SOUTH KOREA SUICIDE ANALAYSIS

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Abstract

South Korea has always been well known for having the highest suicide rate.

However, there were few studies examining the recent changing trends in suicide rates. This study aims to examine the changing trends in suicide rates by time, age group different other factors.

The collected data were analysed, and a variety of categories such as gender, age group, occupations, education levels and etc, were used to find out the insight of the Korea suicide analysis.

With the visual analysis we hope to discover useful insight in order to identify trend and proper implement policies to prevent suicide.

Introduction

South Korea, despite being one of the rapidly growing economies in the world, has the highest suicide rate in the world. According to OECD Statistics, in Korea, 25.6 people commit suicide per 100,000 people (OECD, 2018). In other words, suicide incidents happen to 36 people per day and 13,092 people per year; much higher than the OECD average.

Hence, our group would like to analyse multiple data sets such as gender, social status, and age to understand the underlying social issue of South Korea leading to suicides.

Every number in the datasets affects loved ones, family and precious life. Throughout our journey, we hope to derive insightful meanings from the datasets to highlight the severity of suicide social issue in South Korea, in which the government and society tend to overlook.

Motivation and Objectives

A blockbuster Korean drama, Sky Castle, has been our source of inspiration to the initial idea of our project as the drama portrayed a huge issue of Korea's education system and Socioeconomic Status (SES), which weigh heavily in measuring an individual's success and to a greater extent, they have been ingrained in Korean culture. However, when the pressure to conform to family and society's expectations is too great, suicide is increasingly a top option to escape those expectations.

Our motivation is to review the pattern of suicide numbers over the years based on several factors - occupation, income etc. Korea government website does provide a basic suicide visualisation; however, the visualisation are not stable and data set are not clean as well. Hence, it is essential to identify several factors and these factors, how the charts can be visualised in clearer and insightful way.

Objective

- To analyse suicide growth rate over the years based on multiple factors:
    - Age group
    - Occupation
    - Marital status
    - Student
- To analyse and compare which region is impacted the most, the least and identify the trend.
- To understand how significant each problem affects suicide rate.

Background Research

Our group have collected data from Korean Statistical Information Service website (KOSIS), which provides information and services for the public and

data are from National Integrated Statistics Database System.

KOSIS also provides similar visualisation to highlight the suicide in Korea as follows:

Choropleth Map

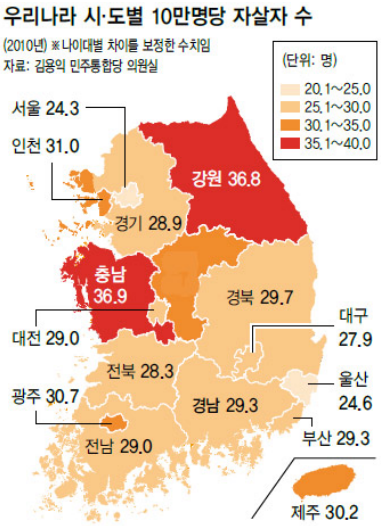

Figure 1 Korea Suicide Rate

Referring to *Figure 1*, the choropleth map visualises the Korea suicide rate in 2010 and explains which region has the most significant suicide's rate. However, the limitation of such map is the ability to display time-series data; hence, it is not viable to identity the trends over the years for each region

Trend

Figure 2 South Korea Suicide Trend Chart

Referring to Figure 2, charts are used to detect any anomalies in the trend. However, the use of absolute value displays a slight fluctuation and relatively constant trend, which requires data aggregation or transformation to derive meaningful information.

Selection of different charts

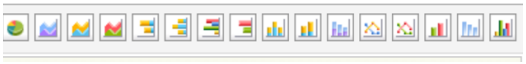

Figure 3 Multiple charts selection

KOSIS provides interactivity by allowing users to choose different types of graphs to visualize and it is a good way to suit to users' preference of specific charts. However, the objective of visualization is to make sense of the numbers and present it in the right way by choosing the right type of charts to derive meaningful knowledge; hence, the interactivity ensues from solving the fundamental issue of visualization.

