

Proactive Preservation Activities of Cultural Heritage by Crowdsourcing

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Proactive Preservation of World Heritage by Crowdsourcing and 3D Reconstruction Technology

- ⇒ Judgment of damaged part
- ⇒ Visualization of damaged state

Cambodia, Bayon

Stone Pillar of ruins



Different chemicals were applied to stones made of same material as ruins to observe progress.

Left: Various stone materials used for ruins

Right: Stone pillar of ruins of observation target

Time-lapse Image with different shooting timing

Previous method



Input image 1

December 2016



Misaligned

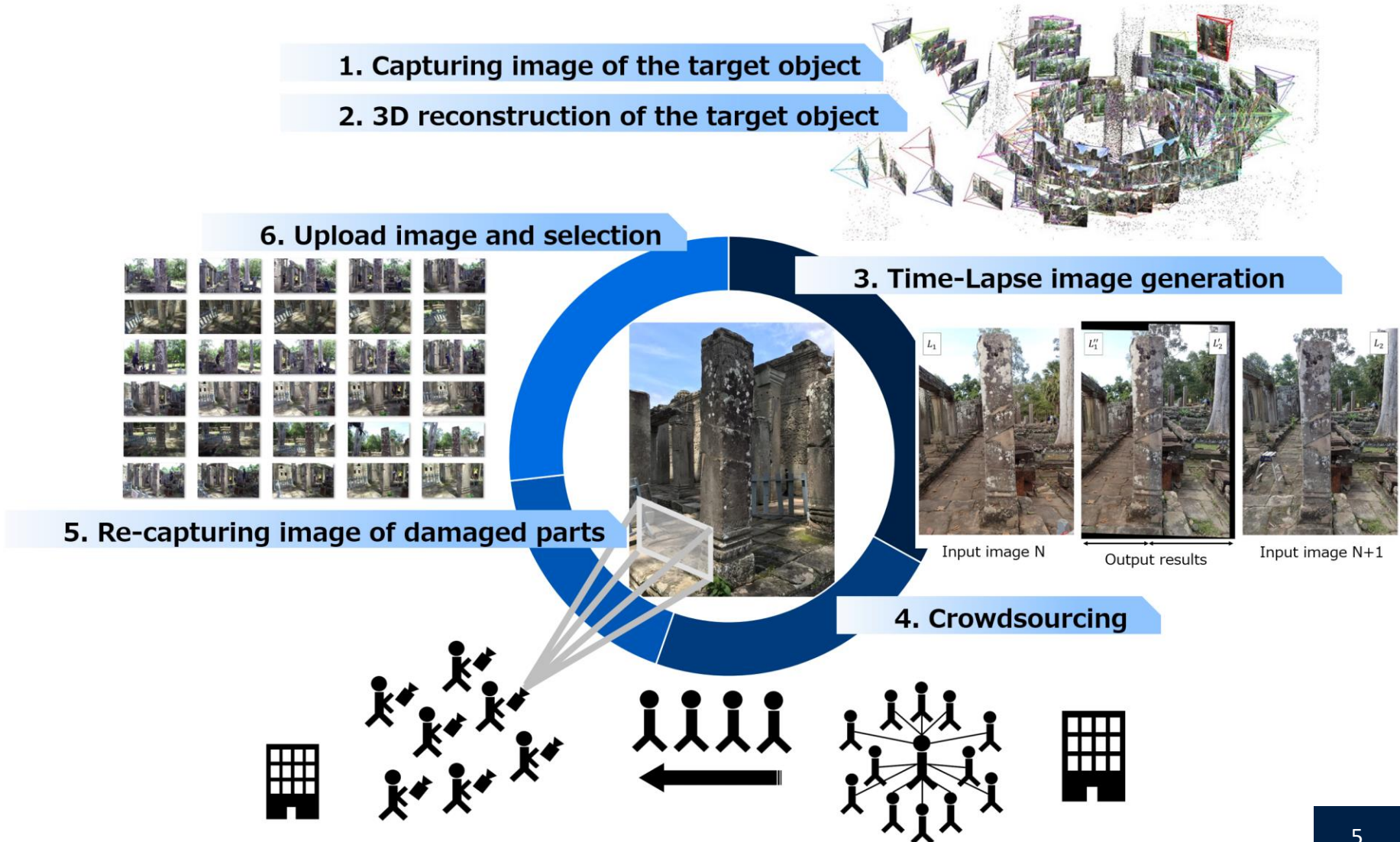


Input image 2

August 2017

Our goal

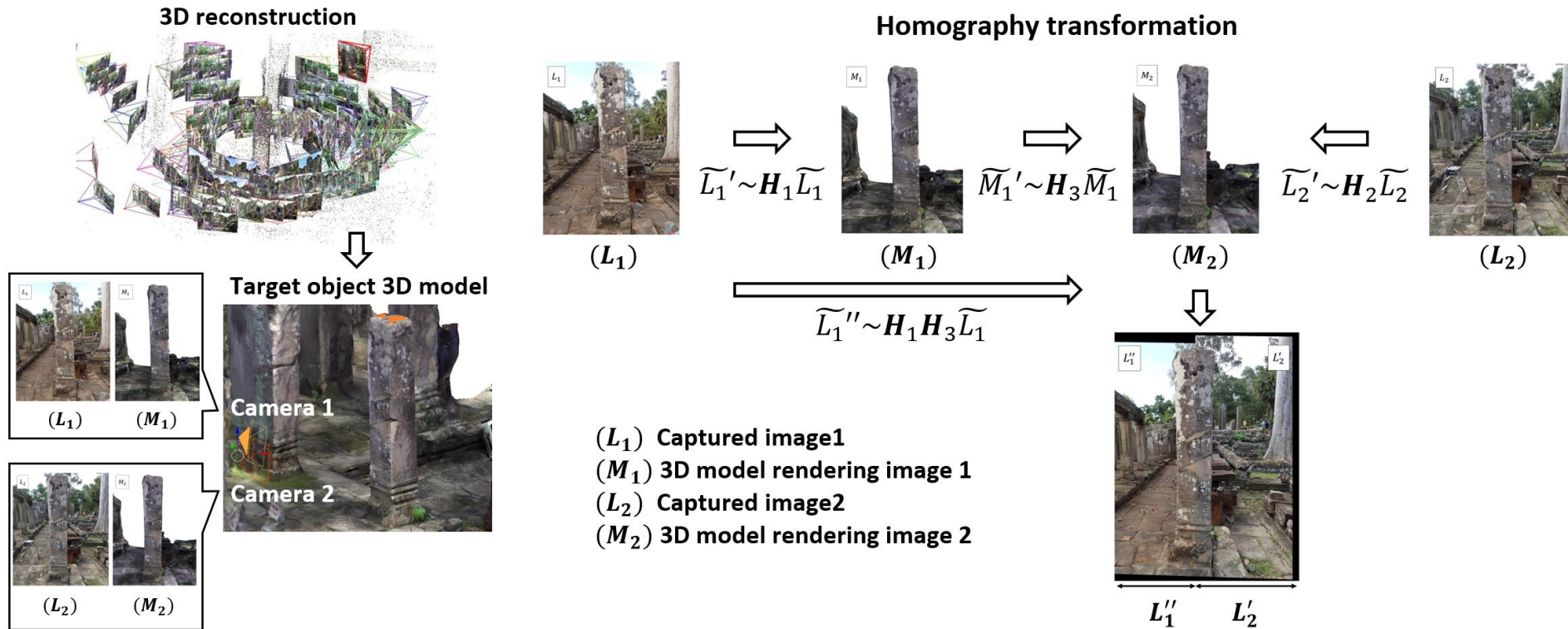
Planning a proactive preservation project of Angkor ruins using crowdsourcing and time lapse images.



Preprocessing of the proposed method



Flow of the proposed method



- The camera position and orientation of two images with different image capture timing are obtained.
- The 3D model of the subject is rendered to the virtual camera.
- Estimate correct feature matches between each image using two captured images and two 3D model rendering images, and perform homography transformation.

