Computational Media Group

Information Display Design on Turn-By-Turn Navigation for Visually Impaired People

We are researching navigation for the visually impaired. We propose a new interface that utilizes sound and vibration to support turn-by-turn navigation that is common for visually impaired. In our proposed interface, the target path is divided into straight segments and points of change direction. The navigation instruction given by the sound and vibration is carefully designed to give minimum yet sufficient clues on the visually impaired walking. We have implemented a preliminary system based on our proposal and conducted a subject experiment for visually impaired people. The results imply that our proposed approach is useful for visually impaired navigation.
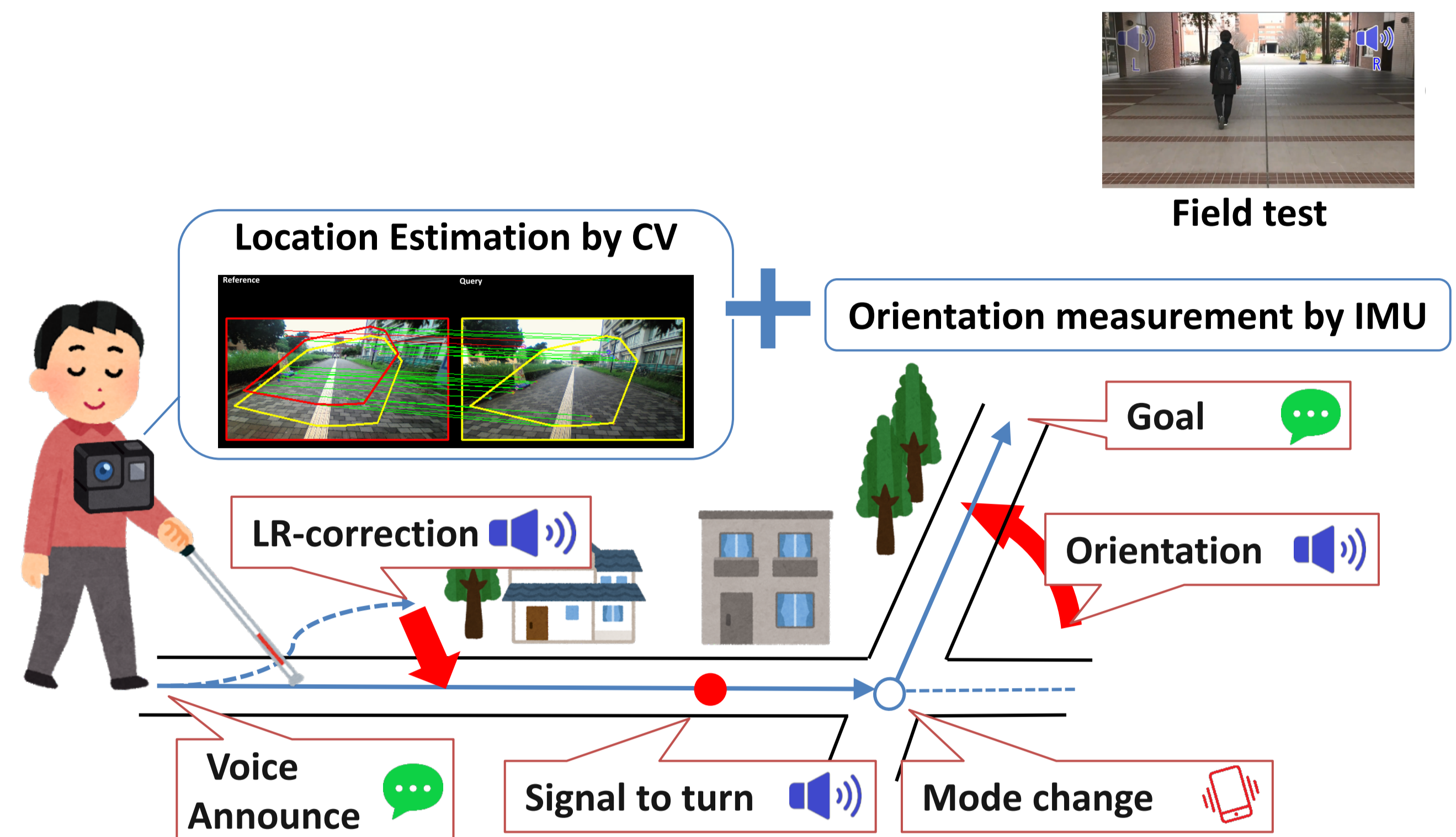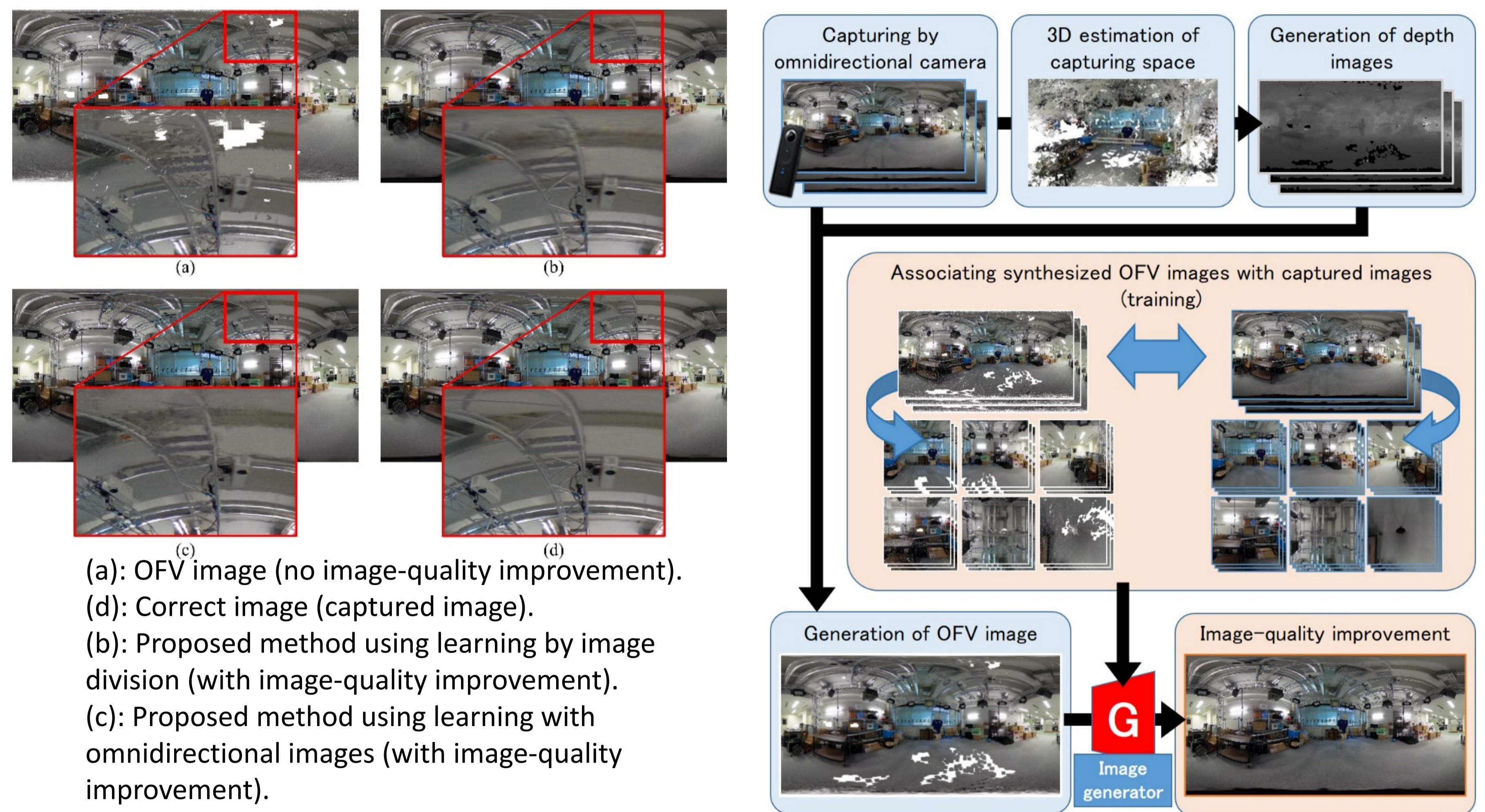

