

## COMP40610 Visual Exploration Tool Design Document

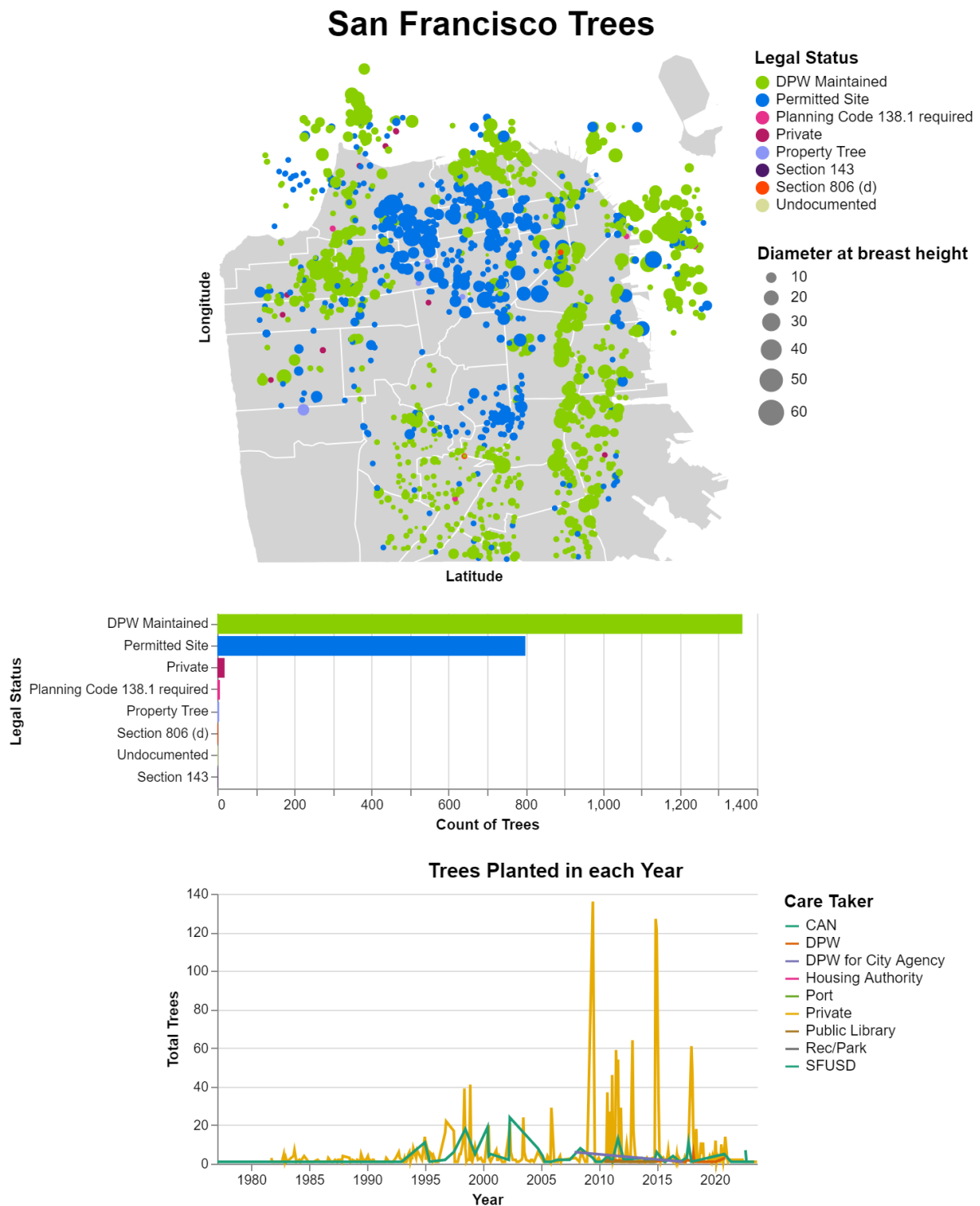
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*Title:*

San Francisco Trees

*Screenshot:*



### *Dataset overview:*

This section should detail the dataset you used, where it came from, and any manipulation you have performed on the dataset.

This is an adaptation of a [San Francisco Department of Public Works](#). The original dataset provides details on List of Department of Public Works maintained street trees including: Planting date, legal status, diameter of breast height and location. In the data pre-processing phase, Python scripts were employed to clean the dataset, removing null values and enhancing its usability : [new version of this dataset](#).

### *Design considerations*

This should provide an overview of your visualisation, a discussion of why you used specific encoding / interaction options, and the pros/cons of your visualisation vs alternatives.