All in all, the existing visualization and interactivities certainly aid in our brainstorming session and following section describe our approach to improvise the models by using an Abela chart suggestions, followed by utilizing interactivity for complex data to convey information more effectively.

User Interface Design approach

Geofacet and proportional symbol map

We realised that showing the proportional symbol map itself does not allow a user to understand the suicide trend over the years base on different gender. Hence, by using Geofacet, suicide trend charts are plotted based on different geographical entities into a grid that preserves Korea geographical orientation.

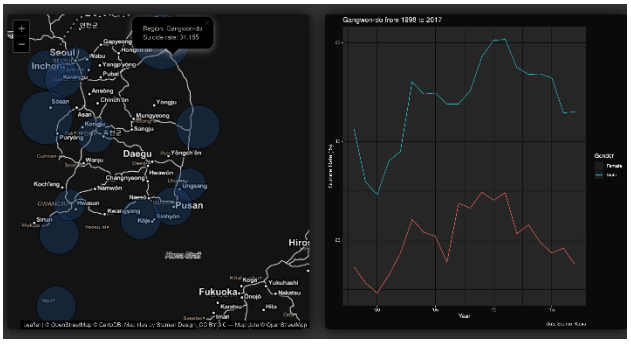

Figure 4 South Korea Suicide rate Region charts

When the user clicks a certain region from the proportional symbol map, the Geofacet will sink to the certain region and zoom in the chart. Hence, this

will allow the user to look into the details of the different regions' suicide rate trend.

Parallel Coordinates

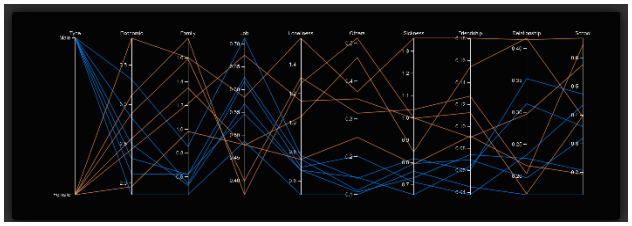

Figure 5 Suicidal Thoughts Parallel Coordinates Chart

The 'Suicide Thoughts' dataset had various reasons for suicide thoughts hence it is ideal to use parallel coordinates has it allow the user to compare many variables together and seeing the relationship between them.

Line Charts

We used line charts for 'Suicide rate by age', 'suicide attempts by students' and 'suicide rate by occupation'. Line graphs are useful as it shows data variables and trends very clearly. Also, the line chart allows us to plot different independent variables at the same time. This will allow users to compare and understand the trend of different variables at the same time.

Stacked bar charts

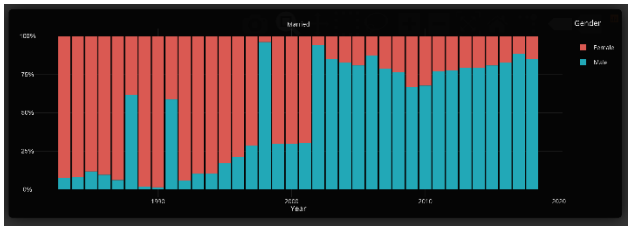

Figure 6 Stacked Bar Chart for Married

The stacked bar chart is used for marital status. The stacked bar chart is useful as it allows users to compare easily which gender tends to suicide more based on different marital status.

Dashboard Design

The dashboard application consists of three sections: Introduction, individual charts and About.

Within the Introduction section, the project's problem statement, motivation and objectives are displayed with clear-cut sub tabs. The About section introduces each of the team members who worked hard to make this project happen.

The individual charts section starts with an overview statement that briefs users areas and charts to be covered. To make the viewing experience smooth and coherent, individual charts not only can be navigated by clicking respective tabs in the sidebar (left), but also viewed as one single page.

Black, the colour of formality and emotion, matches with the topic of suicide. The application adopts a dark theme. The use of negative space helps users reduce distractions and makes the graphics such as the charts standout.

