# Covid19 Narrative Visualization

Babak Asadi | CS 416 | Summer 2024

**Messaging**

The primary message of my narrative visualization is to provide a comprehensive and insightful walkthrough of the COVID-19 pandemic's impact in the United States from January 26, 2020, to March 12, 2023. By leveraging the extensive dataset from John Hopkins University, the visualization aims to convey the progression of COVID-19 cases, deaths, and vaccination efforts across all states. This visualization helps users understand key trends, spikes, and the overall trajectory of the pandemic, including notable variants. Also, by providing a detailed narrative through data, the visualization underscores the importance of public health measures and vaccination campaigns. The narrative visualization includes an intro page summarizing the scenes to help users understand what they will see, better conveying the message and providing context for the detailed data presented in the subsequent scenes.

**Narrative Structure**

The narrative visualization follows the "interactive slide show" structure. The user is guided through four slides that analyze the COVID-19 data in the US, supporting the message mentioned above. In other words, this structure was chosen because it allows users to engage with the data in a step-by-step manner, providing a detailed exploration while also offering opportunities for interactive drill-downs. Each scene in the slide show presents a different aspect of the COVID-19 data, such as new cases, deaths, and vaccination rates. Users can navigate between scenes using navigation buttons (i.e., next/previous), ensuring a structured yet flexible experience. The interactive elements enable users to investigate specific data points and trends more deeply, enhancing their understanding.

**Visual Structure**

Each scene employs a distinct visual structure to ensure clarity and focus. In Scene 1, line charts are used to display new and cumulative COVID-19 cases over time, with dual y-axes to distinguish between the two metrics due to huge difference in scale of them. Scene 2 follows a similar approach for new and cumulative deaths, using color coding to differentiate between them. Scene 3 utilizes bar charts to compare COVID-19 cases and deaths across states at different times, facilitating easy comparison. Scene 4 incorporates line charts again, this time focusing on the evolution of cases, deaths, and vaccinations at both national and state levels, and how vaccination impacted number of cases and deaths. The consistent use of colors (e.g., blue for cases and red for deaths), labels, and axes ensures that users can easily navigate and interpret the data.

Transitions within and between scenes are smooth, with annotations in all scenes further guiding users on key insights and connecting the data across scenes. It should also be noted that hovering over data points in all scenes provides additional information, enhancing the user's ability to understand the data.

**Scenes**

The narrative visualization is divided into four scenes:

1. **Scene 1: COVID-19 Cases** - Displays new and cumulative COVID-19 cases over time in both linear and log-scales with significant peaks.
2. **Scene 2: COVID-19 Deaths** - Shows new and cumulative COVID-19 deaths in which significant peaks have been highlighted.
3. **Scene 3: State Comparisons** - Compares COVID-19 cases and deaths across different states using bar charts in different times. The bars have been sorted and annotation further highlights top 5 states in terms of number of cases and deaths.
4. **Scene 4: Vaccination Impact** - Examines the evolution of COVID-19 cases, deaths, and vaccination rates at national and state levels. Combined dynamic transition and annotation better illustrate the impact of starting vaccination.

The scenes are ordered chronologically and thematically to build a coherent narrative. Starting with the overall case trends, moving to deaths, comparing state-level impacts, and concluding with the effect of vaccinations provides a logical flow that aids user comprehension. Each scene includes smooth transitions to ensure that the viewer is not disoriented when moving from one scene to another.

**Annotations**

Annotations are crucial for contextualizing the data and guiding user attention. The annotation template follows a consistent format of putting important messages inside rectangles with black borders. In scenes 1 and 2 date-specific labels highlight significant events (e.g., initial peaks, variant surges). These annotations are strategically placed to emphasize critical points in the data, such as the introduction of the Omicron variant or the start of vaccinations. Also, a link provided for further information about different peaks in the US. In scene 3, a rectangle will shape around the top 5 states followed by their name and number of cases or deaths based on selected button by user. Scene 4 includes transitions where annotations are dynamically added to highlight key vaccination milestones and their impact on COVID-19 trends. These annotations support the messaging by providing context and narrative hooks that help users understand the implications of the data trends. Annotations also change within scenes to highlight different aspects as users interact with the data, ensuring that the narrative remains dynamic and informative.

**Parameters**

In each scene, various parameters are employed. The Date Range parameter defines the time period displayed, ensuring that users can view data over a specific timeframe. The Data Type parameter indicates whether cases, deaths, or vaccinations are shown, allowing users to switch between different aspects of the pandemic. The Scale Type parameter for example in Scene 1 determines whether the y-axis uses a linear or logarithmic scale, providing different perspectives on the data's magnitude. The Geographic Focus parameter allows the visualization to display data at either the national or state level. Also transitions used in all scenes are another important parameter (speed and delay), highlighting specific events on the chart. The Visibility State parameter controls which elements (such as lines and annotations) are visible at any given time, ensuring that the visualization remains clear and focused. In Scene 3, the Selected Time Index parameter specifies the time point for bar charts, helping to pinpoint specific dates or periods. These parameters collectively define the state of the visualization and control the elements within each scene. For example, changing the data type parameter in Scene 3 updates the bar chart to display either cases or deaths, depending on the user's selection.

**Triggers**

In each scene, navigation buttons serve as triggers to switch between scenes. For example, at the intro page, we have a “Start Visualization” button to move to the scenes. Additionally, clicking the "Next" or “Previous” buttons moves the user among scenes. The toggle scale button in Scene 1 (i.e., Switch Y-Scale) is another trigger that switches between linear and logarithmic scales, providing different views of the data. Data type selection buttons update the displayed data type, such as switching between new cases and cumulative cases, while the geographic focus dropdown updates the chart based on whether national or state-level data is selected. State selection dropdowns are triggers that update the chart based on the selected state, enabling users to focus on specific regions. The time slider is used to update the bar chart based on the selected time index, allowing users to view data from different dates. Hover events are also critical triggers, showing tooltips with additional information when users hover over data points in all scenes. Another trigger adopted from Prof. Hart’s lecture is the state of displaying lines in different scenes. For example, in Scene 1, nothing is displayed until the user selects one of the buttons. In contrast, when moving to Scene 2, the visualization of New Deaths starts automatically. The same concept has been applied to annotations.