

Speed Dating Experiment Board: A Visual Analysis of Speed Dating Results

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Abstract – The population issues such as birth rate slump and the increase of aging population is placing stress on Singapore’s future. The declining of marriage rate is one of the contributor to low birth rate. Some foreign practices has proven that speed dating is an effective way to encourage young singletons to find romantic partners and form families. To propose speed dating as a solution for low marriage rate, we designed and developed speed dating experiment board, an interactive and dynamic web page to direct individual partner-seekers, dating agencies and government personnel to understand the current population problems and explore the speed dating data to gain insights for developing solutions to solve the problems. We use the interactive force-directed chart, force bubble chart, radar chart and Tableau dashboards to demonstrate the potential of speed dating experiment board in problem stating and solution proposing.

Key Words – Population Issues, Speed Dating, Force-Directed Chart, Radar Chart, Box Plot, Force Bubble Chart

1. Introduction

Population issues are always in the list of top concerns for Singapore Government. Two main population issues which are the decrease of birth rate and the increase of aging population are putting huge pressures on the country’s future. They would create a future demographic shift to more aging dependent citizens and less young people who have to work to support them as well as the local economy. This could lead to the fall of Singapore’s gross domestic product. [1] Facing such kind of problem, one strategy which government could do is to encourage producing more babies. However, this is not easy because even the marriage rate among young Singaporeans is declining. Without more marriage couples, boosting birth rate will be impossible.

The above issues about birth rate, aging population and marriage rate are supported with data. Using the data on births, data on population structures and data on marriages from website of Department of Statistics Singapore, we have built graphs to illustrate the aging population trend, birth rate trend and the marriage trends in Singapore from 1980 to 2016.

Figure 1 using a stacked bar chart to show the share of citizens who are above 65 years old is growing every year and this growing rate is accelerating after 2010. This indicates the aging population situation in Singapore.

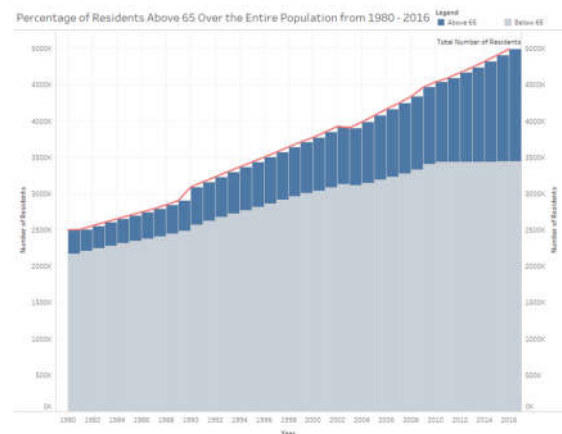


Figure 1 Stacked bar chart reveals aging population trend

Figure 2’s line charts shows the declining crude birth rate which is the ratio of live births to per thousand population in the reference period. This trend of dropping of newborns is mainly due to the fall of fertility rate among young women who are from 20 to 29 years old. Figure 3’s line charts shows that the overall marriage rate is falling and this is because of the dropping of married population. Lesser and lesser men and women from 20 to 29 years old get married according to the graph.

Therefore, encouraging more young citizens to get married is a reliable path to save the birth rate slump and as a result, pull up the young population level and solve the aging population issue.

