

REPORT OF TOPIC CHAIRMAN PRODUCTION TOPIC AREA

Topic Chairman: Kazim PEKTAS - TRT
Period of Report: March 2019 to November 2019
Date of Report: 19 November 2019

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

1. **Radio & Television Archiving including Metadata for International Programme Exchange (P/RTA)**
2. **Ultra High Definition TV (P/UHDTV)**
3. **Systems for people with special needs (P/SN)**
4. **IT-based Production System and file-based workflows (P/ITPS)**
5. **Big Data, Personalisation and Artificial Intelligence (P/BDAI)**

For this reporting period (March 2019 to November 2019) we have received four new contributions from the projects, **TV (P/UHDTV)**, **(P/SN)**, **(P/ITPS)** and **(P/BDAI)**. The following is the compilation of these four update reports from the Project Managers of (P/UHDTV), (P/SN), (P/ITPS) and (P/BDAI)

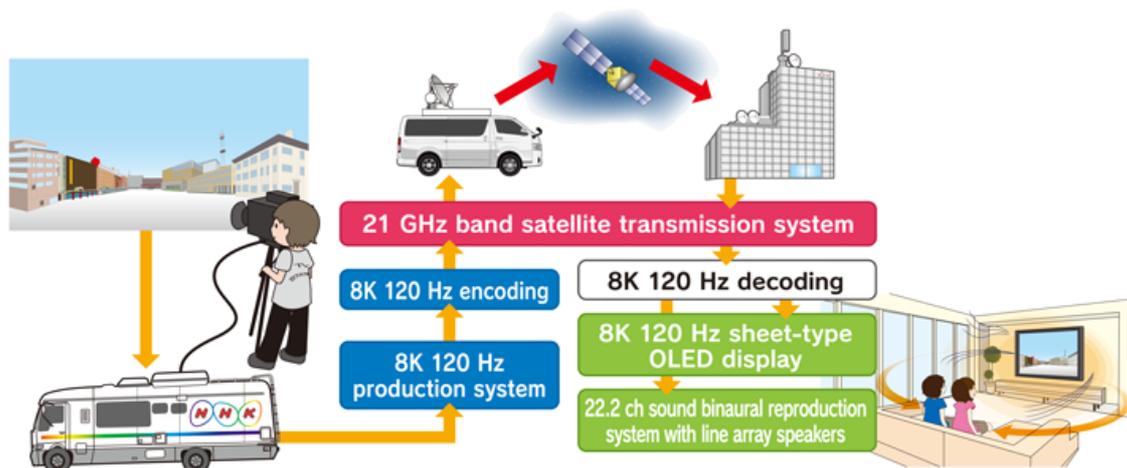
1. Project P/UHDTV (Ultra High Definition TV)

Project Manager: Mr Yoshiro Takiguchi (NHK)
 Co-Project Managers: Mr. Byung Sun KIM(KBS), Mr. Halil Us(TRT)

1.1 8K/120Hz Live Production and Transmission Experiment:

NHK are conducting research on transmission and display technologies and developing production equipment for full-featured 8K that can clearly and smoothly show motion at a high frame rate of 120Hz. A full-featured 8K live production and transmission experiment was exhibited at Open House 2019 of NHK Science & Technology Research Laboratories, using 8K 120Hz* program production equipment, encoder, satellite transmission equipment and display/reproduction devices.

※119.88Hz(120/1.001Hz)



Overview of full-featured 8K live production and transmission experiment



Low-latency, lightweight compression IP transceiver for 8K 120Hz



Online editing machine for 8K 120Hz



HDR-to-SDR conversion



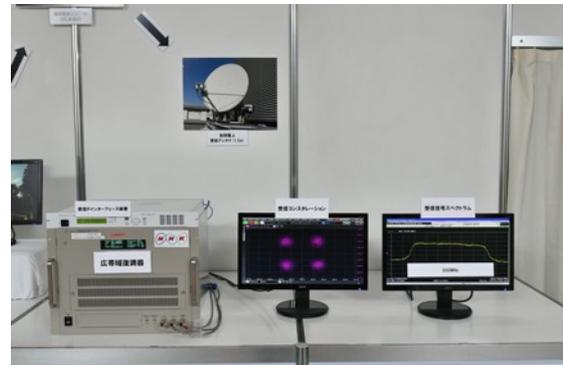
8K 120Hz HDR LCD



8K 120Hz encoder (left) and 8K 120Hz decoder (right)



