2020 18th International Conference on ICT and Knowledge Engineering (ICT&KE)

Visualization of the distribution of newly infected persons with COVID-19 in the prefecture

Mayumi Tanahashi
Graduate School of Science, Tokai University
Kanagawa Japan
0csfm004@hope.tokai-u.jp

Yoshiro Yamamoto
School of Science, Tokai University
Kanagawa Japan
yama@tokai-u.jp

***Abstract*—The purpose of this study was to understand the status of COVID-19 spread in Japan and other countries around the world. To visually grasp, visualization was performed using a map, and the population was also considered. We implemented visualization on the map using statistics software R shiny package and leaflet package**

Keywords—COVID-19, map, Visualization

I. INTRODUCTION

Due to the spread of COVID-19 infection, information on newly infected persons has been made public in prefectures and ordinance-designated cities in Japan. Based on this information, the media reported the number of people infected with COVID-19, and information was collected and visualized at Civic Tech. The Johns Hopkins University (JHU) collects and publishes information on infected people around the world. Jack Japan Co., Ltd. Japan also plays a similar role. In Kanagawa Prefecture, where the main campus of University of is located, the granularity of information of newly infected persons was obtained from a newly infected person, the information was obtained from the municipality of residence, it was found that it is possible to visualize the distribution of the number of newly infected people in the prefecture. To make the distribution of the number of new infections in the prefecture easier to understand, we have realized an interactive application using Shiny, a package of statistical software R.

II. ABOUT THE DATA USED DATA

The data available on the Jack Japan Co., Ltd. Website was up to the city unit as the residence of the number of newly infected persons. Also, it was possible to obtain information about the ward from the Kanagawa administrative website regarding Kawasaki City, which is a government-designated city. The data obtained include; the date of positive detection of the virus, prefecture of residence, municipality of residence, administrative district of Kawasaki, public health center, latitude, and longitude. Also, we used population data from municipalities (including administrative districts) in Kanagawa Prefecture (from the population estimation in October 2019) to consider the population when visualizing.

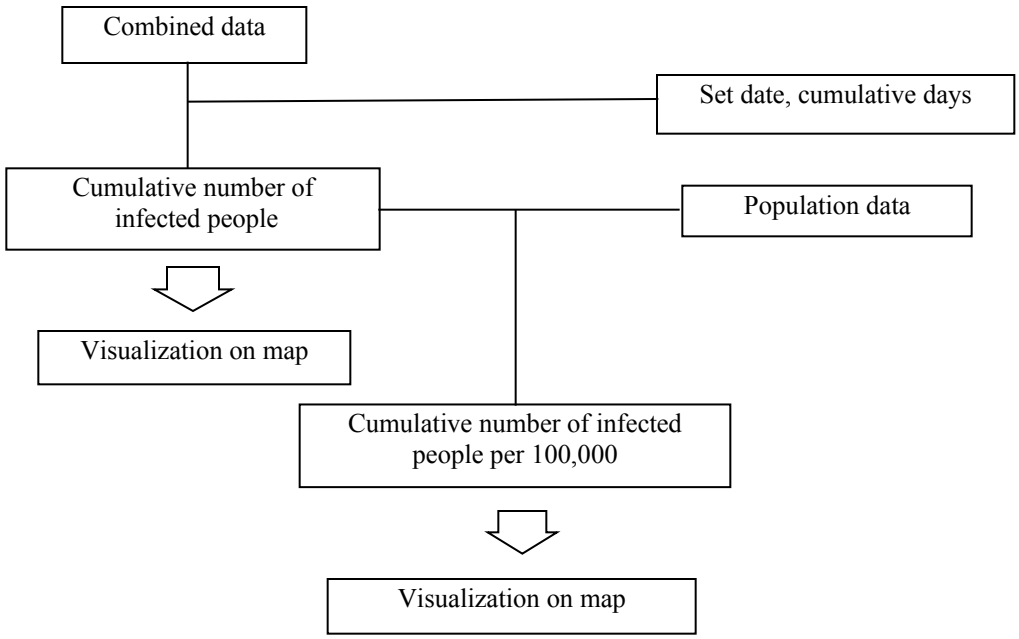

Figure 1. Flow of visualization on a map

From January to April 2020, the data for each public health center was published in municipalities other than ordinance-designated cities, Fujisawa City, and Chigasaki City, thus, there is no record of the municipality in which it resides, and only the jurisdictional health center is available. Also, for Kawasaki City, since the latitude and longitude of the ward were not included in the data, the latitude and longitude data of the ward office of the Kawasaki City administrative district are added. Figure 1 shows the flow of visualization on a map. The application will visualize the map using the combined data that has been preprocessed. Also, the cumulative number of infected persons per 100,000 is calculated using population data. Then, the accumulated cumulative number of infected persons is visualized on a map.