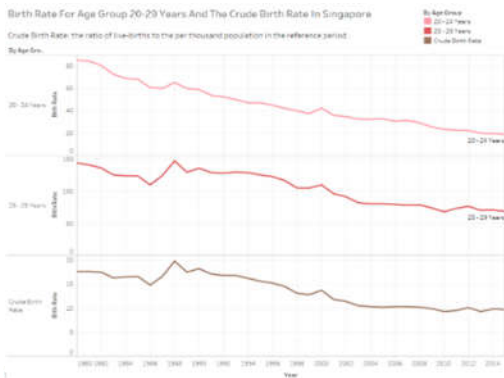


Figure 2 Line chart shows decrease of birth rate

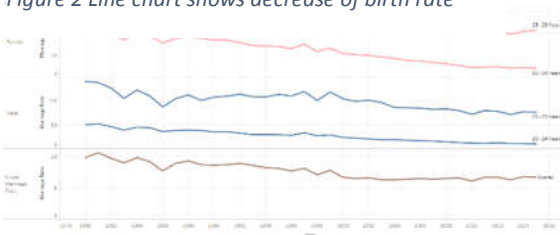


Figure 3 Line chart shows decrease of marriage rate

2. Motivation And Objectives

Nowadays, young people in modern cities are frustrated in finding romantic partners. They are too busy with their daily works to spend time meeting new people, not to say building relationship with them. What they can rely on are speed dating events, which is a type of matchmaking process to make singletons meet a large number of other singletons and quickly form relationships. Speed dating is an effective way to connect young and single Singaporeans together and promote marriage. However, many Singaporeans are neither aware of the speed dating events nor they know the choice behavior of the opposite sex during speed dating. In other words, they do not know how to increase the successful rate during speed dating. Moreover, dating agencies do need to know the facts about speed dating in order to customize events to promote more successful pairs.

Using the experimental speed dating events questionnaire data collected and compiled by Columbia Business School Professors Ray Fisman and Sheena Lyengar, we are interested to explore the following information:

- 1) The matching overview for the data;
- 2) Basic Demographics of the speed dating events participants;

3) Speed dating facts like successful matchings by gender and by age, participants' motivation in joining the events as well as how date frequency and go out frequency affect matching;

4) The importance of share interest; age differences and having identical race and religions to partner selection;

5) The expectations of opposite sex partners' attributes (attractive, sincere, fun, intelligent, ambitious, share of interest)

We will employ different types of visualisation designs to illustrate the above information and then provide a speed dating experiment board in the form of web pages for displaying the final speed dating data analysis results.

3. Visualization Design

3.1. Basic Visualization Of Facts

For time series data such as Singapore's marriage rate, birth rate, inter-ethnic marriage ration over years, we used **line chart** to explore the trend. Different colors are applied for age groups and gender.

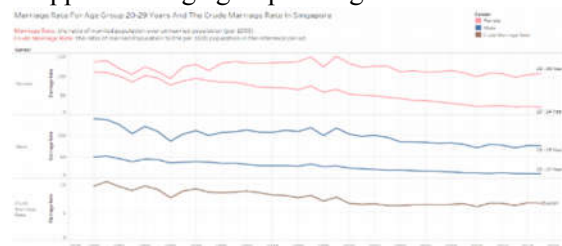


Figure 4 Line chart for time series data

Stacked Bar Chart is used for finding the successful matching rate distribution among people with different go out frequencies. In general, people with higher go out frequency has a higher successful matching rate.

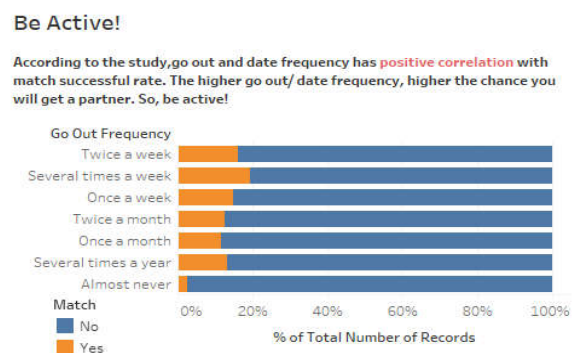
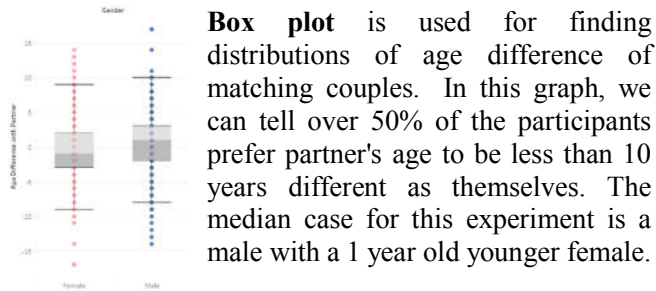


Figure 5 Stacked bar chart to show distribution for matches and no matches



Box plot is used for finding distributions of age difference of matching couples. In this graph, we can tell over 50% of the participants prefer partner's age to be less than 10 years different as themselves. The median case for this experiment is a male with a 1 year old younger female.