Time-lapse Image with different shooting timing

Proposed method



Input image 1
December 2016



Our results



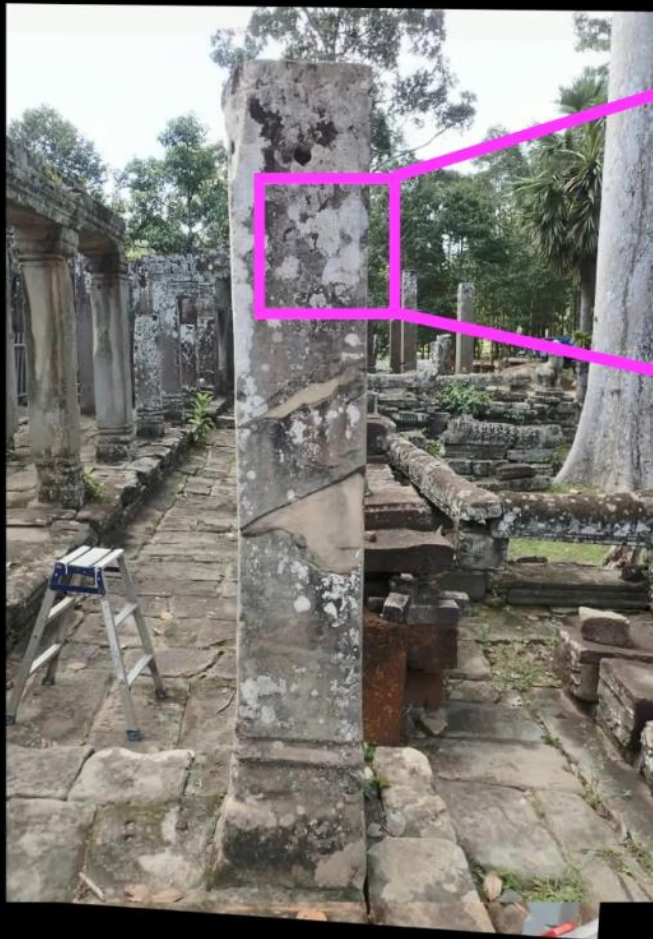
Input image 2
August 2017

Results



Results

Dataset1



2017. August

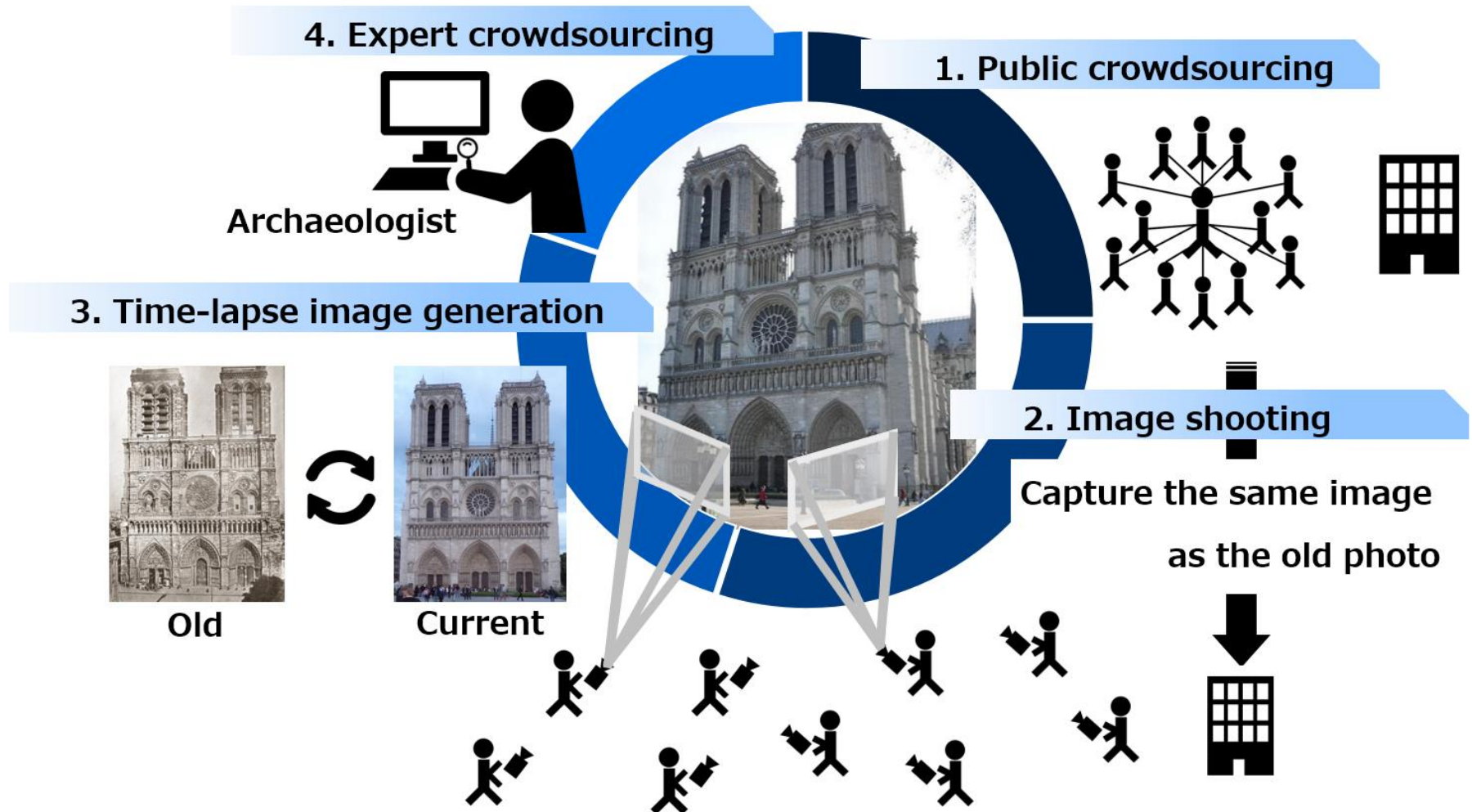


2016. December

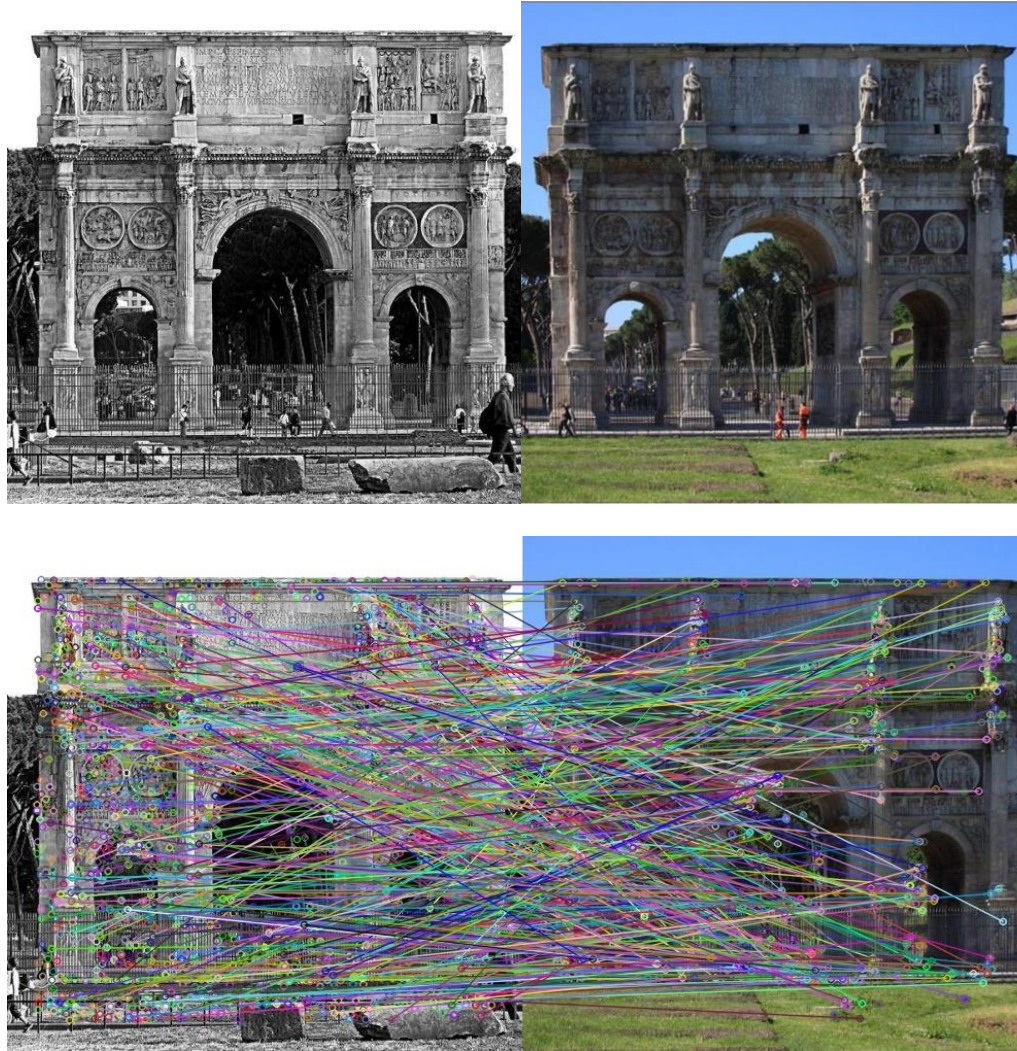
Ours

Our goal

