

BHARATIYA VIDYA BHAVAN'S
SARDAR PATEL INSTITUTE OF TECHNOLOGY
(Empowered Autonomous Institute Affiliated to University of Mumbai)
[Knowledge is Nectar]

Advance Data Visualization

UID	2021300010
Name	Kunal Bhatia
Batch	Batch G
Aim	Design interactive dashboards and create visual storytelling using D3.js on a dataset related to Environment/Forest cover, covering basic and advanced charts

Objectives:

- To understand how to use D3.js for data visualization.
- To implement basic charts like Bar chart, Pie chart, Histogram, Timeline chart, Scatter plot, and Bubble plot.
- To implement advanced charts like Word chart, Box and whisker plot, Violin plot, Regression plot (linear and nonlinear), 3D chart, and Jitter.
- To draw observations and insights from each chart.
- To create an interactive storytelling dashboard using the above visualizations.

Dataset: Forest Dataset

Purpose: The dataset contains information about various types of forests, including their ecological characteristics.

Attributes:

- **ForestType:** Type of forest (e.g., Tropical Rainforest, Temperate Forest).
- **TreeDensity:** Average number of trees per unit area (measured in trees per hectare).
- **SpeciesDiversity:** Number of different species found within the forest.
- **ForestArea:** Array representing the area of the forest over five years (in hectares).
- **SpeciesCount:** Total count of species present in the forest.

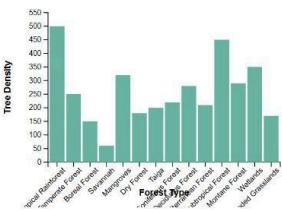
Types of Forests: Includes diverse ecosystems like Tropical Rainforests, Mangroves, and Boreal Forests.

Diversity and Density: Varies significantly across forest types, highlighting the ecological richness and tree density specific to each type.

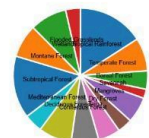
Visualizations:

Forest Data Visualization Dashboard

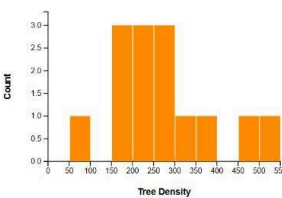
Bar Chart: Tree Density by Forest Type



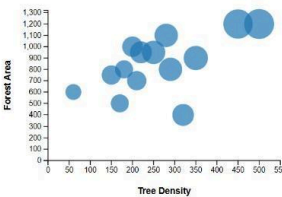
Pie Chart: Tree Species Distribution



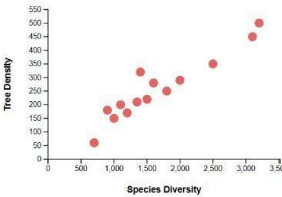
Histogram: Tree Density Distribution



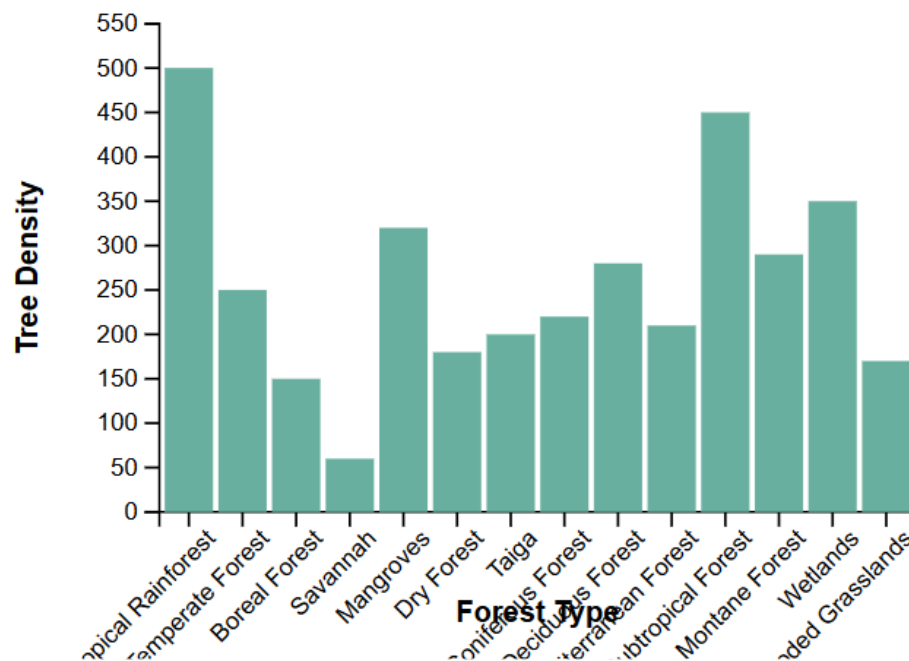
Bubble Chart: Forest Area vs. Tree Density