Figure 4 Box plot for distribution of age differences

3.2. Force Bubble Chart For Basic Demographics

Forced bubble chart in D3.js is used for visualizing the basic demographics of speed dating participants. There are 277 female and 274 male participants in this experiment. Because each data point has many attributes,

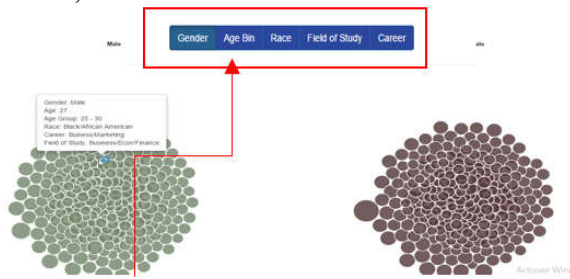


Figure 5 Interactive filter in force bubble chart

an **interactive filter** is applied for re-grouping the participants by gender, race, field of study, career, and age group. Each participant's basic information can be retrieved by hover over the data point.

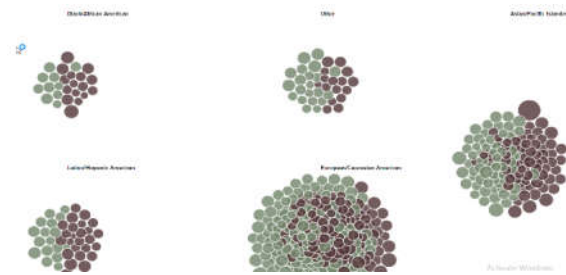


Figure 6 Re-grouping in force bubble chart

3.3. Box Plot For Finding Correlations

Tableau is used to plot box plot, which is effective in showcasing specific variables' data point distribution. By doing so, we are able to explore potential correlations between independent variables of interest - 'importance of same race', 'importance of same religion', 'age difference' and 'rate for share interest' and dependent variable, 'like partner'.



Figure 7 Tableau box plot dashboard

Since 'age difference' is missing in the original dataset, we computed it with 'age' and 'age_of_partner'. After which, we categorized it into 4 bins by making use of Tableau's 'Create Calculated Field' feature.

Box plots plotted indicate that having same race and religion does not necessarily result in higher 'like partner'. On top of which, there is no clear correlation between 'age difference' and 'like partner'. On the flip side, positive correlation between 'rate for share interest' and 'like partner' is observed, indicating that shared interests is an essential aspect to consider when choosing partners during speed dating.

3.4. Radar Chart For Mapping Preferences

The average scores of the six attributes (attractive, sincere, fun, intelligent, ambitious and share of interest) of a preferable opposite sex partner given by male and female participants are computed and drawn using radar chart. **Radar chart** is chosen here because of its ability to display multivariate observations with many quantitative variables. Each spoke of the radar chart represents one attribute and the magnitude of the spoke represents the average score of that attribute by a gender. [2]

The orange plot represents male participants' average demand of female partners' attributes while the blue plot represents female participants' average demand of male partners attributes. The graph shows clearly that most gentlemen prefer their female partner to be attractive and intelligent with less ambition while the ladies prefer intelligent and fun male partners.

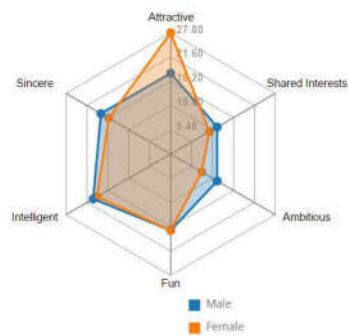


Figure 8 Radar chart showing demand scores of opposite-sex partners' 6 attributes