The primary goal of this visualization tool is to explore the relationship between the characteristics of trees such as Legal Status of the tree, Diameter of the breast height, year in which they were planted and care taker of the tree according to their geographic distribution in San Francisco.

#### 1. Dot Plot Map:

- **Purpose:** Show the distribution of trees in San Francisco along with their Legal Status and, Diameter of the breast height.
- **Encoding/Interaction Choices:**
  - Dot plot map with each tree represented by a dot.
  - Color represents legal status, and size is based on the diameter at breast height (dbh). Used color blind accessible palette for nominal range.
  - I used geoJSON from the [San Francisco neighbourhood boundary source](#).
  - Hovering over each dot displays a tooltip with detailed information about each tree such as Species Type, Address, Tree ID, Location, Care Taker and Care Assistant.
  - Cross-filtering is implemented through interactions between the dot plot map, bar chart, and line chart.
  - Click on legend to view the distribution of trees across san Francisco for a specific legal status.
  - Use brushing to filter or view specific coordinates.
- **Pros/Cons:**
  - Pros: Clear geographic distribution, insights into legal status and tree size.
  - Cons: Over plotting issue in areas.
- **Alternative Consideration:**
  - Aggregating trees into area-level summaries for a clearer view.
  - Could have provided zoom and pan functionality to zoom in where the dots are denser but having interactive legend would solve the issue and help us to view specific legal status without crowded dots.

#### 2. Bar Chart:

- **Purpose:** Display the count of street trees for each legal status.
- **Encoding/Interaction Choices:**
  - Bar chart sorted by the count of trees for each legal status in descending order.
  - Color indicates legal status.

- Cross-filtering with the dot plot map and line chart.
  - Click on specific legal status on bar chart to view their distribution on dot map.
  - Tooltips provide detailed information about count of trees and legal status.
- **Pros/Cons:**
    - Pros: Clear comparison of tree count for different legal statuses.
    - Cons: Sorting by count might obscure specific legal statuses in certain scenarios.
  - **Alternative Consideration:**
    - Grouped bar charts or small multiples for a detailed comparison.
    - Might have used radial plot instead of horizontal bar chart because the exact number of trees can be explicitly displayed with the dimensional overview but there are very few counts of trees which seems not visible.
    - Could have used vertical bar chart but the label is too long and will be difficult to grasp with angled label names.
3. **Line Chart:**
- **Purpose:** Show the trend of trees planted over the years along with the care taker of the trees.
  - **Encoding/Interaction Choices:**
    - Line chart depicting the total number of trees planted each year.
    - Color represents care taker.
    - Cross-filtering with the dot plot map and bar chart.
    - Click on legend to view the trend of trees over the years for a specific care taker.
    - Used brushing to view the count of trees under different legal status from bar chart and also their distribution on dot map.
    - Tooltips provide detailed information about year and month, and caretaker.
    - Again, used color blind safe palette.
  - **Pros/Cons:**
    - Pros: Clear trend visualization, insights into planting patterns.
    - Cons: overplotting in densely planted areas.
  - **Alternative Consideration:**
    - Aggregating planting data to a coarser level for better clarity.

**Interaction consideration:** The interaction between the dot plot map, bar chart, and line chart is achieved through cross-filtering. Selections in one chart dynamically update the data displayed in the others. Clicking on a bar, filters the data in a dot map, allowing users to focus on trees with a specific legal status. Users can interactively select a range on the x-axis (year) using a brush, filtering data in other charts to show trees planted within the selected time frame.

Use brushing on latitude and longitude to see the number of trees under legal status along with the planted year and caretaker.

Legends for legal status and caretaker are interactive, allowing users to selectively include or exclude categories from the visualization by clicking on the legend items which is achieved through legend binding.

These interactive features enhance the exploratory nature of the visualization, enabling users to focus on specific subsets of the data, compare different legal statuses, understand planting trends, and inspect individual trees for detailed information.

#### **Audience:**

Urban Planners:

Urban planners can utilize the Dot Plot Map to gain insights into the spatial distribution of trees, helping them identify areas with high or low tree density. The tool offers a geographic overview, enabling planners to make informed decisions about strategic tree planting initiatives and urban development projects.

#### City Officials:

City officials responsible for tree management can use the tool to assess the dominance of specific legal statuses, plan maintenance efforts, and allocate resources effectively.

The cross-filtering feature enables officials to focus on specific subsets of data, making the tool a practical solution for optimizing tree care strategies.

#### **Interesting Observations:**

The dot plot map highlights the concentration of trees and their legal status in different areas of San Francisco.

The bar chart indicates the dominance of a particular legal status among the trees.

The line chart reveals trends in tree planting over the years and how it varies across different care taker.