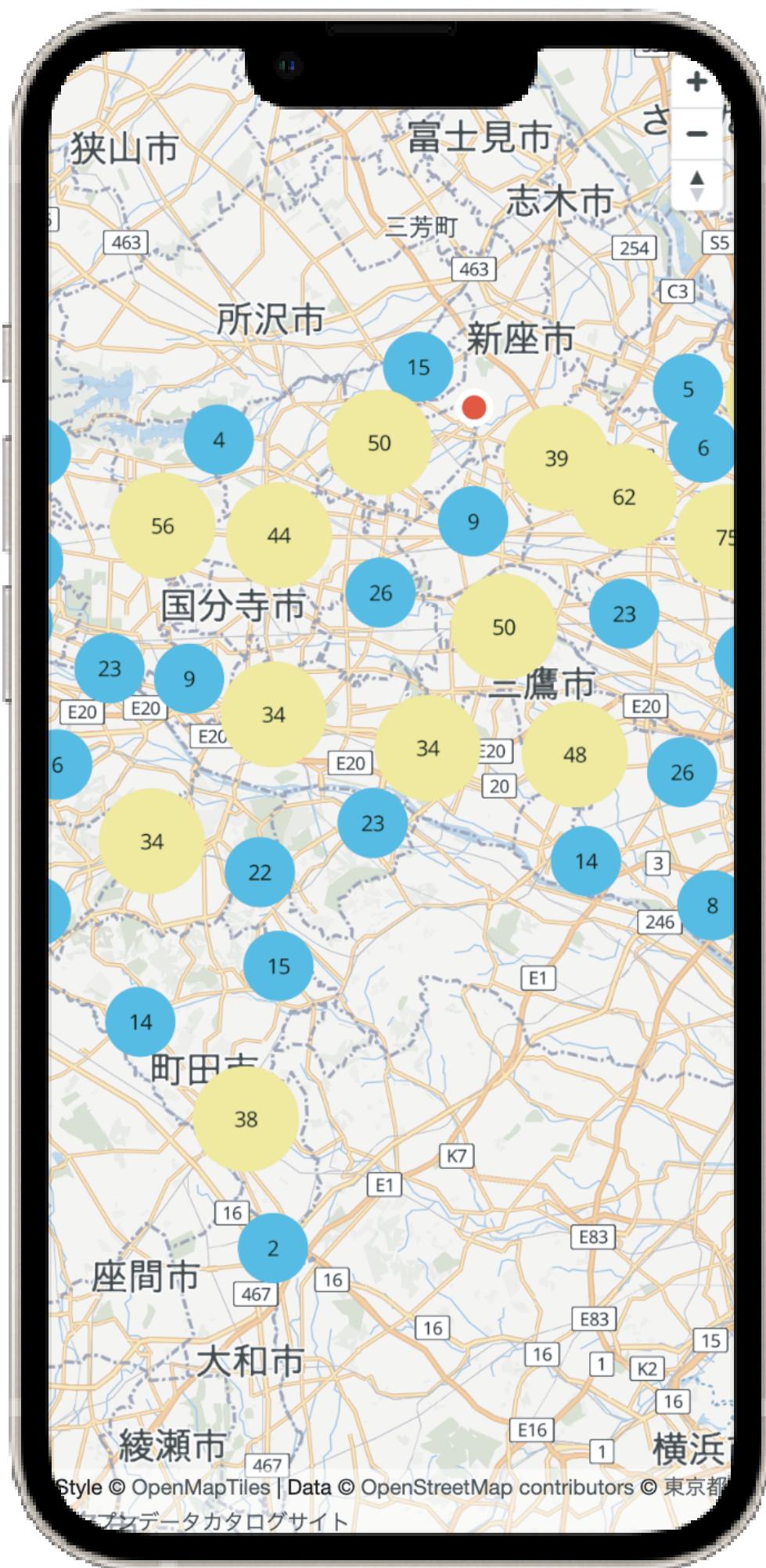


Development of UNVT Portable, a map server with OpenStreetMap pre-installed using a RaspberryPi on a local network in offline situations during disasters.