Planning a proactive preservation project of cultural heritage using crowdsourcing and time lapse images.

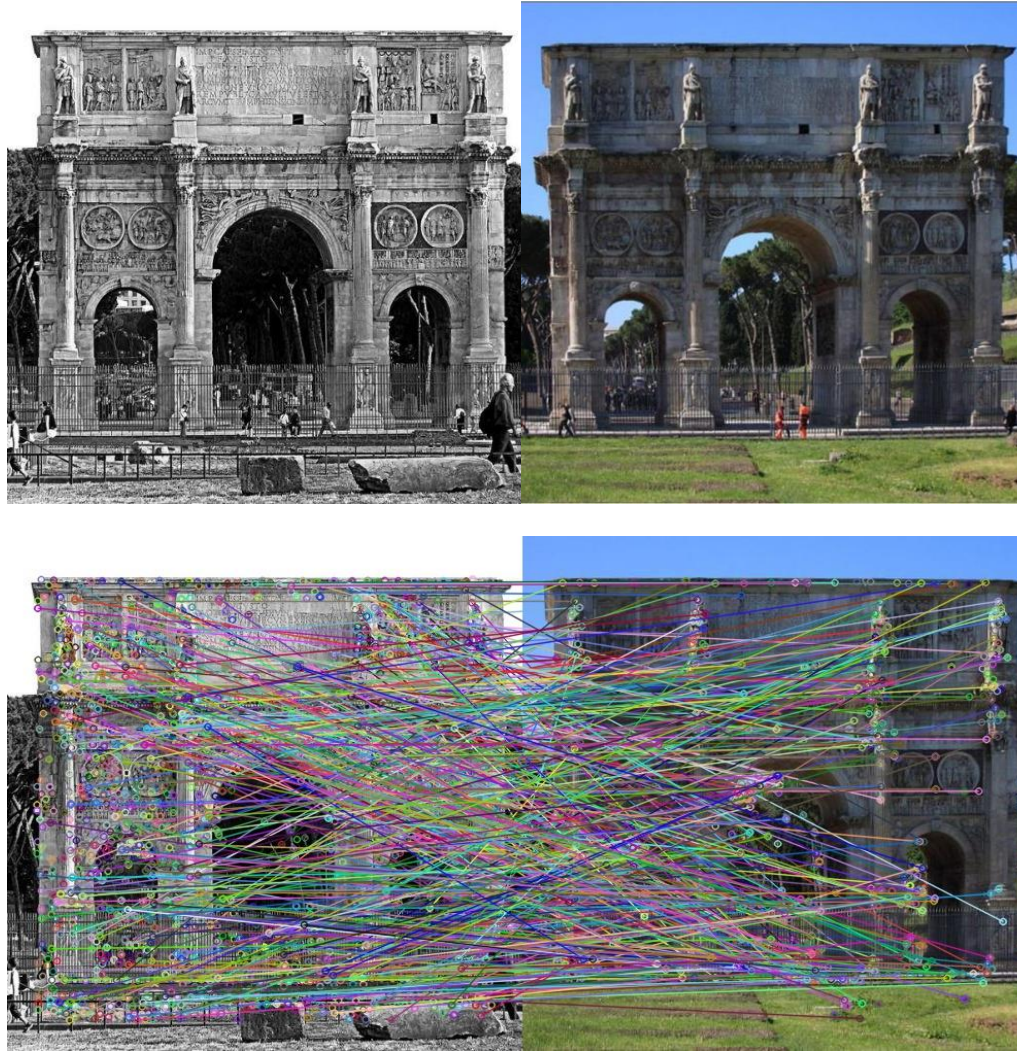


Feature matching of past image and current image (previous method)



Previous method :
→ Many image features are miscorrespondence

Feature matching of past image and current image (previous method)



