CS5300 / INFO5100 Project 3

What are the chances of having depression?

Team:

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Most people have no idea what depression really is. Although it affects more than 350 million people worldwide [1], according to a quick survey, we found that most of our friends had no basic knowledge about depression, and that's because society doesn't make an effort to understand it. People should understand what depression is, any of our friends, coworkers or family members, someone we see every day could have depression. Still, so many people are kept silenced about it because of a simple lack of knowledge. Thus, our project is focused on what we feel every person should know about depression.

According to our deep research, we found that some groups have a higher possibility of having depression. For example, teenagers have a higher possibility than older people. It's said that 11% of adolescents have a depressive disorder by the age of 18 [2]. Women are 70% more likely than men to experience depression in their lifetime. 30% of college students who reported feeling depressed feel disrupted their ability to function in school. Depression is an actual medical and mental disorder, however, the truth is that 50% of Americans with major depression don't seek treatment for this mental illness.

Therefore, in our project, we tried to raise more awareness about depression. Our design idea is to use a survey method to evaluate the possibility of having depression according to data from HP2020 Objective. In our opening, first, we dynamically present some surprising fact numbers about depression. We hope this depression introduction part can give people a brief understanding of this mental disorder. In the survey part, we have 10 questions with variables that affect the rate of depression. A progress bar will show the rate changing according to the survey user's selection. Some selections will increase your rate of having depression while some may reduce it. By showing the final possibility of developing depression, we want to increase people's attention about this illness.

1. Description of Data

Dataset Introduction

At first, we thought it would be easy to find datasets about depression because of the large number of people who suffer this mental illness. However,finding a dataset turned out to take longer than we expected because we only found some statistics data with final results. Our final dataset came from Healthy People 2020 plan. the HP2020 Objective data includes over 1,200 objectives to monitor and improve the health of all Americans over the decade. The objectives are organized into 42 Topic Areas, each representing an important public health area.

One of focus area is “Reduce the proportion of adults aged 18 years and older who experience major depressive episodes (MDEs)”. [3] This dataset was the most relatively data we could found and the original dataset can be found in the following link:
https://www.healthypeople.gov/2020/topics-objectives/topic/mental-health-and-mental-disorders/objectives#4814

Data selection and filter

The original dataset contains different depression rates from 52 states. It divided groups by different categories such as gender (Female or Male), race/ethnicity (American Indian or Alaska Native only, Asian only and etc), age group (18-44 years, 45-64 years and 65 years and over), educational attainment (25 years and over), family income (percent poverty threshold), country of birth, geographic location, health insurance status (<65 years), marital status and veteran status. However, there are some missing data of race/ethnicity in some states. So we only selected the rest 9 categories and added the state living question. Thus, we had 10 questions in total. Although the original dataset had depression rate from 2008 to 2013, we decided to use just the latest rate. If some states don’t have a percentage for any categories, we used average US rate to fill that missing part.

Data format

After the data collection and cleaning, our final dataset has 52 states depression rate of 27 variables (female, male, metro and non-metro etc) in one data.csv file. We collected these data one by one to make sure all data were required.

The other data file us-map.json had information to draw a customize US map. Considering the screen of mobile phone will be too small to show a clickable state map, we made the us map to 52 rectangles with abbreviation of different states.

2. Data Visualization

Visualization Introduction

In our opening part, we used a text transition approach to mimic the dynamic change of text. In the survey, we used pictures to provide a more visual selection. Each time a selection is made, the progress bar will change to show the probability of having depression taking into account that different population features that the user selects (if it increases, the progress bar will change to red or if it decreases, the progress bar will change to green). Moreover, we used a bar chart to visualize and compare these variables once the selection is made. By doing this, the user can have a look at how different variables affect depression rates.

Visualization 0: Responsive Screen

Visualization Approach

In order to make the project responsive to all screens, we decided to use css media queries to add all necessary changes depending on the width of the screen. Most changes were focused on changing the size of elements that were too big to be displayed in the same way as desktop screens.

Mapping from Data to Visual Element

The most difficult element to adapt to smaller screens was the map. Since the map contains text identifying different states and since this information needs to be displayed to the user, we decided to use a different approach instead of including that text into the rectangles. In small devices, when the user selects a state, the name of the state will be displayed above the map so it can be clearly read. Rest of the elements, like titles or pictures, were changed in size according to the screen. Another responsive change that was performed was to stack pictures one below another instead of showing them next to each other as we can do in bigger screens.

Interaction:

Interaction did not change between screen sizes, the only changes were related to the way in which elements were presented as we commented before.

Visualization 1: Depression Statistic Intro

Visualization Approach

Present 11 statistics data facts that show how depression may have a greater impact than people might think, we used text transition to make this text change dynamically on a loop.

