Division of Computational Informatics:Computational Media Group

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In contrast to ordinary supercomputers, which pursue pure data-processing efficiency and speed, computational science that processes information related to humans requires that the time axis of information processing be aligned with that of humans. We are therefore conducting research on the global expansion of human society and its surrounding environments (living spaces, urban environments, etc.). We propose a new framework of computation using computational media as a mediator to present the information obtained by integrating observed data and simulation results in a form that is easy for humans to understand and to feed back to human society.

Specifically, we are implementing large-scale intelligent information media by integrating sensing functionality for real-world information, ample computing functionality for processing diverse information, and large-scale database functionality for selecting and storing information on a computer network. Our research efforts are also focused on the computational medical business.

Measurement and analysis of visual search activities in sports

We proposed a VR system that allows both soccer players and coaches to measure active visual exploratory activity patterns. The main objective of this research is to analyze the ability of soccer players to “read the game” in pressure situations. By using head-mounted display technology and biometrics, including head- and eye-tracking functions, we can accurately measure and analyze the user’ s visual search movements during a game.

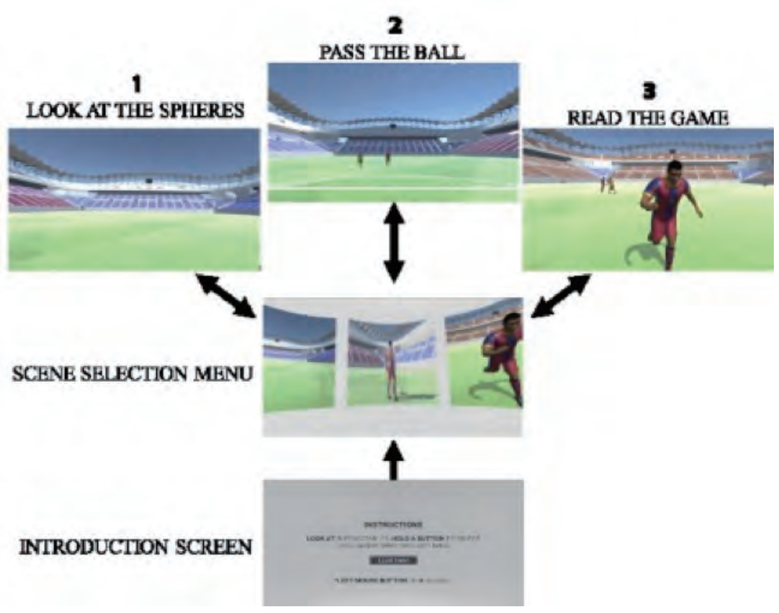

Fig.1 Measurement of visual search movement in VR space

Omnidirectional multi-view image viewing method using 3D image processing and generative adversarial networks (GANs)