Wideband modulator and transmission signal of 21GHz-band satellite transmission system



Wideband demodulator and received signal of 21GHz-band satellite transmission system



Sheet-type 8K 120Hz organic LED display



Binaural system reproducing 22.2 multichannel sound with only line array loudspeakers



Processor for binaural reproduction

2. Project P/SN (Systems for people with special needs)

Project Manager: Mr Shuichi Umeda(NHK)
 Co-Project Managers: Mr Özgür Coşar(TRT), KBS, TBS, RTPRC

2.1 Project on Sign Language CG Production System for Weather Forecast

NHK launched a sign language weather forecasts web site to the public in February 2017. Viewer can access the latest weather forecasts by clicking the map on their own PC, smart phones or tablets.

Features

- The purpose of this sign language system is reducing production cost and interpreter's burden by automatic system.
- For automatic conversion from Japanese to sign language, we have adopted a template based method. We have created a template that corresponds to the standardized weather codes distributed by the Japan Meteorological Agency.
- The sign language motions of our system are produced using pre-recorded motion capture data such as joints of fingers, facial expressions, head tilting, and mouthing.
- In sign language, the movement of the face plays an important role. Native signers can understand what we wanted to express even with poor facial expressions.

Currently they started publishing weather forecasts for only limited areas of Japan, however, in the near future, they will apply sign language system to nationwide and emergency warnings.



Web app

<https://www.nhk.or.jp/strl/sl-weather/>

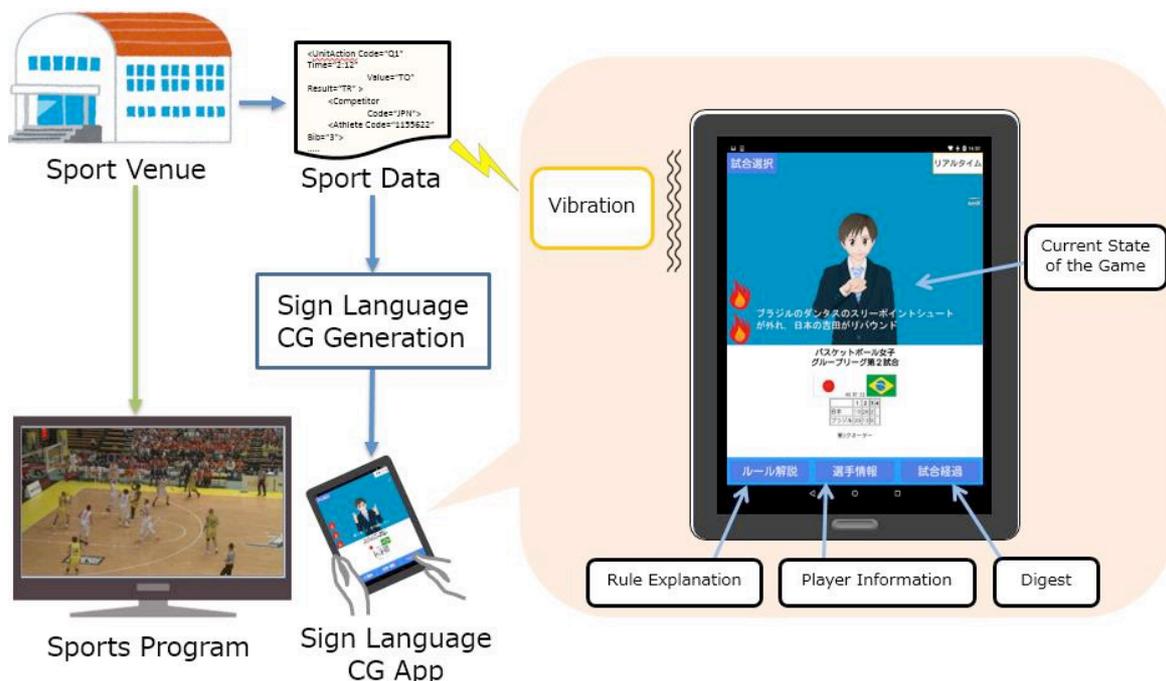
2.2 Project on Sign Language CG Presentation System for Sports Programs