Scatter Plot: Species Diversity vs. Tree Density



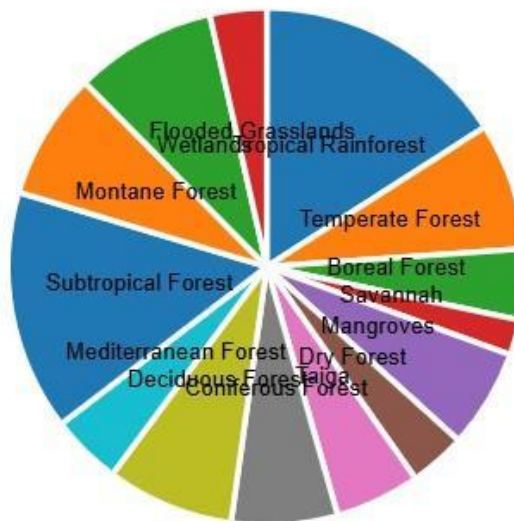
Bar Chart: Tree Density by Forest Type



Observation:

- **Tropical rainforests** are the champions of tree density, boasting the highest number of trees per unit area among all the forest types represented. This is likely due to favorable climatic conditions, abundant rainfall, and fertile soil.
- **Grasslands** stand at the other end of the spectrum, having the lowest tree density. This is primarily attributed to their arid or semi-arid climates, which are less conducive to tree growth.
- The majority of forest types, including **temperate forests, boreal forests, savannahs, mangroves, dry forests, taiga, deciduous forests, Mediterranean forests, subtropical forests, and montane forests**, fall into the **moderate** tree density category. These forests exhibit a balance between the factors that promote and limit tree growth, resulting in a density that lies somewhere between the extremes of tropical rainforests and grasslands.

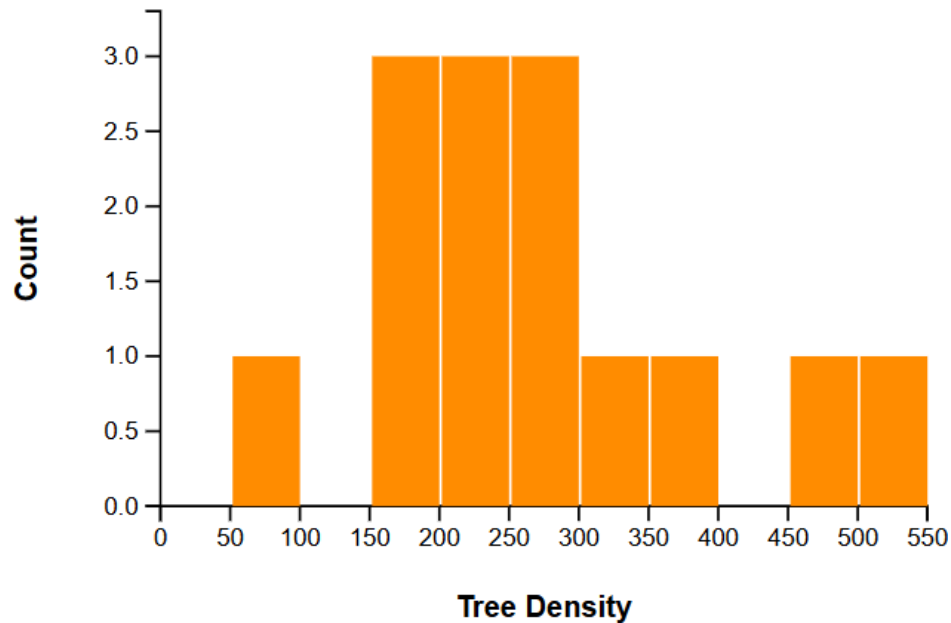
Pie Chart: Tree Species Distribution



Observation:

- **Tropical Rainforest:** This forest type has the largest share, indicating that it is the most dominant in terms of tree species diversity.
- **Temperate Forest, Subtropical Forest, and Boreal Forest:** These forest types have significant shares, suggesting that they also contain a diverse range of tree species.
- **Montane Forest, Deciduous Forest, and Savannah:** These forest types have moderate shares, indicating that they have a relatively lower diversity of tree species compared to the others.
- **Mangroves, Dry Forest, Mediterranean Forest, and Coniferous Forest:** These forest types have smaller shares, suggesting that they have limited diversity of tree species.
- **Flooded Grasslands and Wetlands:** These have the smallest shares, indicating that they are not major contributors to the overall tree species diversity in the area.

