

Repot: A Participatory Geo-Tagged Photo Collection Platform

Yuki Matsuda^{*†‡}

^{*} Okayama University, Okayama, Japan, Email: yukimat@okayama-u.ac.jp.

[†] RIKEN Center for Advanced Intelligence Project AIP, Tokyo, Japan.

[‡] SOKENDO LLC, Osaka, Japan.

Abstract—Citizen participation has become an active initiative in various municipalities as a new approach to urban development, and the utilization of ICT to address regional issues, such as through the use of opendata, is gaining increasing attention. However, for ordinary citizens to fully engage with ICT, it is crucial to lower the barriers to entry. In this study, we propose a framework for opendata creation using a participatory geo-tagged photo collection platform, named “Repot,” that runs in a web browser, and we present several case studies.

Index Terms—Participatory sensing, Framework, Platform, Geo-tagged photo, Location-based services, Opendata

I. INTRODUCTION

As a new approach to urban development, citizen participation has been actively promoted in various municipalities. In recent years, the number of cases where regional issues are addressed by combining such initiatives with ICT has been increasing, and this trend is expected to attract even more attention in the future. Citizen participation utilizing ICT is often referred to as *Civic Tech*, a portmanteau of “civic” and “technology,” and refers to efforts in which citizens themselves take the initiative to use ICT and other technologies to solve local and societal problems. These activities are diverse in scale and purpose. For example, there is 5374.jp¹, an app providing information on local garbage sorting rules and schedules; OpenStreetMap², in which ordinary citizens collaboratively create freely usable maps (*opendata*); and FixMyStreet³, which enables citizens to report road damage, graffiti, broken streetlights, or illegal dumping by submitting photos and comments through a smartphone app.

These mechanisms allow citizens to use their own devices to collect data, are called *participatory sensing* [1]. It leverages the presence of people widely distributed throughout a city to enable comprehensive and extensive data collection — for example, monitoring cherry blossom blooming status [2], streetlight brightness at night road [3], environmental noise levels [4], or air pollution [5]. However, barriers such as the need to install dedicated apps or perform complicated initial setup can discourage even motivated participants [6].

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¹ <http://5374.jp/>

² <https://www.openstreetmap.org/about>

³ <https://www.fixmystreet.com/>

Addressing these barriers is thus crucial to facilitating the participation of ordinary citizens in ICT-based data collection.

II. REPOT – PARTICIPATORY GEO-TAGGED PHOTO COLLECTION PLATFORM

This paper proposes a framework, named Repot⁴, for collecting geo-tagged photos through citizen participation and publishing them as opendata. Since it is known that installing a new application and performing complicated initial setup (such as user registration requiring password configuration) present significant psychological barriers to participation, we defined the following two design requirements for the system:

R1 (Run on applications familiar to the user):

Users are already familiar with applications that come pre-installed on and are regularly used on their smartphones, such as web browsers and communication apps. Implementing the system on these platforms lowers the barrier to participation.

R2 (Minimize initial setup procedures):

Registration processes that require signup or login are known points of user drop-off (often called *form abandonment*). In particular, settings that users must remember, such as passwords, impose cognitive load; thus, efforts are needed to minimize these settings.

To meet these requirements, we designed a photo collection system that runs in a web browser — an environment present on virtually all user devices and capable of collecting photos with location data. Fig. 1 shows the system architecture. We provide an overview of how the system operates in the flow of actual use as follows:

- 1) The user accesses the Repot web-app via a QR code, URL, or web search.
- 2) The app, hosted on the front-end server, is displayed in the browser.
- 3) When the user starts the app, a unique user identifier (ID) is automatically generated and stored in the browser’s LocalStorage so it can be re-linked automatically upon returning.
- 4) When the user sets a nickname or other profile information in the app, this information is stored on the server.