Goals of the proposed method:
→ Remove image feature miscorrespondence

Autoencoder → Used for image feature matching

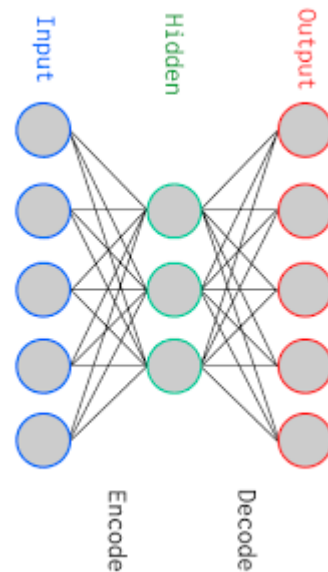
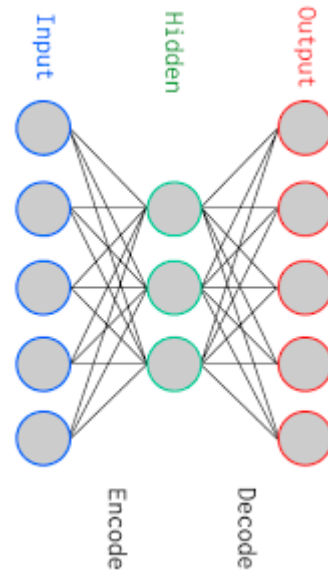
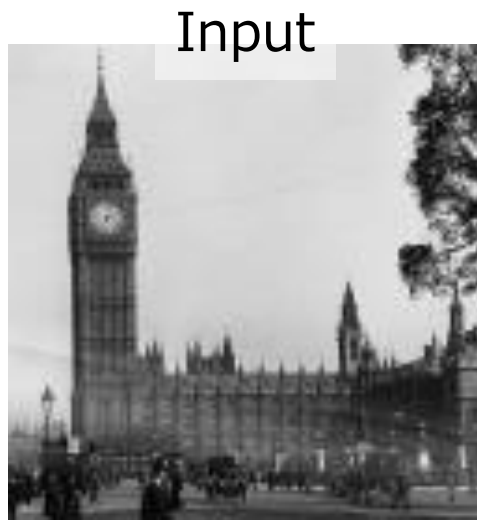
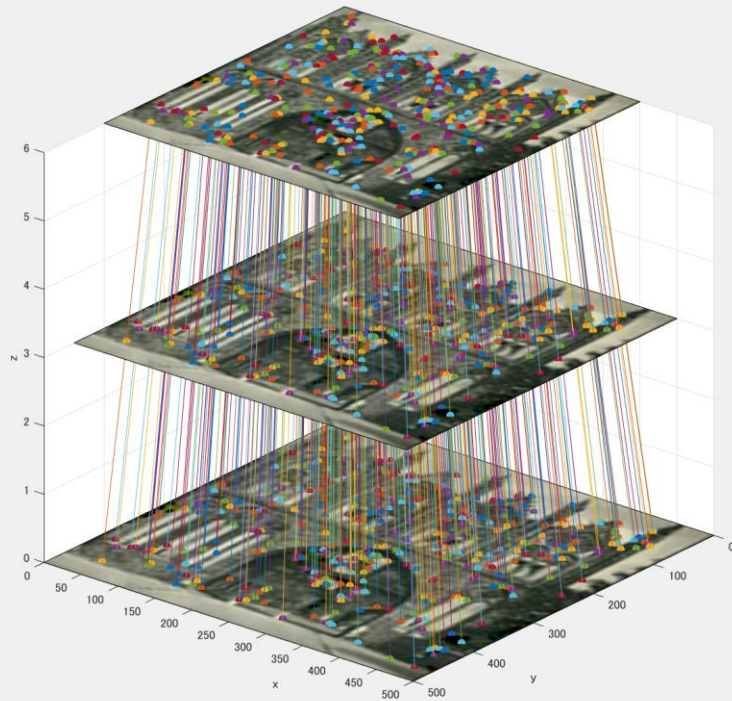


