Visualization for Areal Data of Suicide in Japan

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Abstracts

The objective of this study is to visualize areal data of suicide in Japan. The data which were used in this study are divided into year, area, age and sex. This study's importance is offering for users to find out trends of data and to compare among several parameters. At first, line charts and histograms were used to explain the terms of time and frequency of the data of suicide, while Choropleth maps were used to draw suicide rate in areas of Japan. Then, to treat more than three dimensions the following three tools were applied to find out the characteristics of suicide in Japan: 3D plot (scatter plots and bar charts), animation graphs and interaction handling of displayed graphs. Finally, comparisons and contrasts among the terms of year, area and sex were discussed. This study's contributions are for visualization of areal data of suicide in Japan as well as for that of various areal data. In presentation, the graphs that were drawn will be shown and demonstrations of the interactive handling will be performed.

Keywords: Suicidal data, Animation graph, Interactive graph

1. Introduction

The number of persons who commit suicide in Japan remains at a high level in this decade. More than ten years the figure has been more than 30,000 per year and the rate of suicide per 100,000 population has been around 25 (until 2011), and is the highest among the Group of Seven leading industrial nations. This situation has to be improved and the rate of suicide has to be reduced. This study will contribute to the situation through the results of the data analysis and the visualization of the data.

In the previous studies, spatial scan statistics were applied for Japanese suicide data to investigate spatio-temporal clusters of high suicide rate (risk). These studies focused on the general trends found in the whole area of Japan (Tomita, et al., 2010) or in Tokyo metropolitan district of Japan (Ishioka, et al., 2010), respectively. On the other hand, Kubota, et al. (2011a) detected low suicide rate areas in whole area of Japan.

These applications of the data cover so many parameters such as year, area, age group and sex, even though the data are just the numbers of enumeration. Therefore to visualize the data before/after applications is important to find out trends or outliers of the data, to determine strategy for analysis and to compare among their results to discuss.

In previous study, Kubota et al. (2011b) developed the system to visualize the data especially in the aspect of municipality.

This study concentrated to treat more than three dimensions to find out the characteristics of suicide in Japan.

2. Suicide data

The target data set of suicide in Japan is "Statistics of Community for the Death from Suicide" (Fujita, 2009). This study focused especially on time series, age groups and small areas (prefectures in Japan) and the data include number of suicide, crude

suicide rate, age adjusted suicide rate and standardized mortality ratio (SMR).

3. Visualization

To visualize the data, several ways were used such as static graph, three dimensional plot, animation graph and interactive graph.

Static graph

Line charts and histograms were used to explain the terms of time and frequency of the suicide data. Then, Choropleth maps were used to draw suicide rate in areas (especially prefectures) in Japan. For example, figure 1 shows the histograms of age grouped suicide person and Choropleth maps of suicide rate.

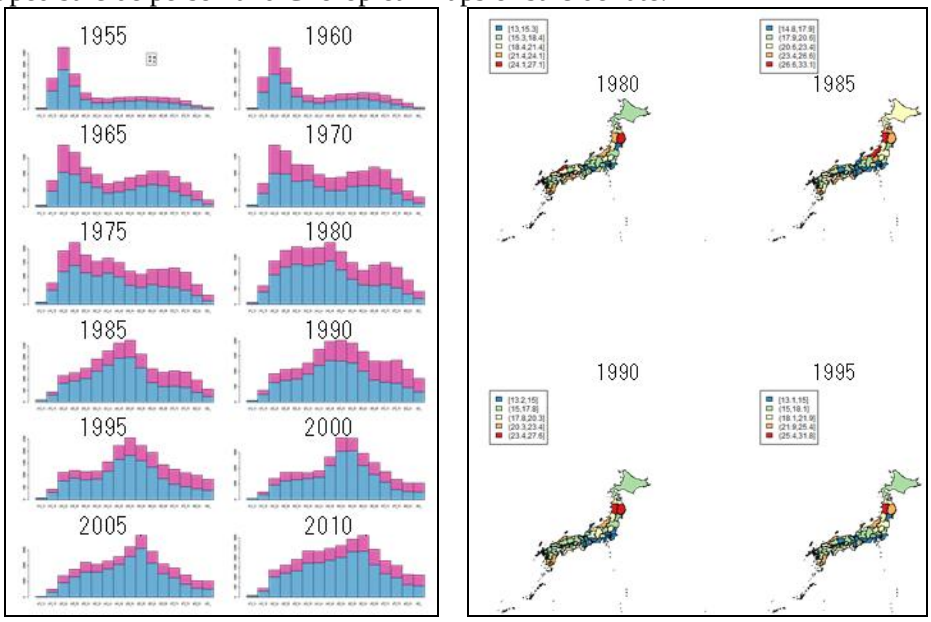

Figure 1. The histograms of age grouped suicide person of male (blue) and female (red) from 1955 to 2010 (left), and Choropleth maps of suicide rate of each prefecture from 1980 to 1995 (right).

