

A Proposal of Mobile Mapping Tools Supporting Old Maps for Fieldworks in Historical Landscape Researches

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Maps are useful data sources and tools in historical landscapes researches. Especially, old maps, including historical maps, old city plan maps, old tourist maps and so on, are important references when investigating the influences of landscape changes. However, such maps are not fully used in outdoor fieldworks. The researchers may spend much energy on locating their current positions and various targets manually on different maps on analog media. Furthermore, they may spend more energy on corresponding the data and materials gathered in the fieldworks to the correct locations on the maps in the indoor tasks afterwards.

Current mobile Geographic Information Systems (GIS) can provide useful functions, including data collection and processes with awareness of users' current locations and context, on basis of the well-surveyed and up-to-date digital map data. However, the old maps cannot be well supported, because they usually contain large and irregular distortions.

As a result, a new mobile mapping platform is needed to integrate old maps with location-aware mobile devices, in order to provide new toolkits to collect, process and visualize data on various maps with portability and usability for the fieldworks. A fundamental function is positioning on various analog maps that were not well surveyed.

In collaborating with historical landscape researchers, we have investigated the existing and potential requirements of mobile mapping in their fieldworks. The expected usage of the mobile mapping toolkits can be divided into the following three stages.

(1) Pre-field Stage is conducted indoor, together with the preparation of the fieldwork. Investigators will convert analog maps to the mapping application, and register georeferences (e.g. reference points) to the maps to make them geo-enabled for positioning. The maps should be organized by temporal and geographic arranges.

(2) Fieldwork Stage is conducted outdoor, when investigators will use the mobile mapping application running on their handsets, such as smartphones and tablet computers. The mapping tools can provide positioning on maps of different types and periods in the history, and compare with the latest maps and the real situation for references. The mobile application can also be used to collect and input field data, for example, photos, text memos, audio records of interviews, and so on. The collected data can also be able to visualize and retrieved on various maps. The application should also support group works, by which investigators can share their locations and collected data on the mappings.

(3) Post- field Stage is conducted indoor, which will organize the collected data, and export them for further analyses. The archived data and results can be accessed and visualized from the mobile mapping toolkits in the future fieldworks.

In our previous researches, we have established a framework of Human-centered Mobile Mapping (HCMM), and developed applications to integrate illustrated walking route maps into mobile mappings for tourists. In this research, we create an initial prototype by extending the existing applications to append basic functions for the Pre-field and Fieldwork Stage. Especially, functions for dynamically inputting and visualizing location-related data and real-time sharing of locations on HCMM are newly developed. The development also considers the easiness of operation by non-GIS specialists.

The prototype will be tested and evaluated in the investigations in the historical districts in Suzhou, China, on the spatial distribution of the residents' daily activities and their attitudes towards the changes of environment and landscapes. Suzhou is a historical city, whose location has changed little after its establishment. The rich resources of Suzhou's old maps are very suitable for the experiment.

With the data gathered in the experiment, the Post-field Stage will be focused to support the complete workflow of a fieldwork with efficiency.