Image matching method using Autoencoder

Past image



Current image

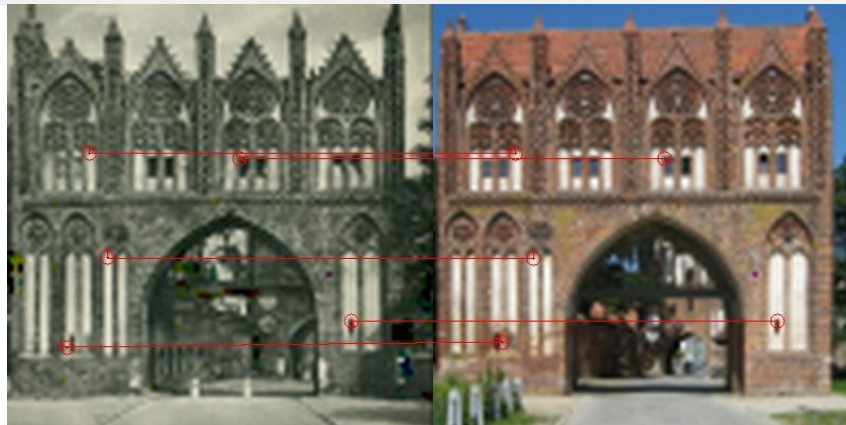
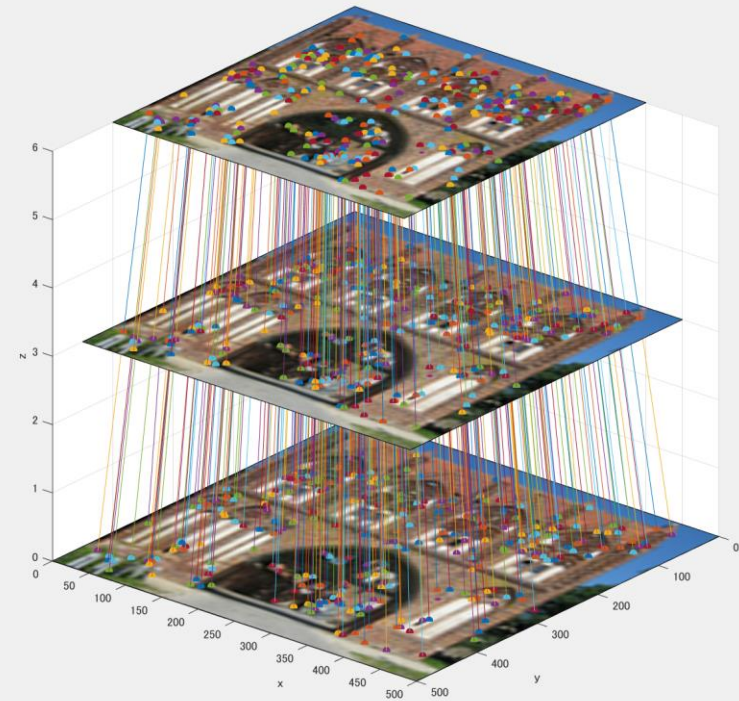
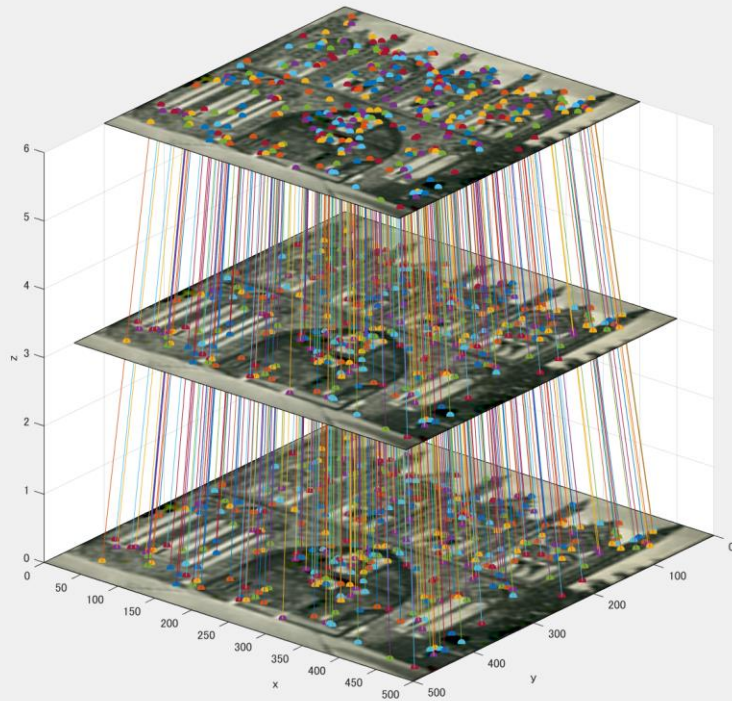
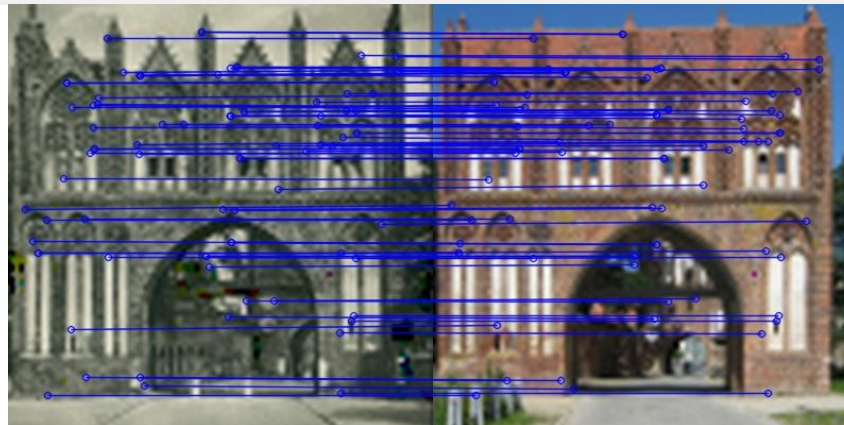
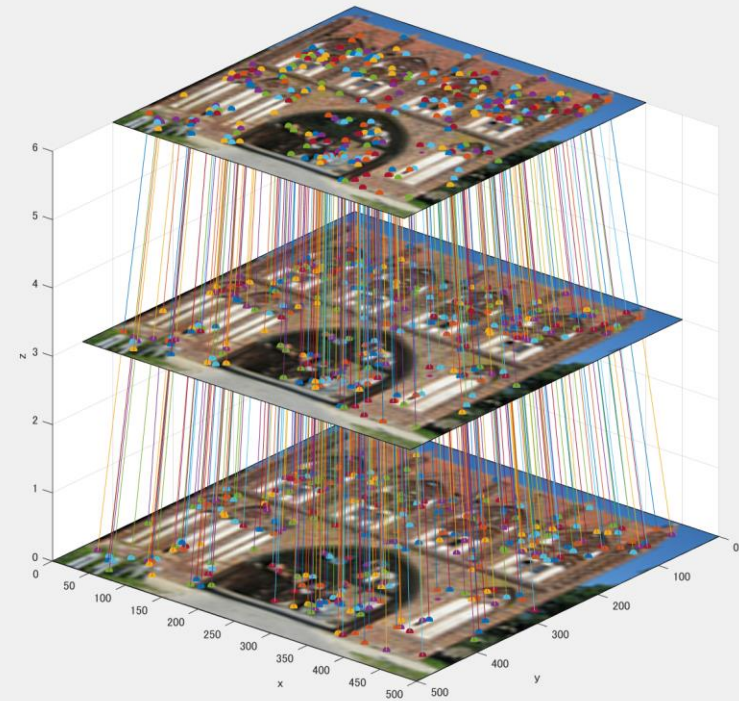