They are researching technology for the automatic generation of sign language CG animation to make sports programs more enjoyable for hearing impaired. They developed a sign language CG application for sports programs that helps hearing impaired understand broadcast sports events. In February, they conducted experiments to provide contents including sign language CG automatically generated from data received in actual games.

Features

- The sign language CG generator analyze the sport data delivered to the broadcasting stations during a game, so it automatically generates and delivers sign language CG that convey the current state of the game.
- The app displays rule explanation, player information, and digests up to the present in sign language CG on a second screen to deepen viewer's understanding of the game.
- Usually, a viewer watches sports programs on a TV screen. When the sports data tells something, the terminal vibrates and guides the viewer's attention.

They have attendees viewing a prototype app. and listening to their opinions. They analyzed the collected opinions to improve the app.



2.3 Project on Sign Language CG Presentation System for Sports Programs

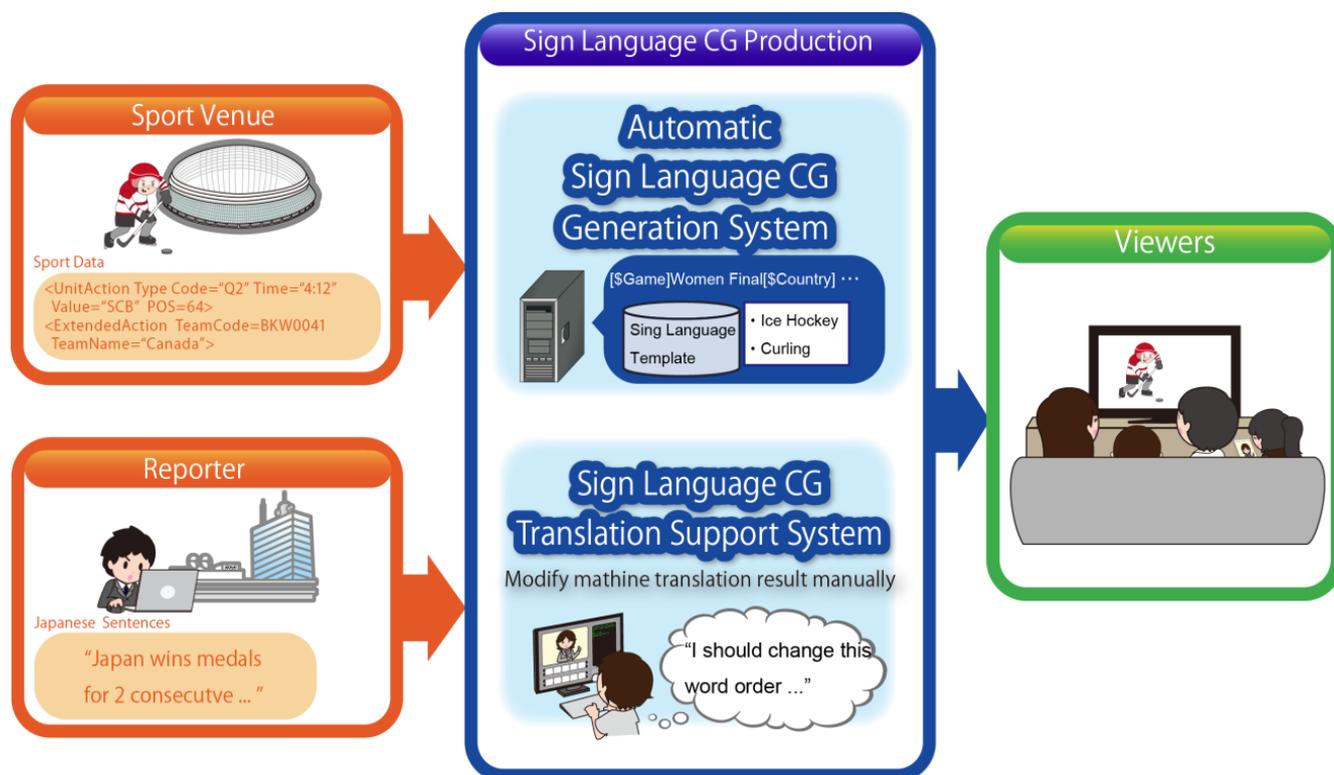
They are developing technology for automatic generation system of sign language CG to make a sports program more enjoyable for hearing impaired. In addition, we have developed a sign language CG translation support system that complements automatic system for content creation that is easier to understand and attracts viewers.

