

## Map Collaging: A Framework of Location-based Services with Heterogeneous Local Maps on Smartphones for Spatial Storytelling

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**(1) Motivation:** Nowadays, web and mobile mapping are widely used. They have powerful location-based services (LBS), but are not detailed or thematic in local areas like parks. Besides, dominant mapping services, like Google Maps, unify mapping styles and prevent maps' diversity. On the other hand, local areas have various analogue maps, like illustrated maps and map signboards, which contain detailed spatial information and thematic local stories such as culture, nature and history. Local analogue maps are well designed for the particular area, but are relatively difficult to read without LBS. This research proposes a framework of map collaging that combines local analogue maps and mobile mapping to enable LBS on the images of local analogue maps on smartphones to tell local stories during navigation.

**(2) Approach:** Map collaging is made up from three hierarchies: raw data, geocoded maps, and courses (Figure 1). Raw data is the data without explicit spatial information, like analogue map images. Geocoded analogue maps are the raw map images (noted as the target maps) that are geocoded with georeferences to build connections to the mobile mapping (noted as the base maps). A course is a combination of series of geocoded analogue maps to enlarge map collaging services areas and to enrich information. The map on the top layer in a course is noted as the main map in the course and other maps are the background maps.

**(3) Originality:** Map collaging provides an innovative platform for local storytelling and knowledge sharing with local analogue maps. It incents cooperation among local governments, communities and individuals in sharing local

knowledge, and broadens the access of local knowledge on analogue maps with mobile mapping services. It is supposed to be applied to protect local knowledge, spread local culture and promote local tourism.

**(4) Characteristics:**

- Polylines are used as georeferences to build mapping relations between analogue maps and the mobile mapping, which ensures accurate positioning along georeferenced polylines (Si and Arikawa, 2016).
- Maps are overlaid based on focus-point without geometric corrections. Typical focus points include the user's position and POI's.
- Spatial triggers are used to organize storytelling among different local analogue maps. Polyline and polygon triggers are set on the base maps and are used to switch main map when a user crosses the boundary of the trigger; POI's icons are used as point triggers to automatically narrate the POI's information as the user gets close to the POI.

**(5) Results:** Cooperated with Kashiwa History Club and Shiroy City Office, iOS applications *KashiwaWalk* (Figure 2) and *白井散策 Map* were developed and are available on App Store.

**(6) Acknowledgement:** We will thank to Kashiwa History Club and Shiroy City Office for providing valuable maps and photos, and helping to test the application and make the content.

**(7) References:**

Ruochen Si and Masatoshi Arikawa (2016) Portable Map Signboard Collages on Smartphones Using Polyline Georeferences. *The Cartographic Journal*, **53** (1): 55-65.

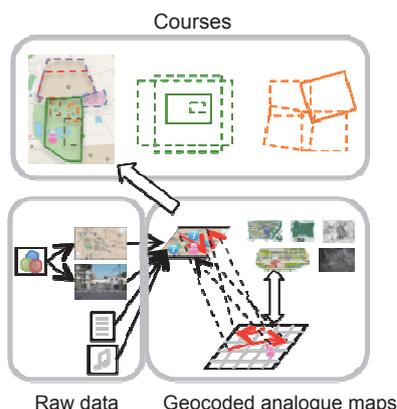


Figure 1: Framework of Map Collaging

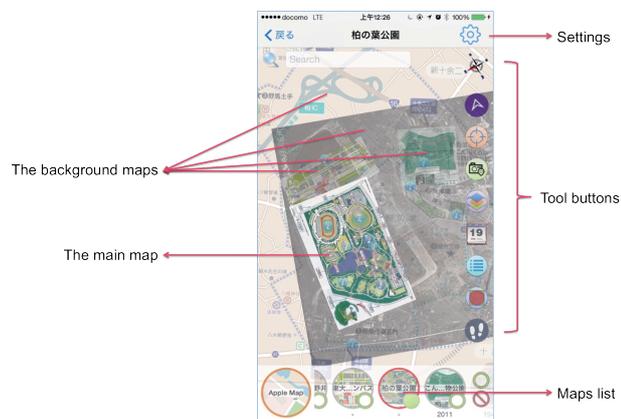


Figure 2: Main interface of *KashiwaWalk*