III. About Pretreatment

Since latitude and longitude data are listed for each municipality, preprocessing is performed to add the latitude and longitude data of the public health center and administrative district to the data of the public health center and administrative district of Kawasaki City. Since the description of the municipality, public health center, and the administrative district of Kawasaki City was different, the data were grouped for visualization on a map.

Then, based on the created data, the number of positive persons was calculated using a fixed date, the city of residence, jurisdiction (health center), and latitude and longitude as keys. Also, the cumulative number of infected people per 100,000 is calculated, taking into account the population.

IV. Creating a Visualization Application

For the visualization, we use the statistical software R shiny package and leaflet package to visualize the map. Also, we construct different applications to graphs and animations.

A. *About input variables of graph*

This application visualizes the cumulative number of infected people on a map. Therefore, the input variable uses the date (a) and the number of days (b). The date (a) is the last day to count the cumulative number of infected persons, and the number of days (b) is the period to count the number of infected persons. For example, if the date (a) is July 15, 2020, and the number of days (b) is 14 days, the cumulative number of infected persons will be calculated from July 1, 2020, to July 15, 2020.

B. *Graph selection*

We can select two graphs in this application. One is a button to visualize the cumulative number of infected people (*1) on the map based on the input variables, and the other is a button to visualize the cumulative number of infected people per 100,000 people (*2) on the map based on the input variables, taking into account the population. The selected graph is created by selecting either of the above two buttons.

