COM 480 – Data Visualization

Viz Hack

<Process Book>

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Introduction

Our goal is to develop an informative and visually appealing data visualization that serves as a powerful tool for understanding the global prevalence of smoking tobacco and its associated health implications. By catering to individuals in the fields of public health, policymaking, and research, our visualization plans to provide actionable information that can guide evidence-based decision-making and inspire targeted interventions. Ultimately, we hope that our project will contribute to reducing the burden of tobacco-related harm globally by promoting awareness, encouraging policy changes, and supporting efforts in tobacco control, health promotion, and disease prevention.

Motivation

The motivation behind our project originates from the urgent need to combat the global tobacco epidemic and its severe impact on public health. Despite widespread knowledge about the harmful effects of tobacco, millions of people continue to use tobacco products, leading to devastating health outcomes. Tobacco is responsible for a range of diseases, including cancer, respiratory disorders, cardiovascular conditions, and premature death. We aims to bring attention to the prevalence of smoking tobacco, shedding light on the regional and global trends over the past three decades. By visualizing the data in a compelling way, we hope to engage and educate a wide audience, including policy makers, public health professionals, and the general public.

Dataset

For this project, we chose to work on the tobacco-centric dataset: “Global Burden of Disease Study 2019 (GBD 2019) Smoking Tobacco Use Prevalence 1990-2019”. This dataset has been compiled and published by the Institute for Health Metrics and Evaluation (IHME), providing comprehensive and standardized information on smoking prevalence across countries, age groups, and genders. Due to the thorough quality checks performed by the IHME, the datasets are considered to be of high quality.

We performed data preprocessing and wrote scripts to generate CSV and JSON files automatically in order to build our visualizations from d3 library.

Challenges

The initial data required significant preprocessing as each type of visualization required its own type of data. The original dataset was augmented with additional data to expedite further preprocessing. Since we decided to display the data based on gender, year as well as region, we needed to collect data for all the demos. Therefore, data preprocessing part took us a considerable amount of time.

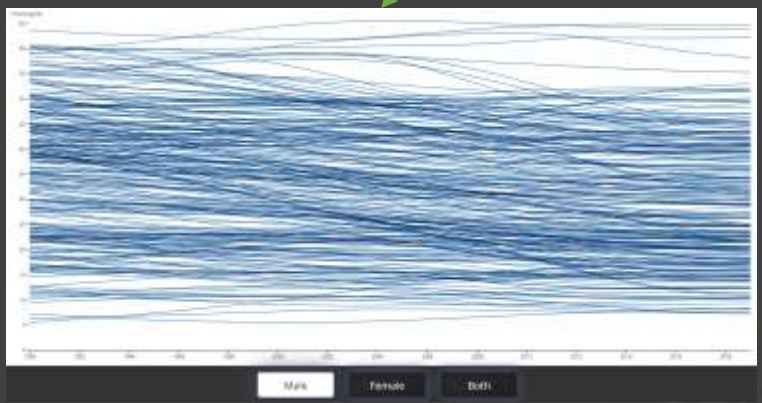
Multi-line Chart

· Design Evolution

The initial design of this visualization is to display the smoking prevalence series in all available countries across the years. Each line represents one separate country, which is able to track the tobacco usage evolution for all sexes.

However, the absence of a gender comparison hinders spectators from perceiving the distribution and evolution details, limiting their ability to generate valuable insights. To address this limitation, a deliberate enhancement has been proposed in the form of three buttons. The buttons enable the viewers to selectively display data for males only, females only, or both sexes.

By incorporating these buttons, the multiline chart gives a more subtle and comprehensive representation of smoking prevalence, better observes gender-specific disparities, and enables spectators to derive valuable insights from the visualization. These buttons are also implemented in other visualizations.



Final Design

Bar Chart Race

· Design Evolution

In this dynamic ranking chart, each bar represents a specific country, and its length corresponds to the number of smokers in that country. While it may initially appear similar to a multi-line chart due to the separation by country and year, presenting more than 200 countries in a bar chart can become overwhelming and difficult to understand. To address this, we have implemented a region filter that enables users to select a specific region of interest. This functionality allows for a focused examination of patterns concerning income or geographical location in relation to tobacco usage.

Since there is only a replay button above the chart to restart the animation, the bar chart race can't be stopped or resumed. In order to enhance its usability and clarity, we add a button to pause or play the animation at any time. Additionally, a scrubber bar is added to choose the year range freely. This empowers users to halt the animation when necessary or resume it as desired and facilitates the exploration of different years

Final Design

World Map

· Design Evolution

The world map displays divided geographical countries or regions that are colored in relation to daily smoking prevalence level. This interactive map provides a quick and intuitive outlook of the global variations in smoking rates, thereby enhancing our comprehension of tobacco usage worldwide. The first design and final implementation don't vary.

Sunburst

· Design Evolution

At first, this is only a possible visualization since it requires a lot of data processing. But eventually, we managed to implement it to showcase geographical features. The zoomable sunburst diagram contains two hierarchies to zoom in and zoom out: super-regions and sub-regional countries. Users can click on one segment to zoom in for that specific super-region or country and click on the center to zoom out. The size represents the number of daily smokers.

Website

· Design Evolution

Our objective is to craft an engaging and user-friendly interface that navigates spectators on an immersive journey through our data story.

Initially, the website design is very simple, containing only the main page with four static images of visualizations.

Later, we decide to employ a dark color palette to accentuate the mesmerizing smoke effects generated by the textual elements, combining the allure of dark colors, reminiscent of swirling smoke. The texts can be reappeared by clicking on the logo.

Each visualization has its own dedicated page, allowing for a focused and in-depth interaction. To provide a convenient overview and encourage exploration, we showcase dynamic thumbnails of each visualization on the main page.

Final Design

Peer Assessment

Ekaterina Sedykh: Skeleton website design, Multi-line chart, Bar chart race with scrubber, World map

Olena Zavertiaieva: Data preprocessing, General website design, Zoomable Sunburst, Gender selection button and year range button

Yuhan Bi: Exploratory data analysis, Main page design, Process book, Screencast Video