

BORN DIGITAL, LIBERATE FROM THE PAPER: A CASE STUDY AND PERSPECTIVES ABOUT APPLICATIONS OF VOICE RECORDING AND OTHER DIGITAL RECORDING METHODS FOR THE ARCHAEOLOGICAL FIELDWORK.

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A-1

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ABSTRACT:

In the field, Archaeologists are often required to record as quickly and exactly as possible but they can't do so because of the time limit or other reasons. Recent innovations of the digital documentation tools, however, have enabled archaeologists to document field data more quickly and exactly. On this point, we present current issues and perspectives of real-time digital documentation by means of GPS, digital camera and especially IC recorder, and other digital tools with the case study of the field walking experiment in the premodern trail of Nakasendo-Kisoji (Central Highland Japan). Basically, our methods can document in the whole of survey processes by using digital tools, so that archaeologists can survey without dropping their concentration in fieldwork, especially general survey. This point of view is more important in the emergency situations (e.g. The assessment about damaged cultural properties in disaster areas.) than usual situations. We used JOSM (Java Open Street Map Editor; Free/Libre Open Source Software) to matching GPS logs digital photographs and audio data (oral documentation). We can achieve to record automatically when, where, what we did without using paper-and-pencil in the field. Our presentations are easy for beginner and non-digital-natives to use, and don't depend on any computer platform or operating systems by using FLOSS. Therefore, not only developed-world people but also developing-world people can use this method.

In addition, we will refer to documentation by applying movies or illustrations (plans) to match our system in the future tasks.

1. INTRODUCTION

1.1 The conventional methods and its problems

In the field, most of the archaeologists use and depend on paper media to document various research information even now (especially in Japan).

Paper media documentation still has many advantages. First, paper media don't need electricity to record. This point is very important, because not all archaeological fieldwork is set up the electricity. Second, paper media are easy to get everywhere. Third, everyone use paper media. No one needs special skill to write and read.

However paper media documentation has disadvantages. The most disadvantages are to need much concentration of researcher to document. The method of writing requires researchers to stop their moving and much concentration.

Basically archaeological data are necessary to have enough accuracy and able to get easily and quickly. On this point, the paper media have a limit.

2. ABOUT AUDIO RECORDING

2.1 The advantages of audio data

To resolve these problems, we propose to apply audio data. Recently, we can get the audio data more easily than before because of the development and dropping down the price of the digital voice recorder. The digital voice recorder can cover very long time (e.g. over 10 hours) recently, so it is possible to record during a few days. To get the audio data digitally native, we can use these data wider and various purposes, for example synchronizing other digital data.

The audio data have many advantages to record in the archaeological fieldwork. Archaeologists usually record a large amount of text data in the fieldwork. But, as long as they use paper media, above-mentioned problems will remain. The audio recording method is able to record fieldwork data in real time and there is no call for archaeologists to pay attention while

they are recording. This advantage will free archaeologists from the paper.

3. THE APPLICATIONS FOR THE ARCHAEOLOGICAL FIELDWORK

3.1 Outline

In autumn 2008, we experimented to walk on the preserved or reconstructed trails in the Kiso valley (called Nakasendo-Kisoji) for four days 43 kilometers in total (Kondo, 2009). The experiments aimed at collecting the data for walking speed and elapsed time at different slopes, related to field of view, roadbed condition, and energetic expenditure, to create a new travel cost model. In these experiments, we tried audio recording to document information automatically.

3.2 Equipments

We used 3 equipments mainly.

1. Digital Voice Recorder
2. Digital Single-lens Reflex Camera
3. GPS Logger (handheld GPS receiver)

Digital Voice Recorder will help to solve writing method, but taking pictures or drawing images method will not able to solve using only it. So we prepared the digital camera to solve this problem, because photograph files have unique time stamps and they are synchronized with the location information.

3.3 Workflow

We prepared the above equipments and equipped them one person (Figure 1) because the location of data is important. If respective people equipped these items isolated, the outputted data aren't able to synchronize each other.



Figure 1. The style of getting data

The person who equipped these items talks to the Digital Voice Recorder about the circumstances instead of writing notes on the paper and takes photographs by Digital Camera during his walking. GPS Logger was logging automatically during his walking.

After the fieldwork, we tried to synchronize these data.

3.4 How to synchronize data

We used JOSM (Java OpenStreetMap Editor^{*}) to synchronize GPS logs, audio data and photographs (Figure 2). JOSM is the

^{*} <http://josm.openstreetmap.de/>

mapping tool for Open Street Map^{**} that is the project creating the free license map.

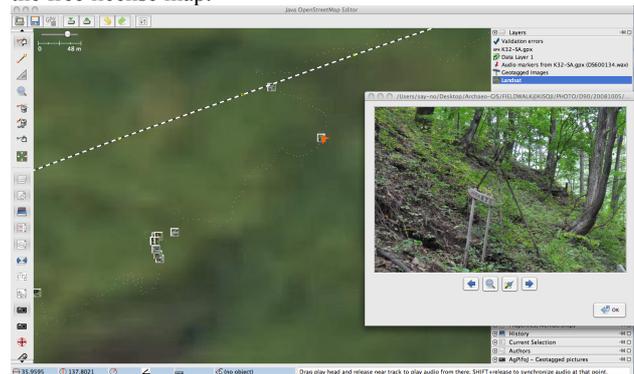


Figure 2. Synchronizing audio data, GPS logs and photographs on JOSM

JOSM is the Free/Libre Open Source and platform-independent Software, so our method is valuable way for not only developed-world people but also developing-world people.

How to synchronizing data is:

1. Import GPS logs to JOSM
2. Import audio data associated GPS logs to JOSM.
3. Import photographs associated GPS logs to JOSM.

JOSM uses GPS logs mainly. Other data are relation them. Audio data are matched GPS logs by their playing time. Photographs are matched GPS logs by its taken date-time data. JOSM can overlay some images or geospatial data, for example not only pictures but also the data downloaded from WMS (Web Map Service) server (e.g. showing Landsat image behind the GPS logs, the photographs and the audio data layer at Figure 2).

We can play audio data relating GPS logs, so it is possible to document much information where we want to know.

4. CONCLUSION

4.1 Results of the experiments

We could get almost necessary information in fieldwork automatically and safely. We also could synchronize these each other in post-processing. Therefore we could see the information about the fieldwork wherever and whenever point we want to know.

4.2 Problems

Audio recording method has problems at the present time. We can get only audio data from this method, so we must put these data into text data after recording to use variously. This method can record immediately, but it will need some processes to apply.

Archaeologists draw many plans in their fieldwork, but our solution is not able to replace this action. To show the substitute method for drawing plan accurately, quickly, and safely is the great tasks for us.

4.3 Future tasks

This recording method will apply to use in dangerous area (e.g. The assessment about damaged cultural properties in disaster areas). Researchers will be needed recording quickly in these areas because of ensuring them from danger.

^{**} <http://www.openstreetmap.org/>

We want farther to synchronize not only audio data but also movie data with GPS logs because they have richer information than audio data. Until not long ago, there was a web service matching movies with GPS logs on the web site in Japan (ALPSLAB^{***}) but it is already stopped now, because the associated service “Yahoo! Video Cast”(video uploading service) was over.

If possible, we achieve synchronizing movies and GPS logs in stand-alone environment because archaeologists are often forced to investigate in no network environment. However, We could not find the solution like that unfortunately as long as we looked for (we found not playing the movie along GPS logs but playing it at a point.).

5. REFERENCES

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^{***} <http://www.alpslab.jp/>