The Application

Finding 1: To analyse suicide growth rate over the years based on key events

Overall, there is a noticeable increasing trend of suicide trend from 1998 to 2017. However, there are spikes in certain years as a result of following key events:

1) 1997 Year International Monetary Fund (IMF)
    a. Financial crisis experienced by Koreans in the 1997 and it was caused by severe foreign exchange shortages on the brink of default.
2) 2003 Credit card lending distress
    a. Korea faced a credit card crisis and it significantly impacted it's financial system and it lead the highest suicide rate.
3) 2007-2008 Global Financial Crisis
    a. Global financial crisis triggered the world's largest economy and Korea was greatly affected

Age Group

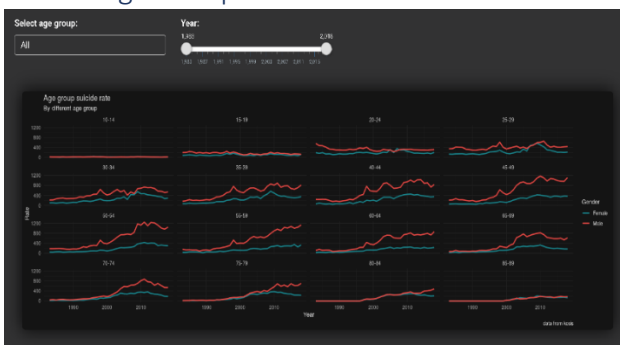

Figure 7 Suicide Rate for different age group

The age group with increasing suicide rate are prevalent among working adults - 35-39, 40-44, 45-49, 50-54, 55-59 and retired citizens beyond 60 years old. As reference to 3 key events, the age group between 35-39 and 40-44 experience the steepest suicide rate in each of those financial crisis events.

Occupation

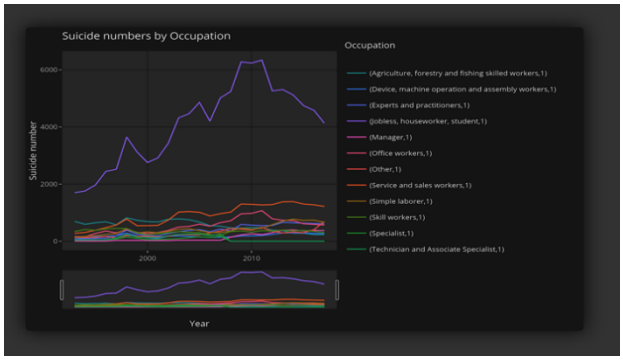

Figure 8 Suicide rate by different Occupations

There are 2 categories of occupation – employed and unemployed. All occupations are affected by the 3 key events, but the most affected group belong to the unemployed or jobless. A noticeable pattern shows 2 critical information – steep increase and prolonged period of increasing suicide rate. For example, the 2008 global financial crisis saw spike increase from 5000 in 2008 to 6000 people in 2009 and the prolonged period from 2009 to 2011 showed the impact were still felt and the suicide numbers reached its peak.

To add on, the trend for students and marital status are unaffected by the key events. It suggests there are other factors impacting the suicide rate, which are explained in Finding 3.

Finding 2: To analyse and compare which region is impacted the most, least and identify the trend.

Figure 9 Suicide rate based on different regions

The proportional symbol map allows users to visualise which region is impacted the most. Different regions are represented by a circle and the size of circles indicate a higher number of people committed suicide and vice versa. Based on the map, Gangwon-do, Chungcheongnam-do and Gyeongsangbuk-do are the most impacted region, which imply the suicides tend to occur further from Seoul

As the map data is in time-series format, the utilisation of Geofacet charts aim to visualise suicide trend for each region. The trend of suicides across all regions has either decreased or maintained since 2010, except for Jeju island where male suicide starts to increase from 2015. On the other hand, Jeollanam-do has experienced a steady decline from 2015.

Finding 3: To understand how significant each problem affects suicide rate.