Features

- They conducted experiment of the automation process from receiving sport game data to uploading sign language CG to the website by using automatic sign language CG generation system. The automatic sign language CG generation system can generate fixed form sentences with sports data template.
- They are aiming to send the sports news that translate from Japanese sentences into sign language CG after the game over. In addition to sending the sign language CG automatically generated to viewers, it is also possible to manually correct expressions as the producer intends by using sign language CG translation support system.

They will exhibit and publish the sign language CG production system of sports information that integrates automatic production and manual support flow at NHK's Open House held on 24/5/2018-27/5/2018

(https://www.nhk.or.jp/str/open2018/index_e.html).



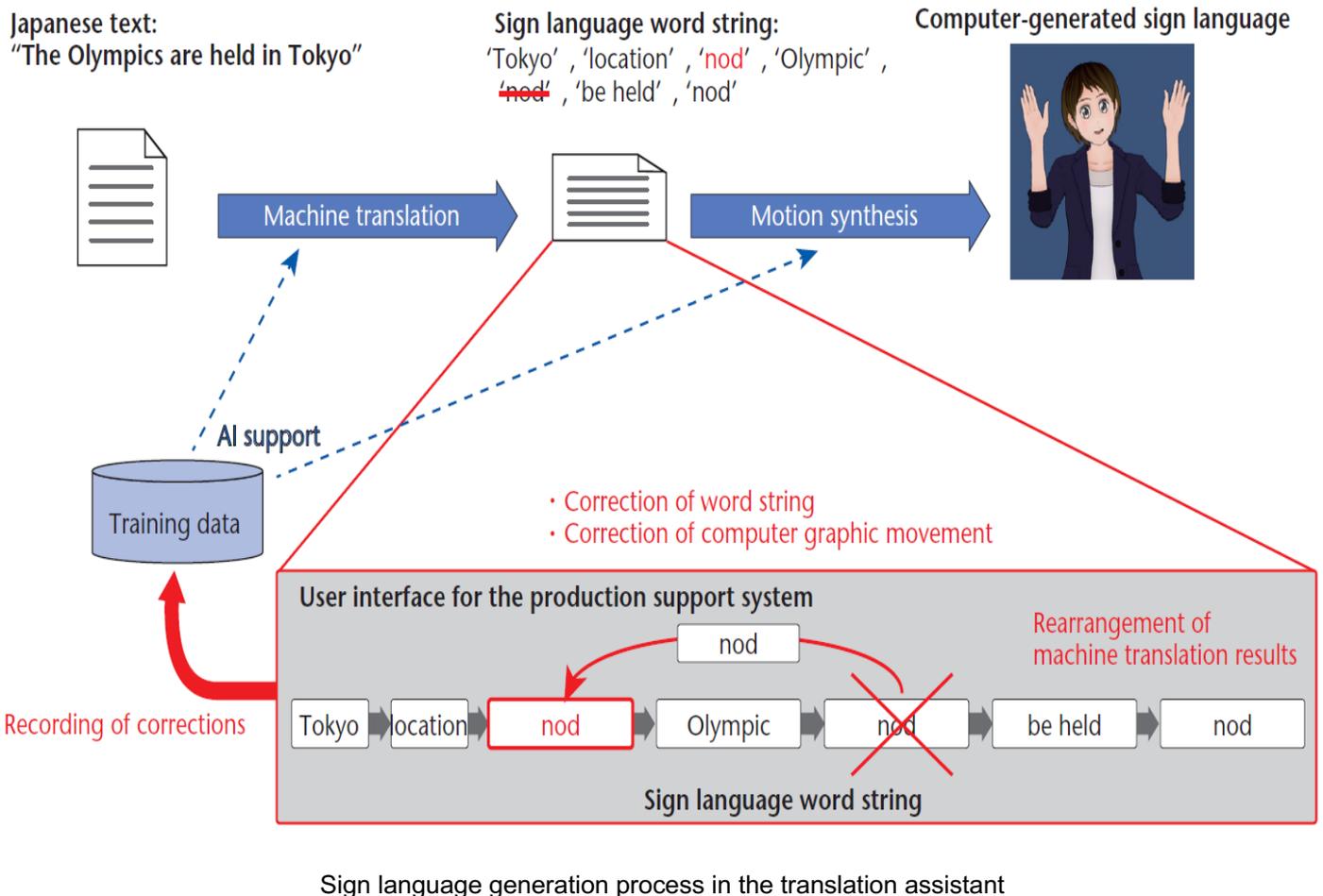
2.4 Project on Sign Language CG Production System for Sport News