Hirasawa Shogo, Furuhashi Taichi

University of Tokyo

Aoyama Gakuin University



"UNVT Portable" is a package for RaspberryPi that functions as a map hosting server and can be freely accessed from a web browser

The United Nations Vector Tile Toolkit

<https://github.com/un-vector-tile-toolkit>

BACKGROUND

The UN Vector Tile Toolkit is a package of open source tools designed under the UN Open GIS Initiative to enable public basemap providers, such as the UN Geospatial Information Service and national government mapping agencies, to leverage the latest web mapping technology. It is designed to enable public basemap providers such as the United Nations Geospatial Information Service and national government mapping agencies to deliver basemap vector tiles using the latest web mapping technology. (Eom et al., 2017; M. A. Brovelli, 2021; UN Open GIS Initiative, 2022). The UNVT Tile Toolkit is packaged with existing proven open source software that generates, hosts, styles, and optimizes fast, interoperable basemap vector tiles for use in various application frameworks. (Fujimura et al., 2019, The United Nations Vector Tile Toolkit, 2022) UNVT Portable is a package for RaspberryPi that acts as a hosting server for vector/raster tile maps and can be freely accessed from a web browser in a local network. It is mainly intended to function in an offline environment in the event of a severe disaster. It is possible to combine drone aerial images with OpenStreetMap and various open data prepared in advance and overlay them on a Web browser in municipalities where disaster crisis headquarters have been established. The system is expected to play an active role in use cases to efficiently grasp the situation of the entire disaster area and enable prompt relief and reconstruction work.

PURPOSE

In this study, assuming currently available RaspberryPi 4 terminals, a pre-installed dataset based on OpenStreetMap will be constructed, and storage methods that interconnect with OSM and other tile-type datasets, etc. Pattern, basemap, drone aerial photography data, theme Calculate appropriate storage allocation available as open data for shelter and hazard map data for mapping. In addition, we will examine methods of acquiring location information on RaspberryPi 4 in an offline environment using an external GPS receiver and Exif (Exchangeable Image File Format).

DESIGN

Fujimura, 2019 has already proposed a partitioning method that is valid for the worldwide OpenStreetMap dataset, and this method is still valid as of 2022; assuming a RaspberryPi 4, the capacity of the MicroSD card that can be installed and the performance of the reading and drawing speed are We evaluate and define the upper cost limit as US\$150, half of the US\$300 price range of a typical Chromebook. For local network communication, a Wi-Fi-based wireless connection was used. The UNVT Portable is connected to the RaspberryPi 4 by an automatic Wi-Fi connection using QR codes, and QR codes are displayed on each thematic map. The system is designed so that even municipal employees unfamiliar with digital terminals can easily access geospatial information, for example, by displaying a QR code for each thematic map.

STRATEGY

Our research group has concluded disaster management agreements with several municipalities in Japan and is engaged in information support activities to promptly provide drone aerial photography in the event of a large-scale disaster. In the process of data provision, geospatial information is not always smoothly communicated due to the information literacy of the recipient municipalities and the operating environment of available terminals; because the infrastructure was paralyzed by the typhoon disaster in 2019, including large-scale power outages and Internet outages, we have developed an easy-to-use, easy-to-use system that can function properly in an offline environment. We hypothesize that a web map-like system that can function properly in an offline environment is needed, and will confirm its effectiveness through demonstration experiments. The UNVT Portable terminal completed in this research will be deployed in large numbers to local governments and other organizations in preparation for possible future large-scale natural disasters.

COMPONENTS OF UNVT PORTABLE

Access point activation



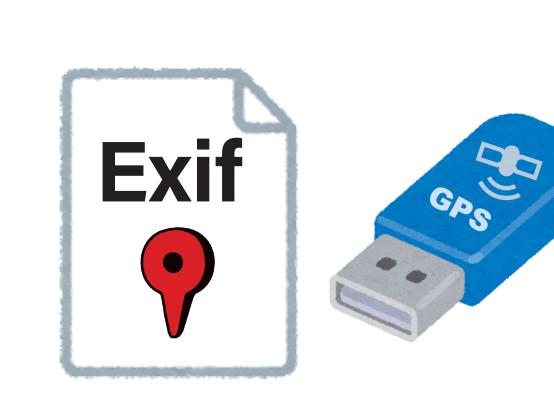
- + hostapd
- + dnsmasq
- + isc-dhcp-server
- + rng-tools

Create Tiles



Generate vector and raster tiles from OSM

location information



Upload Exif image or get location from GPS receiver

Creating a Hosting File



Create CSS, JavaScript, HTML, json files based on Mapbox Vector Tile Specification



Read the 1st QR code for Wi-Fi connection



Scan the 2nd QR code for the map view



Get location information



Disaster preparedness meetings can be held in an offline environment using maps.

OPERATION WORK FLOW

DISCUSSION

We generated multiple variations of tile datasets that are versatile depending on the data source. Specifically, we used OpenStreetMap, SRTM, Landsat imagery, and open geospatial data provided by the Japanese government. We plan to bring the UNVT Portable implemented in this way to local governments and conduct demonstration tests to see if it functions effectively in actual operations.

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