



## Location-based Service for the Mobile Devices and Related Technologies

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**Research Fields** Computer System Network, Software

**Keywords** Mobile Computing, Location-based system, GPS

### ● Research Outline

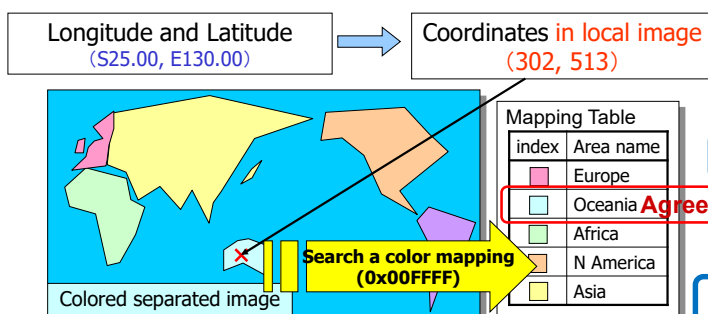
#### Theme1: A High Speed Reverse Geocoding Method

This research proposes a high-speed reverse geocoding method for Location-based Service. In geocoding, the longitude and latitude become mutually convertible with the “area name.” The “area name” is an address and landmark name such as “Motosu City” and “Tokyo Tower” that are easy for the user to understand.

In traditional reverse geocoding methods, long conversion time and low conversion accuracy are problems. Our method reduces these problems by using image-based conversion methods. First, we create “colored map images” and a “color mapping table” for a region from the vector data used in the GIS. Second, we convert the longitude and latitude into a color code such as “FF00EE” using the colored map images. Finally, we obtain the area name from the “color-mapping table.” By this method, we can get the area name from the longitude and latitude without a long calculation time that depends on the number of reiterated areas.

We evaluated the proposed method using the data of a segmented ward, city, town and village of Saitama Prefecture in Japan. As a result, we increased the conversion speed by about 70 times. In addition, we reduced the conversion error rate in comparison with the traditional point-based conversion.

In future research, we plan to improve the methods to consider the borderline of regions for high accuracy. Additionally, we plan to analyze the practicality of our method for Location-based Services.



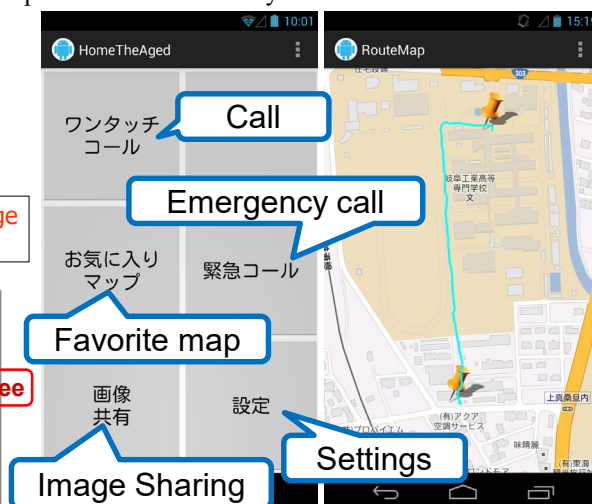
**Fig.1. Overview of our reverse geocoding method**

#### Theme2: Security & Safety System for Elderly by using the Cloud Services

This research describes a smartphone application for the elderly, and verifies its performance. This application provides two functions of Security & Safety System for elderly. The elderly and its family need a smartphone to use this application. This application’s major characteristics are as follows.

- (1) This system searches an elderly’s current position using the GPS on the smartphone.
- (2) This system detects falling accident using an accelerometer on the smartphone, and notifies its family of the elderly person has fallen down.
- (3) Using the cloud service, this system makes the personal information manageable by user self.

We implemented this application’s prototype and evaluate it. The prototype application works on GALAXY NEXUS, an Android-based smartphone. For the evaluation, we demonstrate the prototype application in the laboratory. As a result, this application show the current position of elderly, and its measurement error is less than 10 meters. And the detection rate of falling accident was about 96%. Therefore, the developed application has enough reliability. In future research, we plan to commence trial operation with an elderly.



**Fig.2 User Interface of our Application**