They are moving forward with research on presenting sports competition information as computer-generated sign language. They developed a translation assistant system as part of that for the efficient production of sign language CG from Japanese text. Japanese text that is input to the system is automatically translated to sign language word strings by machine translation. But the order in which the sign language is presented may be incorrect. To address this problem, they developed a user interface that facilitates the rearrangement and insertion of sign language words.

Features

- The interface displays the word string and makes it possible to change the order or insert sign language words intuitively by a mouse operation to make corrections while checking the generated sign language CG
- The system has also a function that records corrections for use as training data and a function for later reuse of the correction history as templates. These functions can be used to improve the translation accuracy.

In future work, they will conduct trials on sports news programs and extend the application of computer-generated sign language to general news programs.



3. IT-based Production System and file-based workflows (P/ITPS)

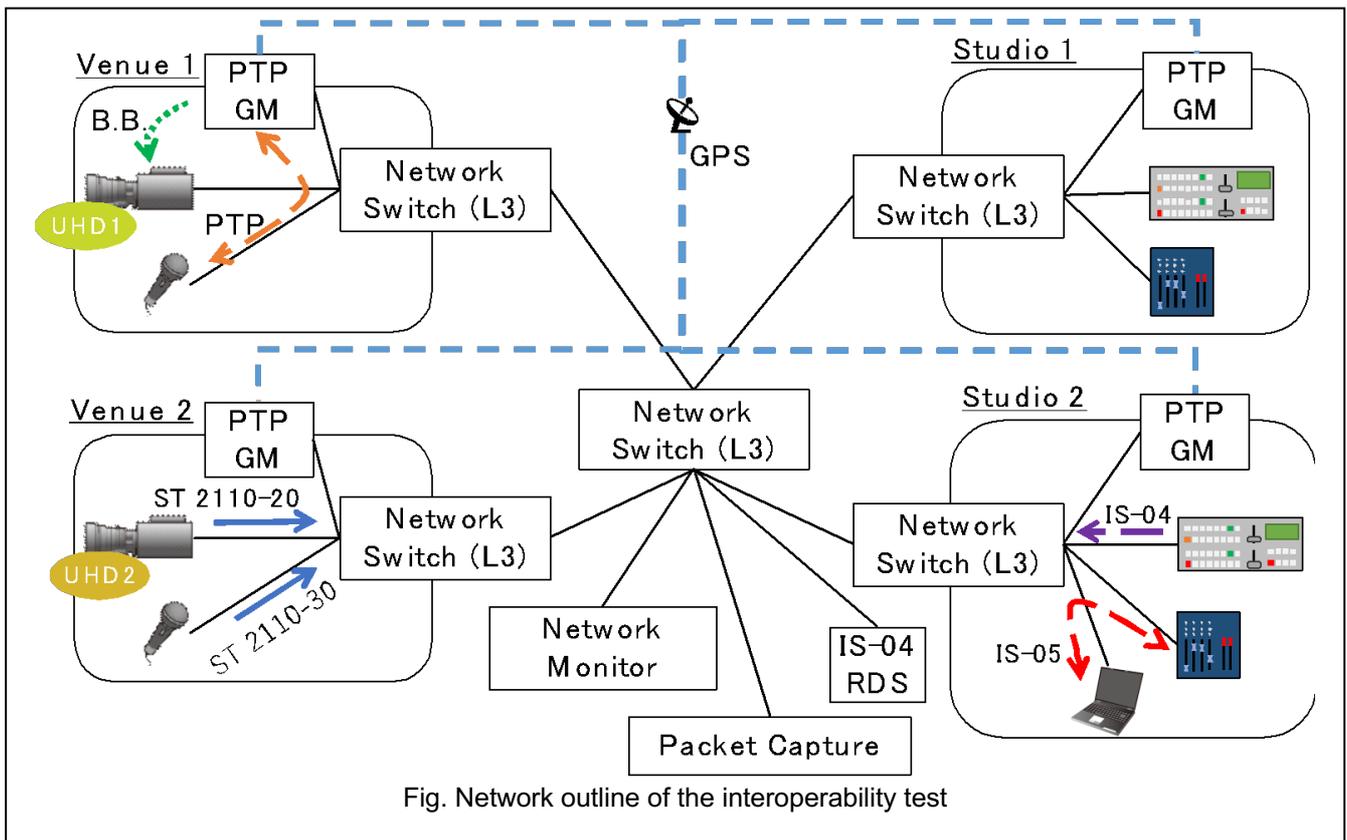
Project Manager: Mr Okan Salman, TRT
 Co-Project Managers: Mr Daeyang Kim, KBS, Mr Türkay Okan Salman, TRT, Mr Gökhan Tikit, TRT, Mr Nguyen Duc Tue, VTV, Mr Tomofumi KOYAMA, NHK, Mr P S Srivastava, DDI, Mr Pradeep Mehra, AIR, Mr Alireza Abedin, IRIB

Interoperability test for IP-based program production system

Interoperability test for IP-based program production system was held in July 2019 at NHK Science and Technology Research Laboratory.

- 42 vendors participated in the test.
- Only standard technologies were used (Video: SMPTE ST 2110-20, Audio: SMPTE ST 2110-30, Synchronization: SMPTE ST 2059-1/2, Control: AMWA NMOS IS-04/05, Routing: OSPF, PIM, IGMP)