Field test

Location Estimation by CV

Orientation measurement by IMU

LR-correction

Voice Announce

Signal to turn

Mode change

Goal

Orientation

Image-quality Improvement of Omnidirectional: Free-Viewpoint Images by GAN

We proposes a method to improve the quality of omnidirectional free-viewpoint images using generative adversarial networks (GAN). By estimating the 3D information of the capturing space while integrating the omnidirectional images taken from multiple viewpoints, it is possible to generate an arbitrary omnidirectional appearance. However, the image quality of free-viewpoint images deteriorates due to artifacts caused by 3D estimation errors and occlusion. We solve this problem by using GAN and, moreover, by focusing on projective geometry during training, we further improve image quality by converting the omnidirectional image into perspective-projection images.

(a): OFV image (no image-quality improvement).
(d): Correct image (captured image).
(b): Proposed method using learning by image division (with image-quality improvement).
(c): Proposed method using learning with omnidirectional images (with image-quality improvement).

Capturing by omnidirectional camera → 3D estimation of capturing space → Generation of depth images

Associating synthesized OFV images with captured images (training)

Generation of OFV image

Image-quality improvement

G
Image generator

Accurate Overlapping Method of Time-Lapse Images for World Heritage Site Investigation

A method is proposed to accurately overlap multiple high-quality images with different shooting positions and intervals by combining corresponding point information between images and 3D shape information. In the proposed method, the correct feature matching of images obtained by rendering the 3D model of the subject is used. In this research, the subjects were the pillars of the Angkor Thom Bayon Temple and the epilithic microorganisms adhering to and eroding their surfaces. Synthetic transformation of a homography utilizing the correct matches is employed to overlap the target images.

Dataset 1

ANAP
PSNR：13.56
SSIM：0.07

Ours
PSNR：18.74
SSIM：0.64

3D reconstruction

Target object 3D model

Camera 1

Camera 2

(P1) Captured image 1
(P2) 3D model rendering image 1
(P3) Captured image 2
(P4) 3D model rendering image 2

(P1) (P2) (P3) (P4)

H_{P3}^{P4}

Z_1 Z_2 Z_3 Z_4
X_1 X_2 X_3 X_4
$P1$ $P2$ $P3$ $P4$
Y_1 Y_2 Y_3 Y_4

H_{P1}^{P2} H_{P2}^{P4}

H_{P1}^{P4}

$P_{Captured\ 1}^{P4}$ $P_{Captured\ 2}^{P4}$