

REPORT OF TOPIC CHAIRMAN PRODUCTION TOPIC AREA

Topic Chairman	: Kazim PEKTAS – TRT-Türkiye
Period of Report	: March 2023 to October 2023
Date of Report	: 29 October, 2023

Reports from Project Managers in Topic on Production

A total of four projects are under the Production Topic Area, as below.

1. **Ultra High Definition TV and Advanced Immersive Sensory Media Systems P/UHDAISM**
2. **Systems for people with special needs P/SN**
3. **IT -based Production System and file-based workflows P/ITPS**
4. **Big Data, Personalisation and Artificial Intelligence P/BDAI**

For this reporting period we received two new contributions from the project group (P/UHDAISM) and 4 contributions from project (P/BDAI). The following is the compilation of these updates reports from the Project Managers of (P/UHDAISM) and (P/BDAI)

Ultra High Definition TV and Advanced Immersive Sensory Media Systems P/UHDAISM

1. Standardization related to immersive content

The feeling of actually being somewhere is called the sense of presence, and the feeling of being enclosed within video is called the sense of immersion. Research is making progress with architectures for realizing “immersive content” that offers both of these senses. By using video objects such as 360-degree video and 2D/3D video as content that is arranged temporally and spatially using a language called “scene description,” it is possible to provide video in all directions from any free perspective position to a wide variety of devices, including TVs, head-mounted displays, and smartphones (Fig. 1).

NHK has made a proposal to the moving picture experts group (MPEG), which is a subcommittee of the International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) that performs standardization of multimedia image processing technology, for extending scene description to, for example, include the “viewing position” recommended by the content creator, and this has been adopted as part of the ISO/IEC 23090-14 “*Information technology — Coded representation of immersive media — Part 14: Scene description*.” Furthermore, this architecture was proposed to the International Telecommunication Union-Radiocommunication Sector (ITU-R) and was enacted as new Recommendation ITU-R BT.2154 “*High-level system architecture for immersive video for presentation on various types of display devices*.”

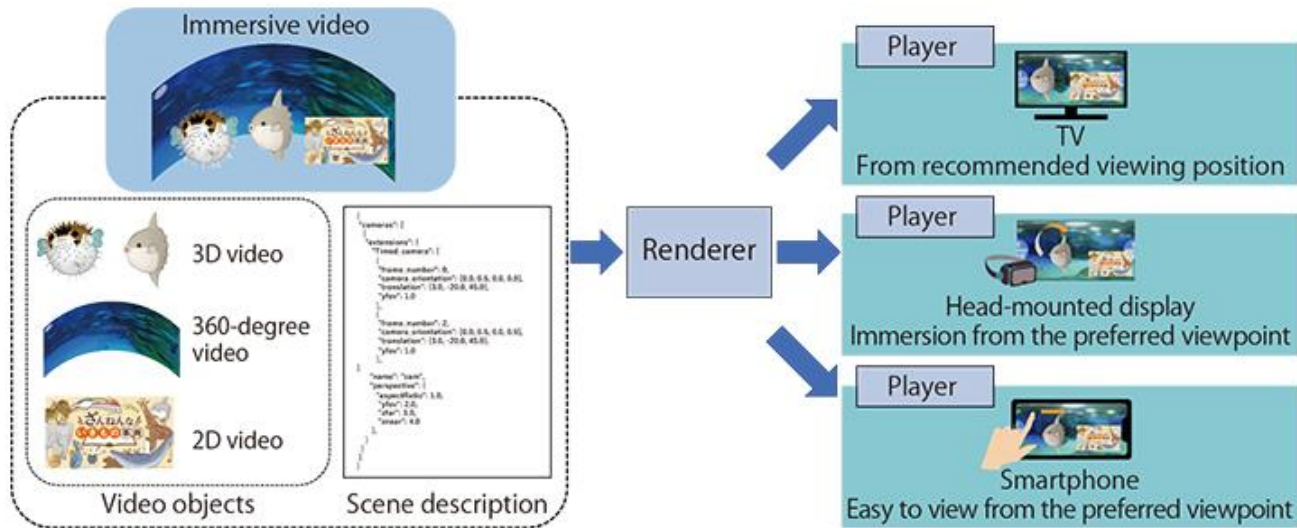


Figure 1. Overview of immersive video from composition to presentation

2. Development of 3D authoring tool for immersive video

NHK has developed an immersive video authoring tool for easily creating immersive content. Figure 2 shows the outline of authoring tool, and it was demonstrated at the 2023 NHK STRL (Science & Technology Research Laboratories) Open House. The authoring tool has the following features.

