Narrative Visualization of Death Rates Worldwide

Link: https://skuppan2.github.io/NarrativeVisualization/

Source: https://github.com/skuppan2/NarrativeVisualization

**Summary:**

The chart shows the decreasing trend of death rate worldwide. Crude death rate indicates the number of deaths occurring during each year (between 1965 and 2021), per 1,000 population estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration. The crude death rate is calculated as the number of deaths in a given period divided by the population exposed to risk of death in that period. For human populations the period is usually one year and, if the population changes in size over the year, the divisor is taken as the population at the mid-year. The rate is usually expressed in terms of 1,000 people: for example, a crude death rate of 9.5 (per 1000 people) in a population of 1 million would imply 9500 deaths per year in the entire population. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration. Vital rates are based on data from birth and death registration systems, censuses, and sample surveys by national statistical offices and other organizations, or on demographic analysis. Data for the most recent year for some high-income countries are provisional estimates based on vital registers. The estimates for many countries are projections based on extrapolations of levels and trends from earlier years or interpolations of population estimates and projections from the United Nations Population Division.

**Deduction:**

Though the death rate trend was decreasing over the past few decades, the onset of COVID virus and subsequent mass deaths worldwide had changed this trend to change and the death rate started to increase after 2020. Though this impact of COVID on the death rate has not mentioned in the WDI data, we are inferring this change in death rate trend from the charts that are being displayed here.

**Development:**

This project with multiple charts shows this overall trend between 1965 and 2021 using a d3 line chart inside and svg using (.html, .js and .css) pages. The annotations are developed using the d3 annotations library. D3 tool tip is used to provide information about a specific year upon user request by hovering over. D3 extent function is used to dynamically vary the axes labels of the charts as each country data is different and projecting the chart on a single fixed axes will not display the line chart properly. Data used for all the scenes comes from WDI (World Bank) in real-time by their APIs, not using pre-loaded CSV file.

**Narrative Structure:**

Martini Glass narrative structure is used for this project. Three scenes added to show the worldwide death rate, USA and different country's line chart, the last scene in the visualization with a few controllable options that viewer can navigate different country's data, including filter to select a specific period.

**Visual Structure:**

* Three scenes in the visualization use the same template developed in a html. The top area of the template tells what data viewer see, followed by a detailed message.
* There are buttons for navigation between the scenes following the message.
* Plotting section (SVG) comes in the middle of the page, Legend describes the line chart color information to explain the meaning of each different color in the line chart.
* At the bottom, I added WDI indicator explanation section in all 3 scenes so when a viewer can double-check the meaning of current WDI indicator without moving to the previous page.

**Scenes:**

There were 3 scenes developed as part of this project. I have mentioned the nature and purpose of each scene below. Navigation buttons are added to help the user navigate between the scenes. The navigation also sets the default axes, period and the data required for the particular scene.

* **Scene 1 - Deaths per year - Worldwide - Past Decades (1965 till 2021)**

This scene shows the trends of death rates recorded worldwide between the years 1960 to 2021. As you can see in the plot, the worldwide death rates have been steadily decreasing, which imply that the overall life expectancy of people worldwide has been increasing over the past few decades.

* **Scene 2 - Deaths per year - Worldwide - Between 2017 and 2021**

This scene is a drill down of previous scene showing the trends of death rates recorded worldwide between the years 2017 and 2021.You can see that the COVID-19 had increased the death rate suddenly and change its decreasing course. The curve climbs up steadily indicating a considerable increase in deaths between the years 2020 and 2021.

* **Scene 3 - Deaths per year - Select Country**

This scene shows the death rate trends of each country based on the period (radio button) and country (drop-down) values selected by the user. The page loads with default country as USA and period as 1965-2021 but can display a customized view based on the user selection.

**Annotations:**

I added each year's death rate value as d3-tooltip on each datapoint's circle, so when a viewer performs mouseover event, tooltip pops up and shows what the death rate for that specific year was. d3- tooltip also provides 3-digit country code in the last scene and help the viewer to distinguish between multiple line charts. I've added annotation on the chart in Scene 2, to point out how the year 2019 had changed the death rate trend. The d3 annotation x and y values are hard-coded in the .js file because the point of change is a fixed pixel in Scene 2. Note and Subject are added to the annotation appropriately.

**Parameters:**

Current visualization implementation has a few parameters internally.

* Plotting works differently based on given 3-digit country code.
* Period selection for data navigation. D3 code calls different APIs to get separate dataset, and draws a chart with different color based on this selection.
  + Orange=Total Death rate
  + Blue =Death rate before COVID
  + Red=Death rate during COVID
* Based on current scene location, visualization page shows different option. For scenes 1 and 2, it doesn't show any option for viewer to filter, however the scene 3 shows period radio box and country selection drop-down.

**Triggers:**

* **Page navigation buttons:** D3 code internally keep track of current scene location and call the WDI API with Start Year and End Year parameters based on the scene chart.
* **Radio box:** Death rate during COVID radio box in scene 3 directly decide which parameter to use for data query.
* **Country select drop-down list:** Depends on which period and country viewer choose in scene 3, it also impacts the behavior of WDI API call, and D3 code either calls world data or each country's data. It also skews the chart appropriately by changing the x and y axes to fit in the data that is available for the country being queried and displayed. If the data doesn’t exist for a specific country in the WDI database, then an alert is displayed on top of the Scene 3 page.