3.5. Graph For Matching Result

The **force-directed graph** is very clear and straightforward in illustrating the matches among speed dating participants. [3] Each node represents a participant. The size of the node represents the number of matches this participant has while the colours of the node represent the races of the participant. The bigger the node, the more popular the participant. To provide more information for the force-directed graph, tooltip is added to each node to show their detailed information such as person id, gender, age, race, field of study, career as well as their interests. User could hover the mouse on nodes to show tooltip and view the detail information for that participant. Each edge represents a match between the two connected participants. The edge strength represents the extent of two participants like each other. The thicker the edge line, the more they like each other. It can be seen that there are many inter-ethnic matches, this indicates that people can accept and can be attracted by partners from different ethnic group. There are some participants who could not get a match from this speed dating experiment, they appear to be a single node with no links to them. However, majority of the participants have had at least one match, some popular participants have gotten more matches. This indicates that speed dating is actually effective in promoting friendship or romantic relationship.

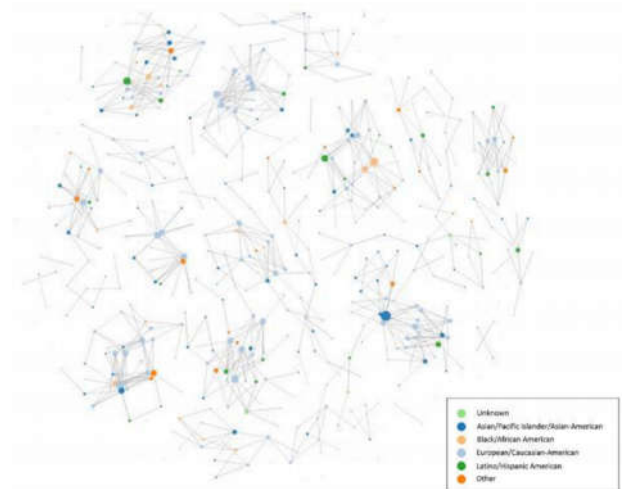


Figure 9 Force-directed chart shows the matches overview

4. Design Of Application

The speed dating experiment board is design for proposing speed dating as a solution to the population issues in Singapore. Therefore, the webpage is divided to 4 main sections: problem statement, speed dating as a solution, discoveries from speed dating experiment and recommendations. The slide show at the top is an overview of our webpage.

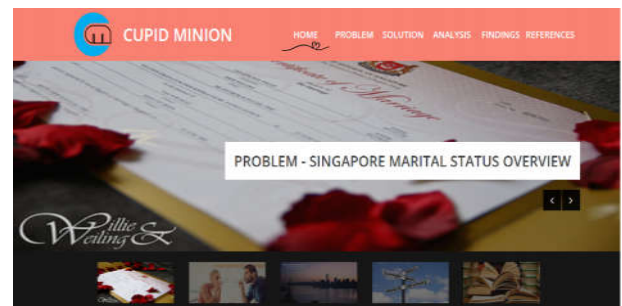


Figure 10 Top slide show for speed dating experiment board

Below the overview section is the problem overview. We combined the stacked bar graph of aging population issue, line charts for birth rate and marriage rate slump issue as well as the line chart of inter-ethnic marriage trend into one Tableau Dashboard to provide an overview of the current population concerns and marital issues and facts in Singapore.

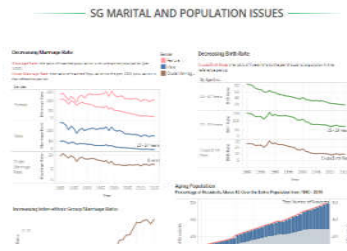


Figure 11 Problem statement section for speed dating experiment board

With the problem stated, we proceed to have a section introducing speed dating to help deal with the problems. It contains our researches about how speed dating help more and more young singletons become couples.

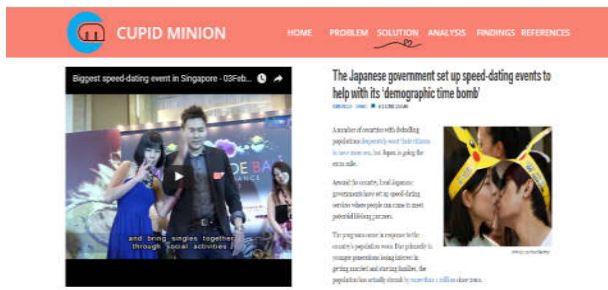


Figure 12 Introduction of speed dating section for speed dating experiment board

The next section is the findings from our speed dating experiment data. The section is separated to 5 independent webpages with each of the webpage using a Tableau dashboard or a Data-Driven Document (D3.js) graph to introduce a set of discoveries.