- **Simplifying the creation of immersive content**

Video objects (including volumetric video and 360-degree video) can be easily placed in a 3D space using a mouse or game controller.

- **An easy way to enjoy immersive content**

Users can use various types of devices, such as a head-mounted display or tablet, to present immersive content and enjoy moving freely within the 3D space.

- **Making use of the latest international standards**

The system makes use of the latest MPEG Standards on coded representation of immersive media including the method of encoding volumetric video and the scene-description format to show how video objects are configured in time-series space (i.e., ISO/IEC 23090-1, 2, 5, 14, 29).

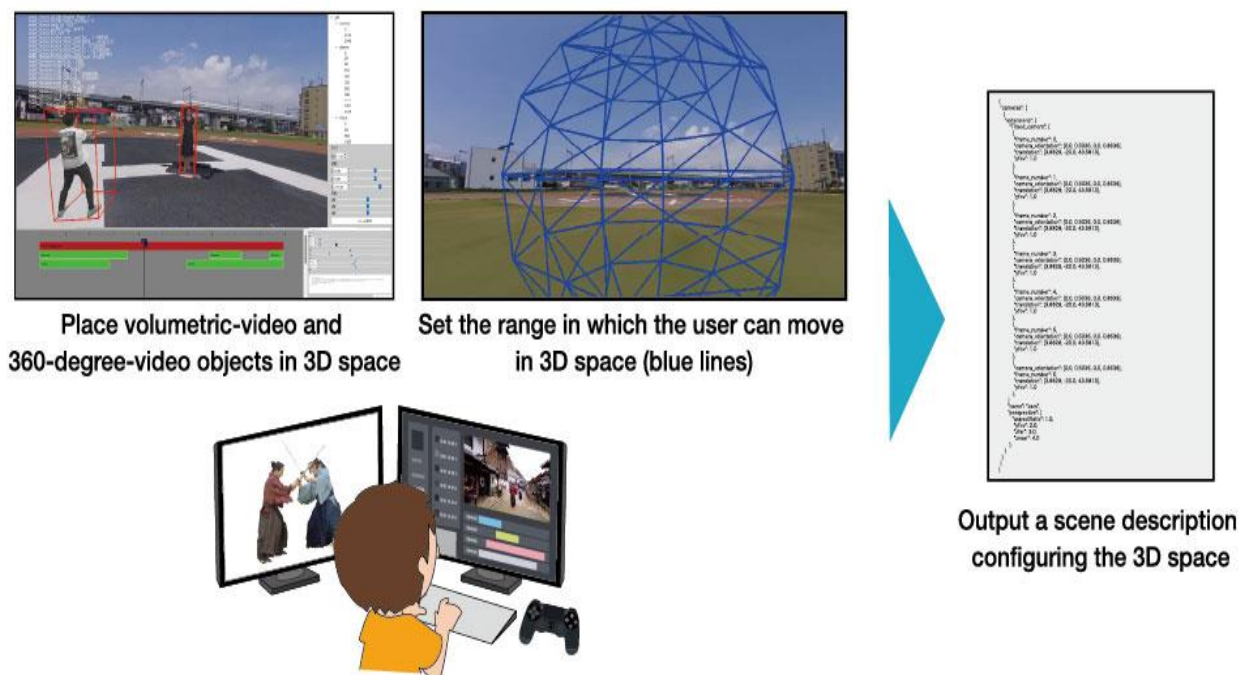


Figure 2. Outline of authoring tool

1. Automatic program video summarization system using image analysis AI

NHK Science and Technology Research Laboratories (NHK-STRL) is researching automatic video summarization technology to support the production of short videos for online distribution in order to showcase TV programs to viewers. This article describes a system that automatically generates a summary video of a program using scenes selected by image analysis AI.

Using image analysis based on AI

The image analysis AI used in this system has learned to recognize the characteristics of composition (appearances of people, objects, scenery, etc.) and camera motion of important scenes that should be included in the summary video. By selecting extracts using this AI, it is possible to generate summary videos with similar quality to those edited by an actual video producer.