Mapping from Data to Visual Element

We created 2 text transitions. The first transition uses d3.interpolateString to change over 11 statistical data values stored in an array, so these number can be displayed repeatedly. The second transition controls 11 explanations related to its corresponding statistical numbers with a fade-in and fade-out effect.

Interaction:

The depression statistic introduction will begin automatically when you open the web application. If you click the start survey button, the introduction part will stop and disappear.

Visualization 2: Depression Survey

Visualization Approach

Generally, we present different variables for each question in the form of pictures. The only exception is the first question about the state, in which we drawed a state map. In the following questions, once the user select an answer and move to the next page, a comparison among variables with chart bars is presented to the user.

Mapping from Data to Visual Element

To draw a US state grid map, we use a gridScale which is created by d3.scale.linear(). We created a us-map.json with x and y position of each state then draw squares to present 52 states. To draw bars to show depression rate of each variables, we use xBar scale created by d3.scale.ordinal() and yBar created d3.scale.linear().

Interaction

When the user selects an answer, he/she can move to the next page by clicking the next button. Otherwise, if the user doesn't select any option, the next button will be disabled until a selection is performed. After this selection, a chart bar will show the comparison among different variables.

Visualization 3: Depression Probability Bar

Visualization Approach

We used an animated bar to represent user's probability of having depression depending on the her/his selection.

Mapping from Data to Visual Element

We made the total length of the bar to represent only a 12% rate. This decision comes from the fact that the average probability of having depression does not go above this rate. If we used 100% to be the length of the whole bar, the change in the total percentage will be almost undetectable. The position of the arrow is user's current probability to get the depression.

Interaction

When the user select an answer for each question and move to the next page, his/her probability to get the depression will change based on the answers and our data. We display his/her's current probability to get the depression using the animated bar. If he/she chooses an answer that increases his/her chance to get the depression, the bar's color will turn red; if he/she chooses an answer that decreases his/her chance to get the depression, the bar's color will turn green.

3. Storyline

In our introduction page, before starting the actual survey, we provided some surprising facts about depression using text transition. These facts are:

- "350,000,000" -"The number of people globally who are affected by some form of depression"
- "11%"-"The percentage of adolescents who have a depressive disorder by the age of 18",
- "70%"-"The percentage by which women are more likely than men to experience depression in their lifetime"
- "16,000,000"- "The estimated number of U.S. adults who had at least one major depressive episode 2012"
- "14%"-"The percentage of women from a 2013 postpartum depression study who had the disorder four to six weeks after giving birth"
- "30%"-"The number of college students who reported feeling depressed"
- "$80,000,000,000"-"The estimated annual cost of depression in the U.S. due to lost productivity and health care"
- "8,000,000"-"The number of ambulatory care visits from a 2010 CDC report where a major depressive disorder was the primary diagnosis"
- "50%"-"The percentage of Americans with major depression who don't seek treatment for the mental illness"
- "10%"-"The estimated number of American adults age 65 and older who have a diagnosable depressive disorder"
- "10 - 20"-"The number of weeks psychotherapy treatments for depression usually lasts"

In the survey part, we had 10 questions with variables that affect the chances of having depression. When we show the bar chart, we intend to show some comparison in order inform the user which groups might need more attention because of the higher possibility to develop depression. For example, the followings are some conclusions that can be gathered from visualisations:

- Female have higher possibility to get depression than male
- people between 18-44 years age have higher rate than people over 65 years
- Education level in “some college” often have the highest depression rate
- As for family income, people below poverty threshold have the highest depression rate
- Uninsured people are more likely to get depression than insured ones
- Veteran are less likely to get depression than non-veteran
- Married ones have the lowest rate of depression and divorced or separated ones have the highest rate
- People born in US have higher rate of depression than born outside US which is interesting
- People live in non-metropolitan actually have higher rate of depression than ones live in metropolitan, which is surprising

A progress bar also shows the rate changing according to survey selections. The progress will be green if your depression rate decreases and turn red if your depression rate increases. By showing the final percentage to having depression, we want to increase people’s attention about this health problem.

4. References

[1] 6 Things Anyone Who Doesn't Understand Depression Should Know
http://themighty.com/2016/05/what-i-wish-people-knew-about-depression/

[2] 11 Statistics That Will Change The Way You Think About Depression
http://www.huffingtonpost.com/2015/01/20/depression-statistics_n_6480412.html

[3] **MHMD-4** Reduce the proportion of persons who experience major depressive episodes (MDEs)
https://www.healthypeople.gov/2020/topics-objectives/topic/mental-health-and-mental-disorders/objectives#4814