3D plot

3D bar chart and scatter plot 3D were used to apply three dimensional data (Figure 2) which have three parameters; year, age group and suicide rate.

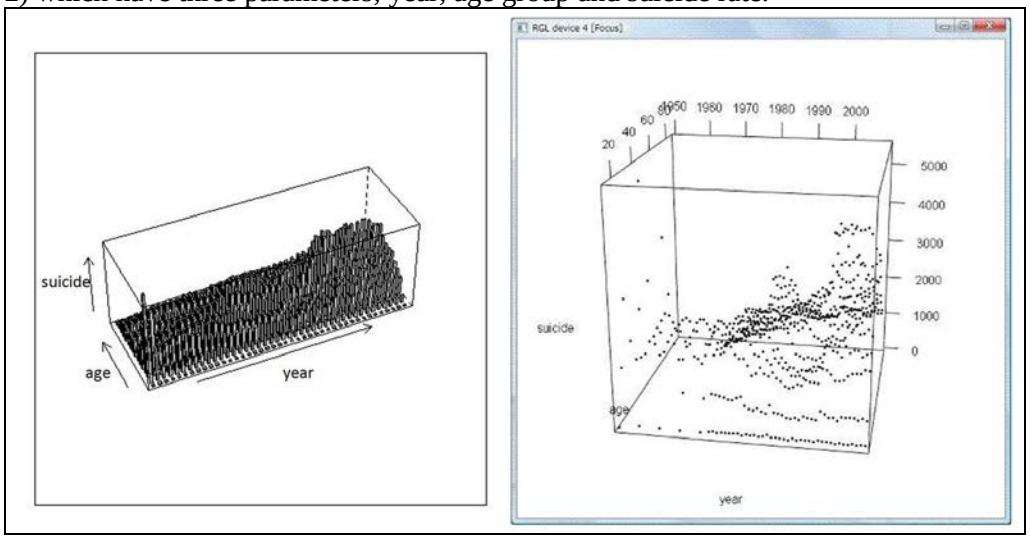

Figure 2. 3D bar chart (left) and scatter plot 3D (right) of suicide data including three parameters: year, age group and suicide person.

Animation graph

To realize three dimensions in two-dimensional graph, animation graphs were applied to use time axis as the third dimension. In figure 3 of left, line chart which shows time series and histogram of age groups of male and female are connected to show one moment corresponding to one year; 1998. Similarly, in figure 3 of right, line chart and Choropleth map are connected.

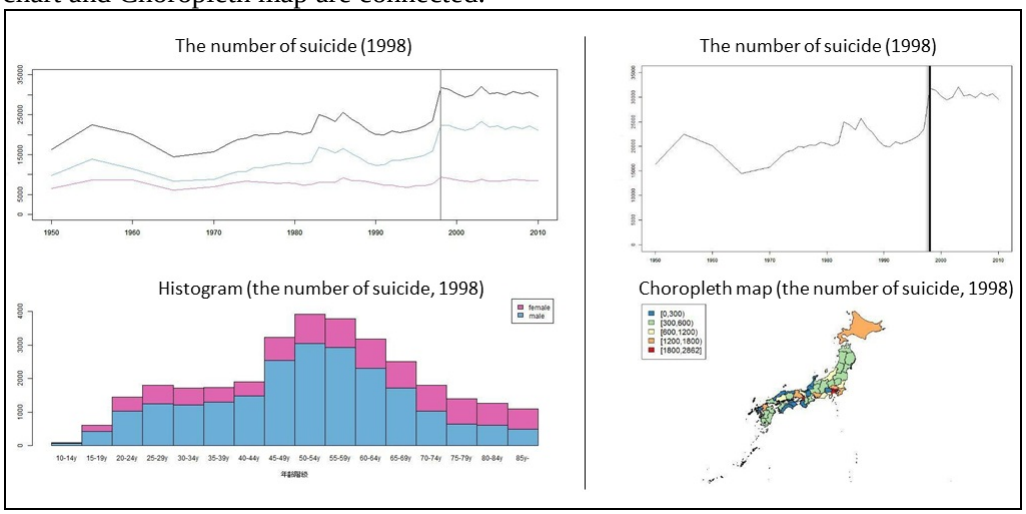

Figure 3. Connected line chart and histogram (left) and line chart and Choropleth map (right) of the number of suicide in 1998.

Interactive graph

Interactive handling graphs were offered to perform the way that user can change parameters such as year, age group and sex. In figure 4, the parameters of the line chart (right) were selected by the left form. Also, in figure 5, the parameters of Choropleth map were selected by the left form.