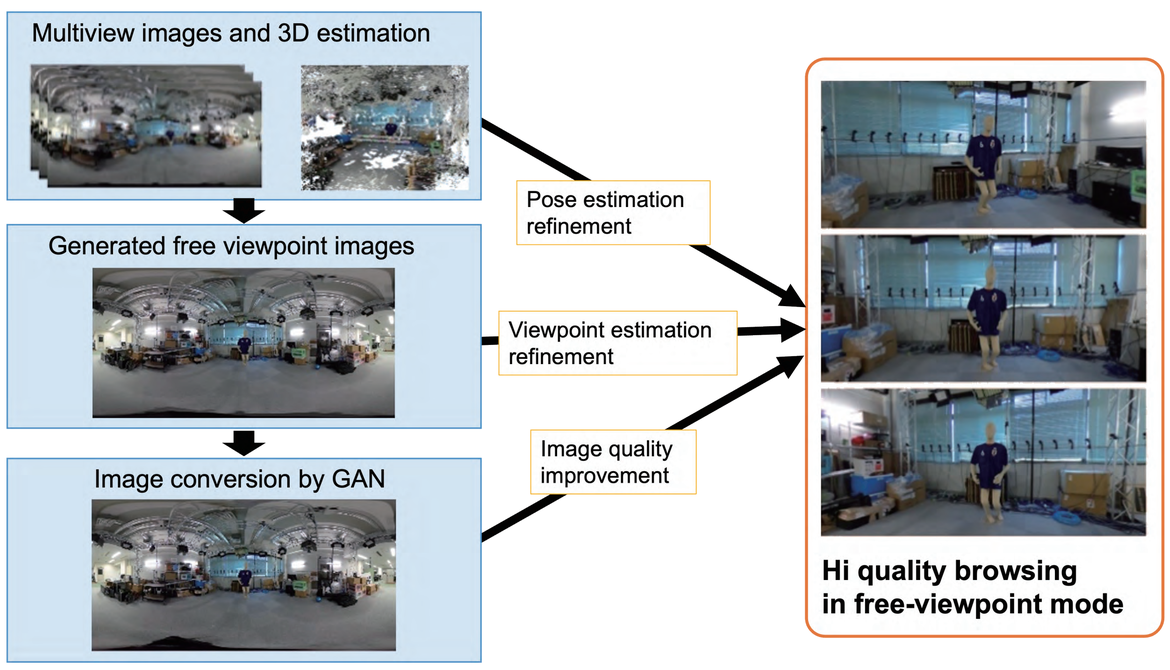

Fig.2 Omnidirectional multi-view image viewing method overview

We propose an omnidirectional multi-view image viewing method using 3D image processing and GANs. With structure from motion, we can estimate the camera parameters and 3D information of the targeted workspace from the omnidirectional multi-view images and generate the free viewpoint image with an arbitrary viewpoint image rendering process based on the depth information to achieve smooth viewpoint movement. The quality of free viewpoint image is improved by deep learning using a GAN to achieve high-quality omnidirectional multi-viewpoint image viewing.

Visualization of time-series changes in 3D reconstruction of cultural heritage buildings

Investigating the degree of deterioration, damage, renovation, or alteration of cultural heritage buildings over time is an important issue. Continual image capturing from one viewpoint over a long period of time is impractical. In this research, by using a self-encoder (auto-encoder) and guided matching, we succeeded in precisely visualizing time-series changes by accurately aligning past and present images of the target building.

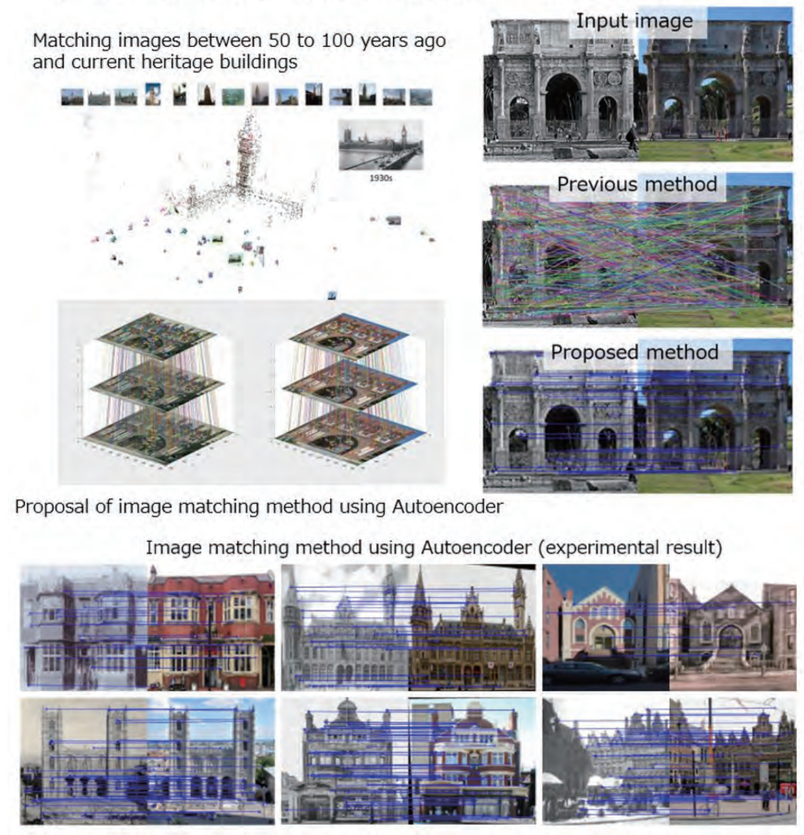

Fig.3 Superposition of past and present images using the proposed method