- There were 2 venues and 2 studios connected by 100 Gb Ethernet. Media flows were routed by PIM-SSM, PIM-SM and IGMP.
- Each venue had PTP Grandmaster clock that was locked to GPS.
- HD/UHD1/UHD2 images were transferred on the same network.

We confirmed the interoperability of production system built with video, audio, and network equipment from different vendors. We also confirmed that more vendors are supporting NMOS IS-04/05.



Project P/BDAI (Big Data, Personalization and Artificial Intelligence)

Project Manager: Dr Byunghee Jung(KBS)
 Co-Project Managers: Dr Jun GOTO(NHK), Mr Sansung KIM(KBS)

NHK has been developing an AI-driven broadcasting technology called "Smart Production". They introduced the technologies of Smart Production in ABU Technical Review 2018.

Document: ABU Technical Review 2018 Issue 275 Q3

Title: AI-Driven Smart Production

Summary:

NHK has been developing a new broadcasting technology called "Smart Production," which conveys information to viewers using artificial intelligence (AI) quickly, accurately, and automatically. Smart Production consists of two technical components. The first component uses program production assistance technologies to automatically extract useful information from big data and present it to the program producers. The technologies are social networking service (SNS) data analysis for prompt news gathering, speech recognition for generating closed caption, and image analysis for generating metadata of video footage. The other component uses a technology for automatically converting broadcast data into forms that can be easily understood by all viewers, i.e., sign language computer graphics (CG) animation for the hearing impaired and automatic audio description generation for the visually impaired. Some of these Smart Production technologies are in trials aimed at practical use at broadcasting sites. We expect these technologies to transform the working style of TV and Radio program production and to enhance the abilities of program producers in the broadcasting industry.