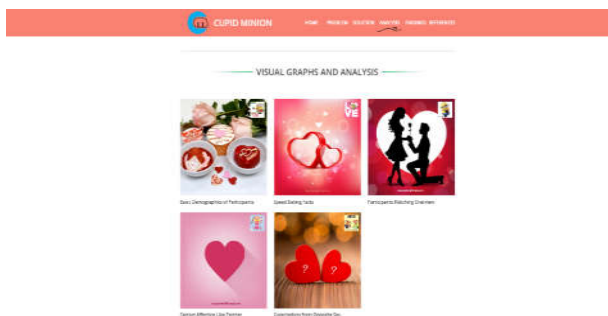


Figure 13 Data visualisation and analysis section for speed dating experiment board

Finally we have a recommendation section to give suggestions to individual, government and agencies based on findings in the previous section.

4.1. Data Visualisation

We used data visualisation in the problem statement section and the speed dating experiment discovery section. For interactive design purpose, we use D3.js to create box plot graph, force bubble graph, force-directed graph as well as the radar chart. D3.js as a JavaScript library is easier to integrate with our web application and is very convenient for csv data file importing.

The HTML5 and D3 JavaScript together create high quality, interactive, attractive and animated data visualisations which user can easily reconfigure the graph to filter the results, interact with the graph to see tooltips as well as distort the graph at different zoom levels. [4]

Moreover, we use Tableau dashboard to place the line charts as well as the stacked bar charts so as to categorize and organise the charts which pertain similar information.

The speed dating experiment board is designed to display information in a clear to view, simple to understand and interact, and interesting manner. Therefore, we adopt the approach of combining Tableau dashboards and D3.js graphs to provide neat and attractive data visualisation for our users.

5. Recommendations

From the visual analysis findings, we have developed some suggestions to individuals who intend to attend speed dating events, dating agencies which hold these events as well as government which is seeking ways to pull up marriage rate.

The first suggestion to singletons is to be more active in their private time by going outdoor more than once a week, this could increase the chance to get partners during speed dating. Secondly, individual partner seekers need to develop more interests because it increase the chance to have same interests with other participants and as a result securing successful matches. Thirdly, one does need to worry about their race, religion and age when they attend speed dating. Majority of people are very open to having partners in different race or religions. In fact, the inter-ethnic marriage rate in Singapore is seeing an increasing trend according to the data on marriage from Department of Statistics Singapore. Also, majority of the speed dating participants do not take age gap as a factor for choosing partners. Lastly, ladies could into

heart that male participants prefer them to be attractive and intelligent and gentlemen need to know that female participants prefer intelligent and interesting men.



Figure 14 Line chart shows the growing trend of inter-ethnic marriage in Singapore

Since people with similar interests are more likely to become partners, dating agencies should hold theme events to gather participants with similar interests which ensures a higher successful rate of matchmaking.

Speed dating has shown its effectiveness and efficiency in creating couples, hence it could be widely conducted to achieve government's goal of pulling up marriage rate. Government could support speed dating events by sponsoring agencies to promote their speed dating events or having Ministry of Social and Family Development to collaborate with dating agencies to provide assistance to newly formed couples.

6. Conclusion

The speed dating experiment board is designed specifically for providing evidence for proposals. It should provide the logical steps from problem statement to solutions recommendation. Also, it has to be simply enough for normal people to understand the problems and its seriousness and interesting enough to catch their attention on the solution presentation. Right now the speed dating data we are using is static, we expect our application could take in live data of Singapore speed dating events to provide real-time visual presentation for the events. Furthermore, we would like to include additional factors affecting speed dating partner selections such as income level and education level.

7. Reference

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