Image matching method using Autoencoder

Past image



Current image



50 to 100 years ago image and current image data set for cultural heritage buildings



arch_easy01.jpg



arch_easy02.jpg



bank01.jpg



bank02.jpg



chinesebuilding01.jpg



chinesebuilding02.jpg



londonbridge01.jpg



londonbridge02.jpg



montreal01.jpg



montreal02.jpg



neubrandenburg01.jpg



neubrandenburg02.jpg



portcullis01.jpg



portcullis02.jpg



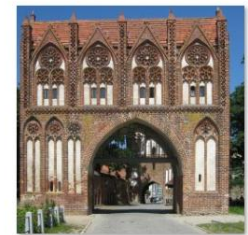
postoffice01.jpg



postoffice02.jpg



stargarder01.jpg



stargarder02.jpg



synagogue01.jpg



synagogue02.jpg



tavern01.jpg



tavern02.jpg



townsquare01.jpg



townsquare02.jpg

Hauagge, D. C., & Snavey, N. (2012, June). Image matching using local symmetry features. In Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on (pp. 206-213). IEEE.

Image matching method using Autoencoder (experimental result)

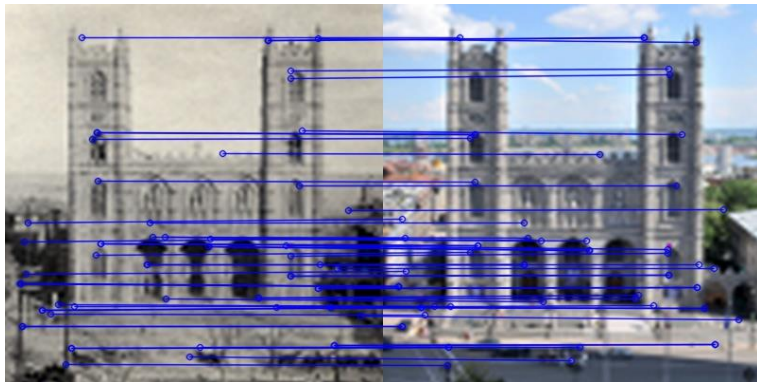
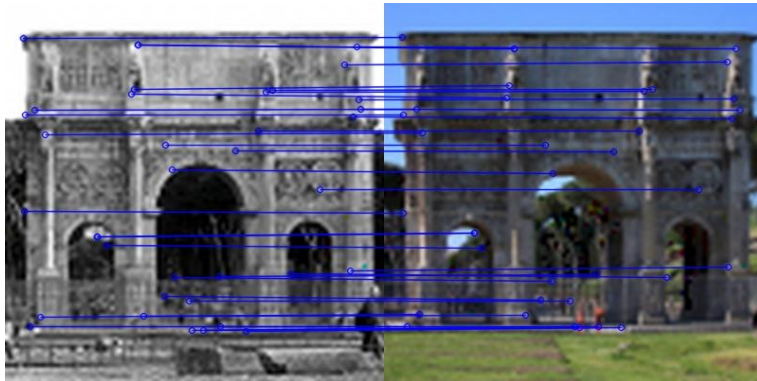
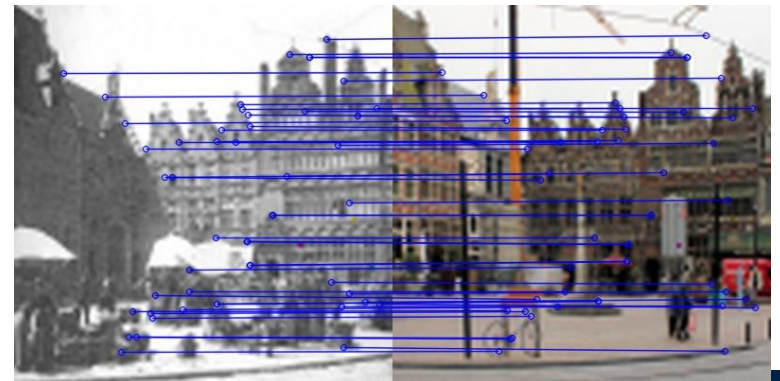
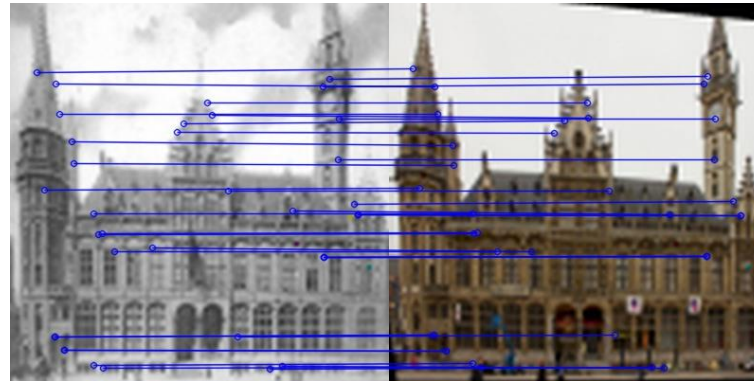
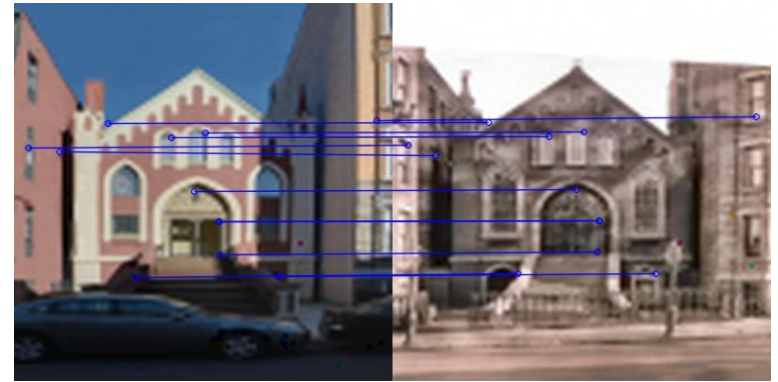
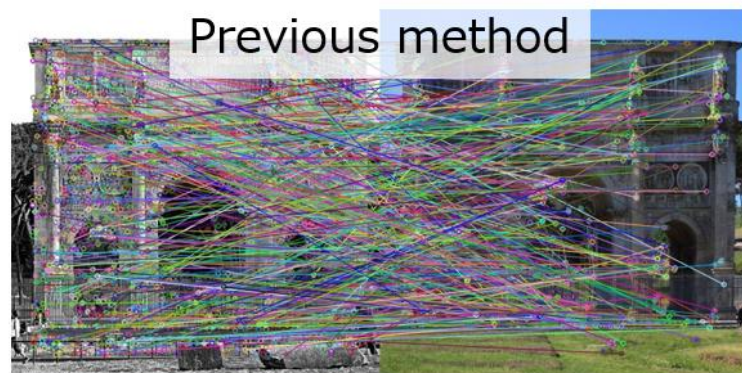
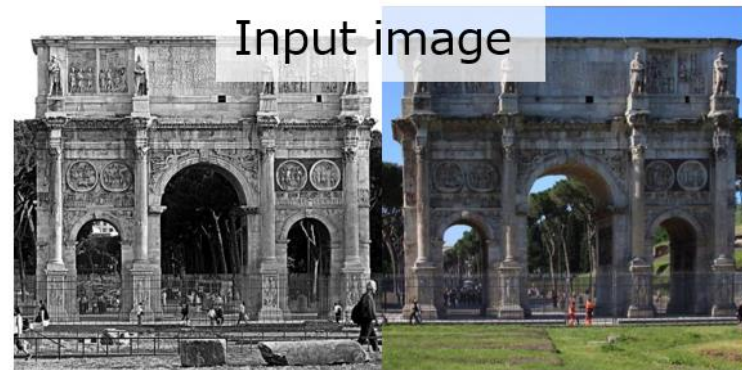
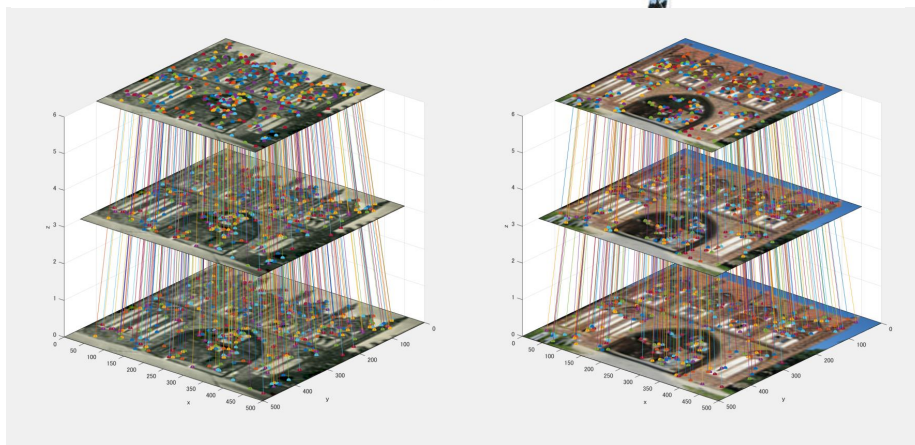
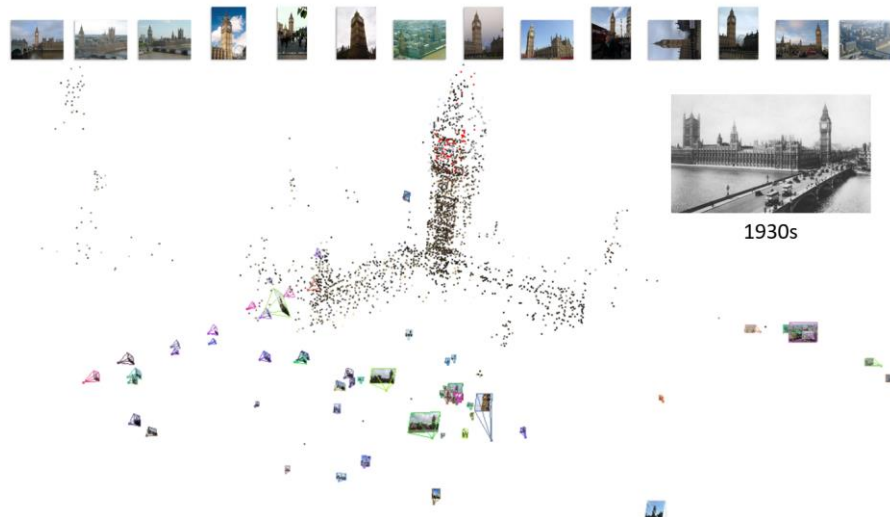


Image matching method using Autoencoder (experimental result)



Research on 3D reconstruction of cultural heritage buildings

Matching images between 50 to 100 years ago and current heritage buildings



Proposal of image matching method using Autoencoder