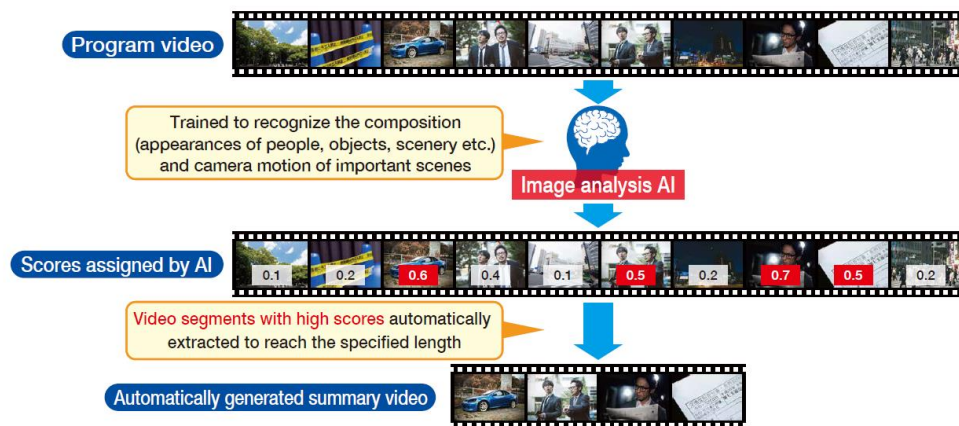
Modifying automatically generated summary video

Short-video producers have various aims or preferences, such as “avoid close-ups of faces,” “keep camera movement slow,” or “keep each cut short.” To respond to these precise requirements, the system includes functions enabling users to easily modify the automatically generated summary video.

Practical use of automatic summarization system

NHK-STRL has developed a “news program automatic summarization system” combining image analysis AI and speech recognition technologies that is now in practical use at news production sites. Summary videos of news programs can be generated and shared on social media immediately after the program has been broadcast.

As well as expanding the use of the news program automatic summarization system, NHK-STRL aims to put automatic summarization systems into practical use for other genres of TV programs.



Outline of automatic program video summarization process

2. AI in Multi-cam Production: "VVERTIGO"

The AI-based multi-cam production solution, 'VVERTIGO', enables low-cost and highly efficient multi-cam production by creating individual videos through auto-tracking multiple subjects using a single 8K camera. Since its inception in 2019, it has been utilized for official fancams of <Music Bank>, showcased on its YouTube Channel, KBS K-pop, which boasts 8 million global subscribers. In December 2022, 'VVERTIGO Live' was introduced to support live production, interacting with UHD cameras in real-time and simulating a multi-cam video production environment without requiring a director. KBS has notably enhanced AI performance to facilitate real-time processing and aims to further develop 'VVERTIGO Live' for diverse content, including sports, concerts, and live commerce. The technology

was globally showcased, and business opportunities in overseas markets were explored at the NAB Show 2023 and IBC2023.

3. AI in Color Restoration

KBS, which holds Korea's most extensive video archives dating back to 1961, has effectively utilized AI to restore heritage videos, including some black and white films. This AI application has proven to be significantly time-efficient and quality-effective in color-restoring historically significant videos. In 2022, the technology was used to produce the Liberation Day special "Our Faces in Color," restoring 50,000 black-and-white frames to color, with only 365 frames being manually colorized. With ongoing research and development, the applications of AI are progressively expanding. This year, we are restoring the legendary 1972 drama "Yeoro" in color.

4. Next-generation content search service models for KBS open archive "BADA"

KBS "BADA," introduced in 2022, represents an open archival service designed to facilitate unrestricted access for all Korean citizens to downloadable video materials, available for creative use. The term "BADA," translating to "sea" in Korean, aptly conveys the concept of an expansive and limitless content repository. Within this platform, advanced artificial intelligence (AI) engines undertake the intricate task of content analysis for video materials that pose challenges in manual tagging for search purposes. These AI engines will adeptly extract pertinent intelligent content keywords, thereby enhancing the effectiveness of the search process. The intended outcome is to empower content creators with the ability to precisely locate the specific scenes or elements they require, thanks to the wealth of material video information made accessible through this platform. It is important to note that this research initiative receives funding from governmental sources.