CS7DS4 / CSU44065 Data Visualization 2023-24

Assignment 3

Part A: Visualization Analysis

Visualization 1:

New York City Weather in 1980 – by Edward Tufte

Data/Dataset Type:

This visualization is a representation of a time series dataset, focusing on the meteorological conditions in New York City during the 1980s. It incorporates daily readings of various weather parameters such as temperature, precipitation, and humidity.

Tasks:
- **Trend Identification:** This aspect of the visualization facilitates the examination of temperature fluctuations throughout the year. The use of cylindrical figures to display actual versus expected temperatures each month offers insights into seasonal weather patterns.
- **Comparative Analysis:** The visualization enables the juxtaposition of diverse meteorological elements. The contrast between the actual temperature (dark cylinders) and typical temperature ranges (shaded cylinders) for each month is a key feature.
- **Anomaly Detection:** Key to this visualization is the ability to pinpoint weather anomalies, which are represented by distinct graphical variations, such as unusual curves or non-uniform graph segments, indicative of atypical weather conditions in 1980.

Visual Encoding Channels:
- **Spatial Orientation:** The visualization is structured along a time series, with each day plotted along the x-axis and corresponding temperature values along the y-axis.
- **Chromatic Differentiation:** Varied color tones are employed to differentiate between actual temperature readings and historical norms, enhancing the visual distinction.
- **Geometric Representation:** The use of cylindrical shapes is a strategic choice to depict the disparity between the daily and normal temperature ranges throughout the year.

Visualization 2:

Music, Google, and Books – by Federica Fragapane

Data/Dataset Type:
This visualization integrates network and tree data structures to present a composite view of music, Google trends, and literary data. It encompasses a collection of 40 musicians and bands, detailing their popularity on Google trends from 2012 to 2017 and their representation in biographies in the British Library's catalog.

Tasks:
- **Pattern Recognition:** The visualization is designed to analyze and present trends in artist/group popularity, as reflected in Google searches and literary representation.
- **Comparative Evaluation:** It provides a mechanism for assessing different variables, such as the number of biographies (indicated by circle sizes) and countries' interest levels in the artists/groups (represented by color variations).
- **Outlier Identification:** The visualization is adept at highlighting exceptional cases, particularly in the context of Google trends, where the height of the heap indicates the number of groups/artists for which a country has the highest search interest levels.

Visual Encoding Channels:
- **Spatial Arrangement:** The organization of musicians along specific axes, correlating their first album release year with the total number of studio albums.
- **Color Utilization:** Different hues represent various countries, indicating the level of interest based on Google trend data.
- **Dimensional Attributes:** The scale of the circles is indicative of the number of biographies associated with each artist/group in the British Library's catalog, while the height of the heaps correlates with the prominence of interest level on Google trends.

Visualization 3:

Growing Family – by Nathan Yau:

Data/Dataset Type:
This visualization uses dynamic data drawn from a national survey on family growth, charting out timelines of childbirth across numerous families. It includes data points on the frequency of births over the years and the ages of mothers.

Tasks:
- **Distribution Illustration:** The main objective here is to depict the variation in childbirth timelines amongst different mothers, emphasizing the diversity in family sizes and timing.
- **Temporal Evolution:** This visualization tracks the evolution of family planning choices over time, focusing on maternal ages and the frequency of childbirth.
- **Demographic Comparison:** It facilitates an analysis of how family planning decisions vary across different age groups of mothers.

Visual Encoding Channels:
- **Horizontal Representation:** Maternal age is plotted on the horizontal axis, with the vertical positioning of dots corresponding to the number of children.
- **Color Coding:** The use of green dots effectively represents total birth counts at specific maternal ages.
- **Size and Placement:** The size and spatial arrangement of the bubbles are instrumental in encoding the total number of births experienced by mothers at varying ages, thereby conveying the range of family planning decisions.

Part B: Visualization Design

Global CO2 Emissions Over Time

Visualization Data:

This visualization, "Global CO2 Emissions Over Time," includes CO2 emissions data from various countries over several decades. The data sources are the Global Carbon Project and the Carbon Dioxide Information Analysis Center (CDIAC).

Detailed Visualization Tasks Used:

- **Longitudinal Trend Analysis:** Tracks the rise or fall in CO2 emissions globally and by individual countries.
- **Geographical and Comparative Analysis:** Enables comparative analysis of emissions between countries and regions.
- **Historical and Policy Context Integration:** Correlates emission data with key historical events and policy implementations.
- **Purpose and Functionality:** Serves both exploratory and explanatory purposes.

Visual Encoding Channels:

- **Advanced Line Charts:** Depict emission trends of each country with variations in line style and thickness.
- **Comprehensive Color Coding:** Differentiates between countries using a curated color palette.
- **Interactive Elements and Tooltips:** Provide additional data and annotations about momentous events.
- **Combination of Bar and Line Graphs:** Emphasizes total global emissions and highlights trends.

REFRENCES:

- **Global Carbon Project**: This organization's website provides extensive data on global emissions, including interactive visualizations and downloadable datasets. [Global Carbon Project](#)
- **Carbon Dioxide Information Analysis Center (CDIAC)**: CDIAC offers historical CO2 emission data, along with in-depth analysis and reports. [CDIAC Data](#)
- **Our World in Data - CO2 and Greenhouse Gas Emissions**: A comprehensive resource for data-driven insights on CO2 and other greenhouse gas emissions, featuring interactive visualizations and detailed analyses. [Our World in Data - CO2 Emissions](#)

✦ **Declaration:** "I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at http://www.tcd.ie/calendar. I have also completed the Online Tutorial on avoiding plagiarism 'Ready Steady Write,' located at http://tcdie.libguides.com/plagiarism/ready-steady-write."