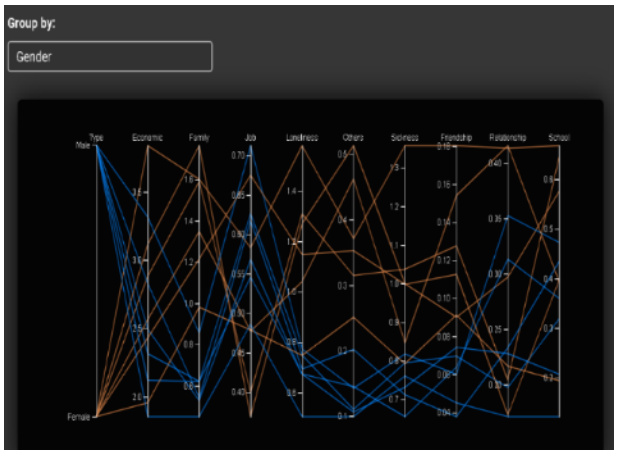

Figure 10 Suicide thoughts in parallel chart

Figure 11 Suicide rate base on different marital statusFigure 12 Suicide thoughts in parallel chart

There are 9 problems as followed: 1) Economic, 2) Family, 3) Job, 4) Loneliness, 5) Sickness, 6) Friendship, 7) Relationship, 8) School, 9) Others

5 factors: 1) Gender, 2) Age Group, 3) Employment, 4) Satisfaction, 5) Educational Level.

Key analysis (Other than economic issues) for each factor:

1) Gender: **Job** and **Relationship** also contribute to higher suicide rate for male while the reasons are highly varied for women

2) Age group: Generally, the older people committed suicides due to **sickness** and **family** issues and to a certain extent, loneliness.

3) Employment: **Family** and **Loneliness** issues contribute to the suicides for the unemployed. For employed, the reasons are highly varied

4) Satisfaction: People with dissatisfaction have higher percentages of suicide rates across all problems.

5) Education level:

Elementary school graduate - **Sickness**

Middle & High school graduate - **Family and loneliness**

University Graduate - **Job and Loneliness**.

Finding 4: Marital status suicide analysis

The data set used is the general demographic of suicide rate based on marital status in Korea. The analysis is gained based on different marital status. Also, the trend who intend to commit suicide over the years.

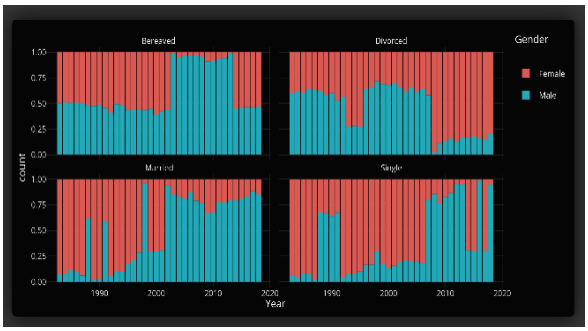

Figure 13 Suicide rate base on different marital status

Figure 14 Suicide rate base on different marital status

For bereaved, the suicide rate for both genders was similar. In 2003 suicide rate for male suddenly increased and it becomes stable again in 2014 onwards.

The more married male tends to commit suicide more because of their responsibility of taking care of family and handling the stress from the company.

More single females committed suicide in 2007 till 2018, a higher rate of divorced females committed suicide reason behind is in Korea society, it is harder for female alone to support and take responsibility of the family.

Limitation

The research paper intends to highlight the topic of suicides in Korea as accurately and informative as possible. However, the values in the report may not accurately represent the entire population of Korea due to incomplete and missing values. Some of the values are based on surveys, which may lead to misinterpretation of certain trends; hence, Korean

government needs to step up their efforts in gathering as much data, perform extensive data cleaning and use appropriate visualization charts to convey clear message to the citizens.

Conclusion/Suggestion

Our results showed that there were differences in the changing trends in suicide rate by sex and age groups. Our finding suggests that there was a possible relationship between implementation of second national suicide prevention policies and a decline in suicide rate.

For future research our interactive visualization can explore many potential areas such as

- Find co-relationship between different factors that affect suicide.
- Create a prediction model based on the dataset to further analysis
- Enhance the user experience by more interactive tools in the dashboard

Acknowledgment

We respect and thank Prof Kam Tin Seong for providing us great opportunities to do the project and giving us continuous support and guidance, which allowed us to complete the project.