**CSEN 396B – Data Visualization**  
**Assignment – 2**  
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**Story: Waste Management Efforts at Santa Clara University**

The provided dataset contains information about waste characterization events at Santa Clara University over eight years (2015 to 2023). By analyzing this data, we can gain insights into the university's waste management efforts and identify potential areas for improvement.

The visualizations created for this project effectively illustrate the distribution and trends of waste across different buildings, years, and waste streams. The interactive line and bar charts provide a comprehensive view of waste management practices over time.

**Design Rationale and Justification**

1. **Visualization Type**:
   * **Line Graph**: Used to represent temporal trends in waste generation. It allows users to see how waste quantities change over time, providing insights into seasonal patterns or the impact of specific events.
   * **Bar Graph**: Used for a comparative analysis of total waste by building and waste stream. It highlights which buildings and streams generate the most waste, making it easier to target high-impact areas for improvement.
2. **Interactivity**:
   * **Dropdown Menus**: Allow users to filter data by specific buildings and waste streams. This interactivity enables users to tailor the visualizations to their specific interests and questions, enhancing the exploratory analysis experience.
3. **Color Scheme**:
   * **Distinct Colors**: Different colors are used to distinguish between buildings and waste streams in the graphs. This makes it easy to compare and contrast data visually, ensuring clarity and readability.
4. **Annotations**:
   * **Dynamic Annotations**: The visualizations are designed to be dynamic, with labels and tooltips providing detailed information about each data point. This enhances the interpretability of the graphs and helps users understand the context of the data.
5. **Labels and Titles**:
   * **Clear Labels**: Each graph includes clear labels for the axes and a descriptive title. For example, the line graph has labels for "Date" and "Weight (lbs)", while the bar graph labels the x-axis with "Building" and the y-axis with "Total Weight (lbs)".
   * **Descriptive Titles**: Titles like "Waste Trends Over Time" and "Total Waste by Building and Stream" provide immediate context to the visualizations.
6. **Background and Aesthetics**:
   * **Background Image**: The application uses a background image that aligns with the environmental theme of waste management. This adds to the aesthetic appeal of the dashboard.
   * **Dark Theme**: The dark theme of the plots ensures good contrast and readability against the background, making the data stand out.
7. **Data Transformation**:
   * **Aggregation**: The data was aggregated to sum up the weights for each combination of building, year, and waste stream. This transformation allows for a clear representation of the overall weight distribution and trends across different categories.

**Effectiveness of the Design**

The chosen design effectively communicates the story by providing a detailed and interactive overview of waste distribution at Santa Clara University. The interactive elements allow stakeholders to filter and explore the data dynamically, uncovering patterns and trends that can inform waste management strategies.

**Examples**:

* **Identifying Hotspots**: Darker areas in the bar graph indicate higher waste generation, highlighting buildings or streams that may need targeted waste reduction efforts.
* **Temporal Analysis**: The line graph allows users to identify periods of high or low waste generation, which could correlate with specific events or operational changes on campus.

The combination of interactivity, clear labels, dynamic annotations, and a visually appealing design ensures that the visualizations are both informative and engaging. This project provides valuable insights that can guide the development of targeted strategies to improve sustainability and reduce waste at Santa Clara University.