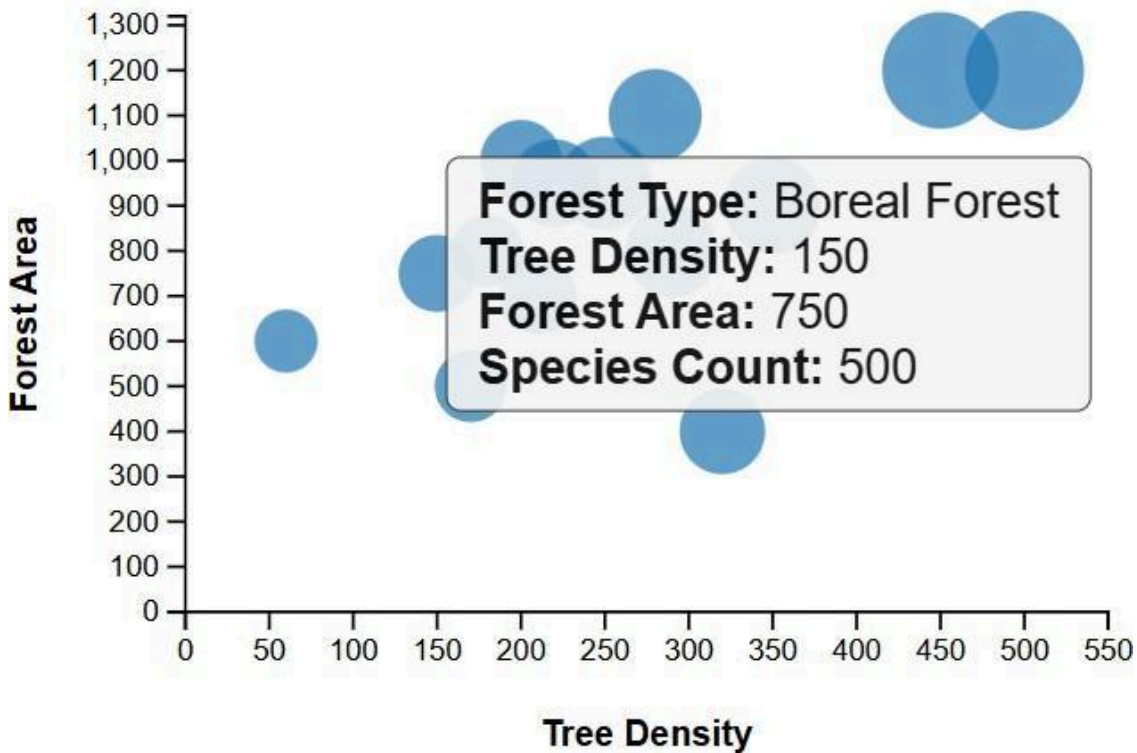
Histogram: Tree Density Distribution



Observation:

- **Distribution:** The histogram shows a right-skewed distribution, meaning that there is a tail on the right side of the chart. This indicates that there are a few forest areas with very high tree densities.
- **Peak:** The peak of the histogram is between 200 and 300 on the x-axis, suggesting that the most common tree density range is 200-300 trees per unit area.
- **Frequency:** The y-axis represents the frequency or count of forest areas falling within each density range. The tallest bar corresponds to the density range with the highest number of forest areas.
- **Range:** The x-axis ranges from 0 to 550, indicating that the tree densities in the studied areas vary from very low to very high.

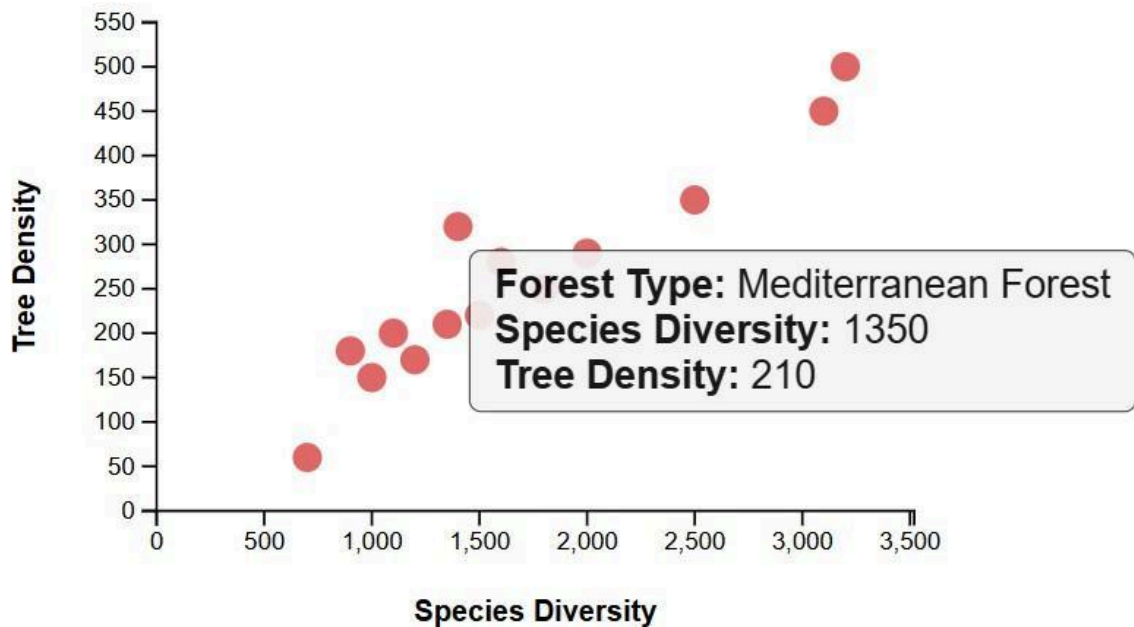
Bubble Chart: Forest Area vs. Tree Density