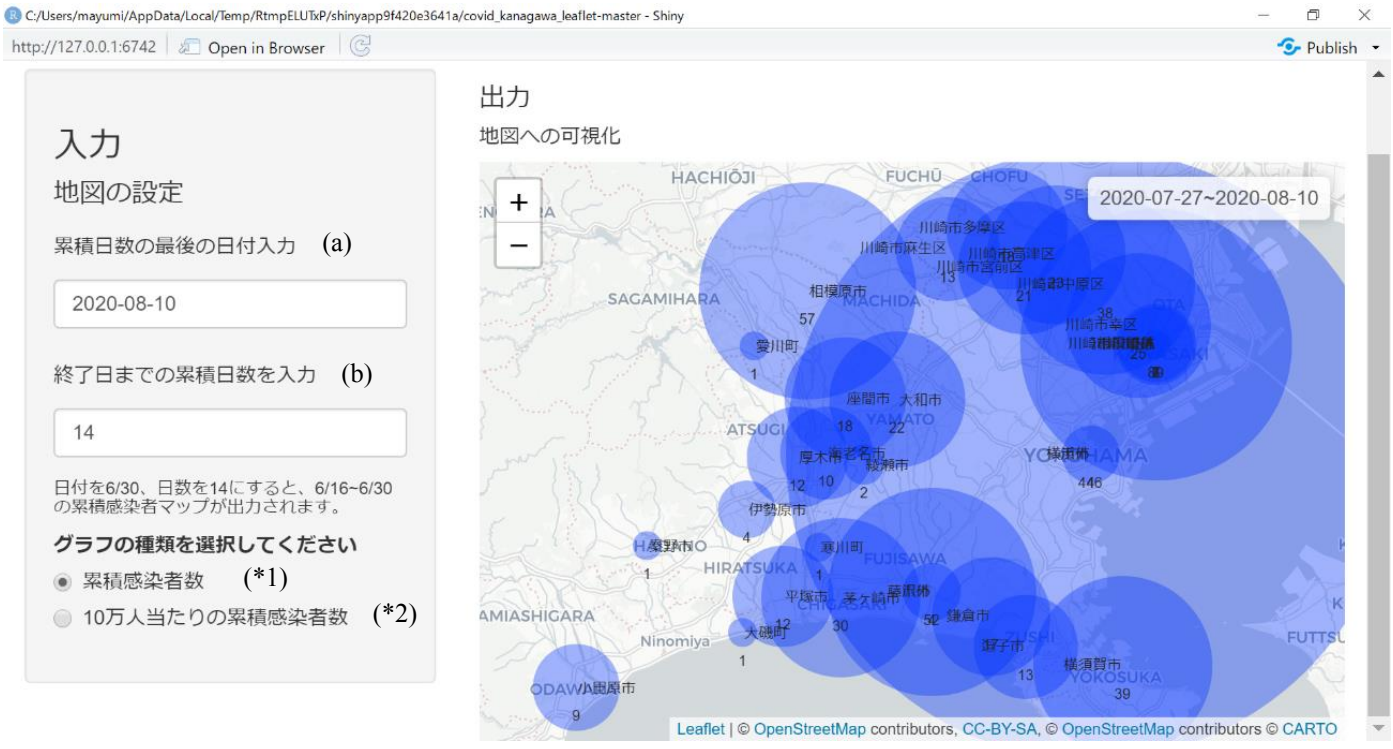

Figure 2. Screen for cumulative infection count

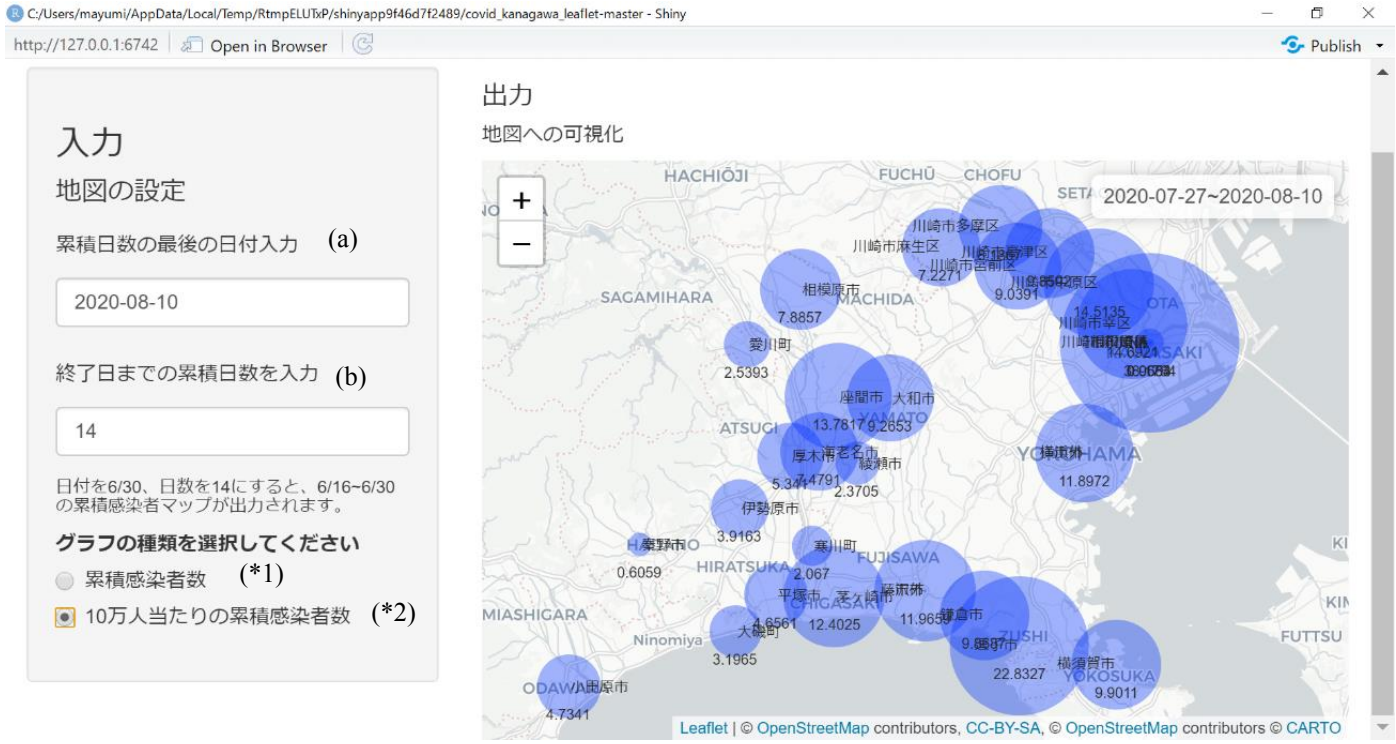

Figure 3. Screen for cumulative number of infected people per 100,000

C. *Animation creation*

We created an application that creates animation separately from the graphs. Since it takes a long time to create an animation, and there is animation after pressing the execute button, the graph application and the animation application are created separately.

Also to the input variable of the graph, the animation input variable can specify the animation date interval (c) and the animation save destination (d). For example, if the date (a) is July 24, 2020, the number of days (b) is 7, the date interval (c) is 3 days, and the save destination (d) is your own folder, July 2020 6 maps of 2–9 days, 5–12 days, 8–15 days, 11–18 days, 14–21 days, 17–24 days are created, and these 6 maps are used for gif animation format. The animation is saved ina specified folder.

D. *Run the application*

The application created this time is published on GitHub and can be called and executed from the statistical software R.

```
library(shiny)
# Application for visualization of the cumulative number of infected persons
runGitHub("covid_kanagawa_leaflet," "tanamym")
# Animation application
runGitHub("covid_kanagawa_anime," "tanamym")
```

V. CONSIDERATION

Information was available Kawasaki on the ward basis, but not for Yokohama City. This is because data disclosure policy differs depending on the administrative unit in Japan. Considering the situation in which Civic Tech utilizes data for new infectious diseases, we would like you to provide as much detailed information as possible. However, there are cases of harassment of infected persons in prefectures where the number of infected persons is small, and there is also the aspect that easy information disclosure is not desirable.

REFERENCES

[1] Jack Japan Co., Ltd. Map of the number of new coronavirus infections by prefecturehttps://gis.jag-japan.com/covid19jp/