Information: <https://www.abu.org.my/technical-review>

Transcription System for Program Production

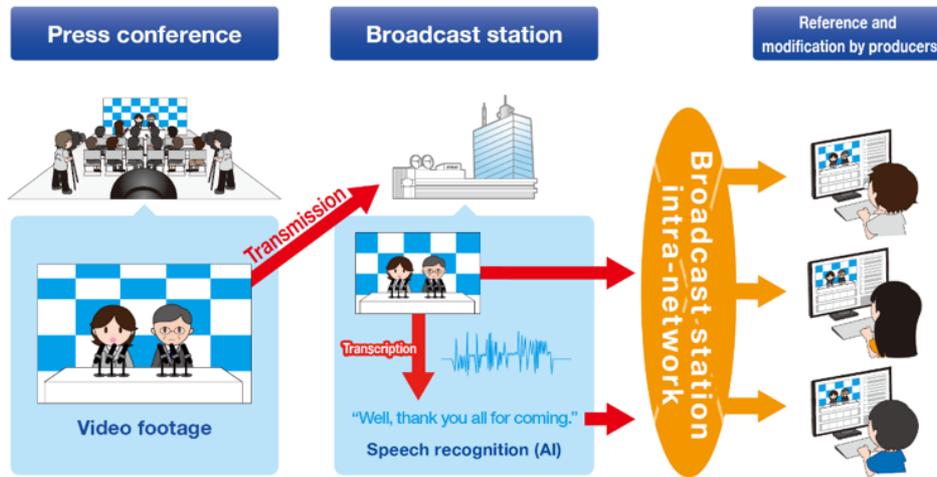
For program production based on a wide range of video footage, it is essential that comments included in the video footage can be transcribed rapidly. They are developing a system that uses speech recognition technology to produce transcripts from video footage both quickly and efficiently.

Features

- They provide a transcription system that recognizes speech in video footage sent from press conference sites to the broadcast station and transcribes it in real time. We developed an interface that allows multiple producers to simultaneously refer to and modify the resulting transcription by accessing only the parts that they want to check in a long video footage sequence.

- In collaboration with program producers, we trained the system with about 4,500 hours of voice and text, including all transcribed video footage to date, so that it can respond to various environments for speaker, recording conditions, and speaking styles.
- By providing speech recognition for video footage in real time, we aim to facilitate the rapid production of programs and contribute to reforming work styles at broadcast stations.

They will continue our efforts to develop speech recognition technology that functions accurately regardless of the background noise or the clarity of speech, and we will develop a speech recognition interface that is optimized for program producers to use.



Automatic Colourisation Technology for Monochrome Video

Monochrome video stored by broadcast stations is a valuable historical resource, and the impression of realism that it conveys to viewers can be enhanced by colourising it. In response to a growing demand for colourisation for use in new programs, we are researching the automatic conversion of 4K-resolution-equivalent monochrome film video to colour video.

Features

- They trained deep neural networks using a huge volume of TV program videos collected from sources such as the NHK archives. Monochrome videos are automatically colourised using three neural networks: colour estimation, colour correction, and colour propagation.
- The ability to correct colours based on historical facts, where known, is essential in TV program production. We developed a correction mechanism and user interface that allow users to correct colours by simply specifying the correct colours at several points in the target area.
- In the past, the only way to colourise monochrome video was for specialists to colour each frame individually by hand. Colourising just a few minutes of video required several days of highly skilled work. Our newly developed technology can cut the work time required for colourising 5 seconds of monochrome video from 30 minutes to approximately 30 seconds.

This technology has been applied to the production of programs such as “NHK Special, Nomonhan: An Irresponsible Battle”, “That Day, That Time, That Program” and “NHK Taiga Drama Series, Idateen”, contributing to the reduction of the workload involved to about 1/60th of that of the conventional process.