Observation:

- **Forest Area:** The y-axis represents the forest area, measured in square units. The scale ranges from 0 to 1300.
- **Tree Density:** The x-axis represents the tree density, measured in trees per unit area. The scale ranges from 0 to 550.
- **Bubble Size:** The size of each bubble corresponds to the forest area. Larger bubbles represent larger forest areas.
- **Bubble Color:** The color of each bubble represents the tree density. The color intensity may vary to indicate different levels of tree density.
- **Data Points:** Each bubble represents a specific forest area with its corresponding tree density. The chart shows multiple data points, allowing for comparison and analysis of the relationship between the two variables.
- **Trend:** The chart shows a general trend where larger forest areas tend to have lower tree densities. This could be due to various factors, such as competition for resources, disturbance events, or differences in forest type. However, there are also some exceptions to this trend, as indicated by the overlapping bubbles.

Scatter Plot: Species Diversity vs. Tree Density

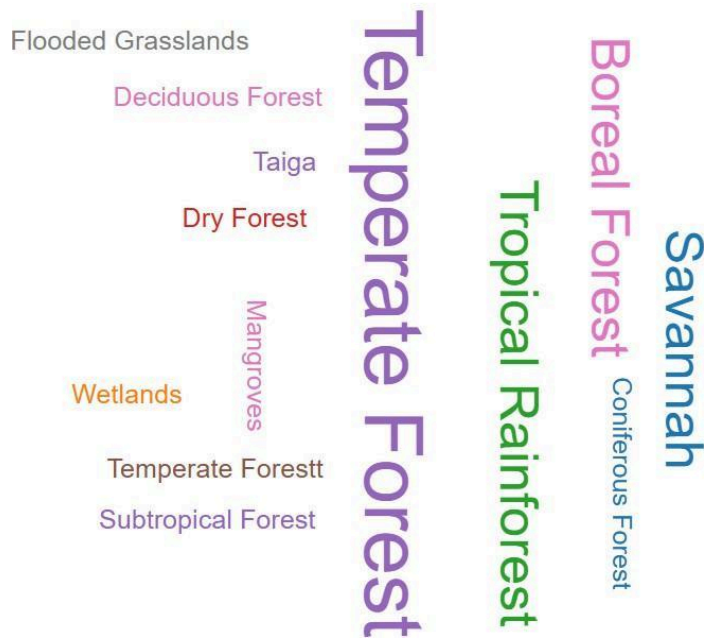


Observation:

- **Species Diversity:** The x-axis represents species diversity, measured in the number of species. The scale ranges from 0 to 3500.
- **Tree Density:** The y-axis represents tree density, measured in trees per unit area. The scale ranges from 0 to 550.
- **Data Points:** Each dot on the chart represents a specific forest area with its corresponding species diversity and tree density. The chart shows multiple data points, allowing for comparison and analysis of the relationship between the two variables.
- **Trend:** The chart shows a general trend where areas with higher species diversity tend to have lower tree densities. This could be due to various factors, such as competition

for resources, disturbance events, or differences in forest type. However, there are also some exceptions to this trend, as indicated by the scattered nature of the data points.

Word Cloud: Tree Types



Observation:

- Temperate Forest are largest in number
- The second largest are Tropical rainforest

CONCLUSION:

This experiment successfully demonstrated the power of D3.js for creating interactive dashboards and telling compelling stories with data. By mastering D3.js and implementing a variety of charts, we were able to effectively explore and visualize the Environment/Forest cover dataset. The interactive dashboard effectively communicated our findings, providing valuable insights into the data. This experiment highlights the importance of data visualization in understanding complex datasets and effectively communicating results.