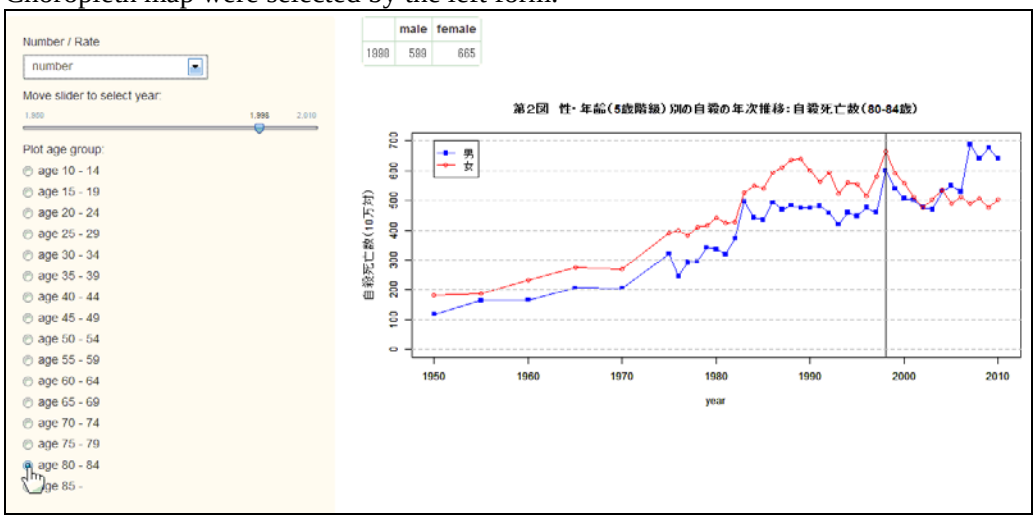

Figure 4. Interactive handling graph; the form (left) to select the type of suicide case (number or rate), year (from 1950 to 2010) and age group (from 10-14 to over 85), and corresponding line chart and the number of male and female (right).

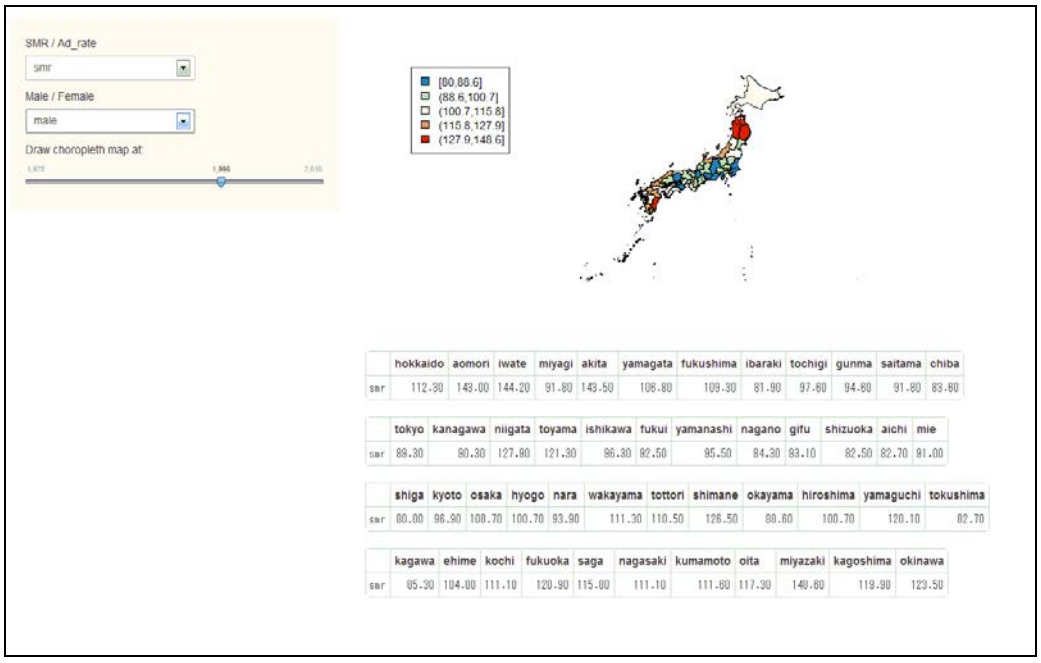

Figure 5. Interactive handling graph; the form (left) to select the type of suicide case (SMR or age adjusted rate), sex (male and female) and year (from 1975 to 2010), and corresponding Choropleth map and SMR of each prefecture (right).

4. Summary

In this study, several kinds of graphs were used to visualize suicide data in Japan. These applications, especially in interactive handling graphs, offered users to select parameters and change their graphs. This will contribute several fields as well as suicide.

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