⁴ <https://repot.sokendo.studio/>

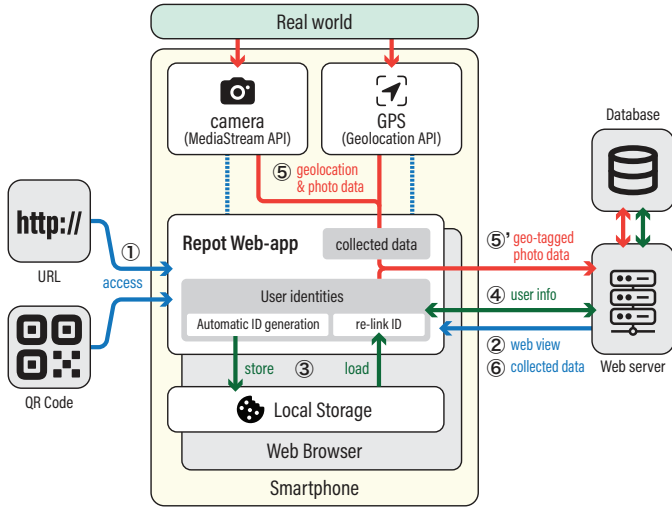


Fig. 1. Architecture of the Repot System

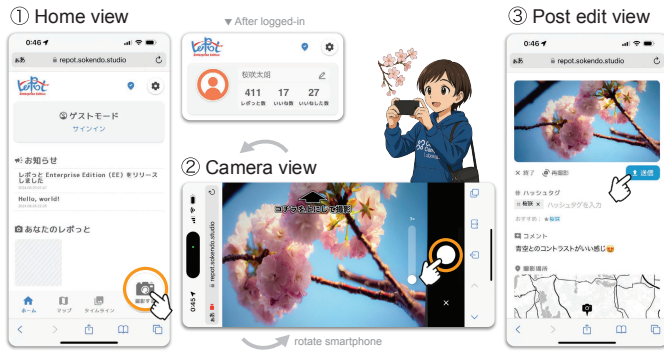


Fig. 2. Example Screenshots of the Repot Web Application

- 5) The user captures geo-tagged photo data from the camera and GPS and uploads it.
- 6) Data uploaded by the user and others is visualized on a map and timeline in the app.

The system automatically saves and re-links user information in the browser using LocalStorage, eliminating the need for sign-up or login during initial setup. If users sign in with their email address, it is possible to re-link even if LocalStorage is cleared or the device is changed.

An example usage of the Repot web-app is shown in Fig. 2. In the initial state, all functions are available as a guest. When taking a photo, the camera is activated within the web browser. After shooting, hashtags and comments can be added.

III. USE-CASES

The geo-tagged photo data collected using Repot can be published on the opendata portal — *Repot Archive*⁵ (Fig. 3). Below are the use cases conducted so far:

- **Asynchronous photo sharing and archiving of events** (319 photos): Participants posted photos of kite-flying events held in 22 national parks nationwide at their own timing, creating a digital archive of the events and skies.

⁵ <https://repot-archive.cocolab.jp/>

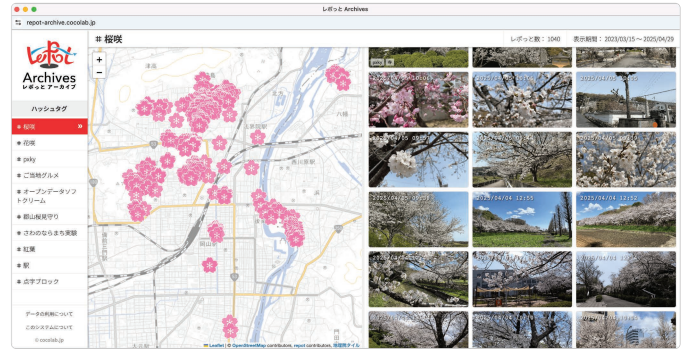


Fig. 3. Repot Archive: Example of a Cherry Blossom Blooming Dataset

- **Monitoring cherry blossom blooming and damage by invasive bugs** (1,265 photos in total): Citizens posted photos of cherry blossom blooming status and damage caused by invasive bugs, creating opendata for monitoring changes in the local natural environment.
- **Mapping the location and damage of braille-bricks** (1,671 photos): To help improve and maintain safe pedestrian environments for the visually impaired people, a dataset was created by recording the location and damage status of braille-bricks in the city.
- **Collecting minor tourist Points of Interest (PoIs)** (1,615 photos): Tourists posted photos of objects or places with touristic value that were not listed in map applications, creating a dataset that highlights lesser-known but valuable locations.

To facilitate smooth data utilization, we adopted a simple licensing scheme inspired by OpenStreetMap. However, manual verification is still required to ensure the rights of individuals and objects depicted in the photos, such as portrait rights and copyrights. Automating this verification process, incorporating additional features such as photo annotation, and providing accessible APIs, including SPARQL endpoints remain important challenges for future work.

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