. VR Image using Masking Effects

IV. CONCLUSION

The use of 360° VR can produce more various video contents than ever in the content area and its future is promising as well. Video contents shot with 360° VR will be able to be competitive as much as existing video contents shot with conventional cameras and more competitive than existing video contents. The video produced in the present paper is expected to be utilized as introduction guidance for beginners in 360° VR rather than having value as the above-mentioned competitive video content.

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REFERENCES

- [1] Kwangsoo Kim, “*Study on filming 360° VR video using a remotely controlled mobile robot*”, The Graduate School of Applied Art Photography Chung-Ang University, 2017.
- [2] Kwangsoo Kim, Yonghwan Lee, “Comparison and Usage Analysis of 360 Degree VR Video Rigs”, *The Society of Modern Photography & Video*, 19(1), 2016, 87-106.
- [3] Junmo Kim, “*The Design and Implementation of authentication system for VR-Machine*”, The Graduate School of Soongsil University, 2016.
- [4] Ministry of Science, ICT and Future Planning Blog “VR”, http://blog.naver.com/with_msip/220833593757, (2016.10.11)
- [5] Buyeon Jung, “Virtual reality (VR) market status and prospects”, *Korea Information Society Development Institute Trend*, 28(23), 2016.
- [6] IT Chosun, <http://it.chosun.com/news/article.html?no=2820234>
- [7] Woontak Woo, “Augment Reality and Augment Human”, *KISA Report, The Photonics Journal*, 2015. 8.
- [8] DMC report, “Direction and Prospect of VR Industry”, *DMC Market Report Study (MA2016018)*, 2016.
- [9] Yunhap News, <http://www.yonhapnews.co.kr/bulletin/2016/10/09/0200000000AKR20161009010700003.HTML> (2016.10.10)