



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

## Expt 8 : Designing Interactive Dashboards and Storytelling using D3.js on Environment/Forest Cover Dataset

Name: Anish Gade

UID: 2021700022

Aim:

To design interactive dashboards and create visual storytelling using D3.js on a dataset related to Environment/Forest cover, covering basic and advanced charts.

Objectives:

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

Expected Outcomes:

1. Ability to create various types of visualizations using D3.js.
2. Interactive dashboards demonstrating different types of charts.
3. Insights from the Environment/Forest cover dataset through visual storytelling.

Code:

```
<!DOCTYPE html>
<html>
<head>
  <title>Data Exploration Dashboard</title>
  <script src="https://d3js.org/d3.v6.min.js"></script>
  <style>
    body {
      font-family: Arial, sans-serif;
      margin: 0;
      padding: 20px;
      background-color: #f5f5f5;
    }

    h1 {
      text-align: center;
      color: #333;
      padding: 20px 0;
      margin-bottom: 30px;
      background-color: #fff;
      box-shadow: 0 2px 4px rgba(0,0,0,0.1);
    }
  </style>
</head>
```



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

```
.dashboard-container {  
  display: grid;  
  grid-template-columns: repeat(2, 1fr);  
  gap: 30px;  
  max-width: 1400px;  
  margin: 0 auto;  
}
```

```
.chart-container {  
  background: white;  
  border-radius: 8px;  
  padding: 20px;  
  box-shadow: 0 2px 4px rgba(0,0,0,0.1);  
}
```

```
.chart-container h2 {  
  margin-top: 0;  
  margin-bottom: 20px;  
  color: #444;  
  font-size: 1.2em;  
  text-align: center;  
}
```

```
/* Make charts responsive */  
.chart {  
  width: 100%;  
  height: 400px;  
  overflow: hidden;  
}
```

```
/* Axis styling */  
.axis-label {  
  font-size: 12px;  
  fill: #666;  
}
```

```
.axis path,  
.axis line {  
  stroke: #ccc;  
}
```

```
/* Responsive design */  
@media (max-width: 1200px) {  
  .dashboard-container {  
    grid-template-columns: 1fr;  
  }  
}
```

```
/* Tooltip styling */  
.tooltip {  
  position: absolute;  
  padding: 8px;
```



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

```
background: rgba(0, 0, 0, 0.8);
color: white;
border-radius: 4px;
font-size: 12px;
pointer-events: none;
}
</style>
</head>
<body>
  <h1>Plastic Waste Analysis Dashboard</h1>

  <div class="dashboard-container">
    <div class="chart-container">
      <h2>Top 10 Countries by Plastic Waste</h2>
      <div id="bar-chart" class="chart"></div>
    </div>

    <div class="chart-container">
      <h2>Distribution of Waste Sources</h2>
      <div id="pie-chart" class="chart"></div>
    </div>

    <div class="chart-container">
      <h2>Recycling Rate vs. Per Capita Waste</h2>
      <div id="scatter-plot" class="chart"></div>
    </div>

    <div class="chart-container">
      <h2>Waste Impact Analysis</h2>
      <div id="bubble-chart" class="chart"></div>
    </div>
  </div>

  <script>
    // Create tooltip div
    const tooltip = d3.select("body")
      .append("div")
      .attr("class", "tooltip")
      .style("opacity", 0);

    d3.csv('data.csv').then(function(data) {
      // Sort data by Total_Plastic_Waste_MT and get top 10
      const top10Data = data
        .sort((a, b) => b.Total_Plastic_Waste_MT - a.Total_Plastic_Waste_MT)
        .slice(0, 10);

      createBarChart(top10Data);
      createPieChart(data);
      createScatterPlot(data);
      createBubbleChart(data);
    });
  </script>
```



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

```
function createBarChart(data) {
  const margin = {top: 20, right: 20, bottom: 60, left: 60};
  const width = document.getElementById('bar-chart').clientWidth - margin.left -
margin.right;
  const height = 400 - margin.top - margin.bottom;

  const svg = d3.select("#bar-chart")
    .append("svg")
    .attr("width", width + margin.left + margin.right)
    .attr("height", height + margin.top + margin.bottom)
    .append("g")
    .attr("transform", `translate(${margin.left},${margin.top})`);

  const x = d3.scaleBand()
    .range([0, width])
    .padding(0.1);
  const y = d3.scaleLinear()
    .range([height, 0]);

  x.domain(data.map(d => d.Country));
  y.domain([0, d3.max(data, d => +d.Total_Plastic_Waste_MT)]);

  // Add bars
  svg.selectAll(".bar")
    .data(data)
    .enter()
    .append("rect")
    .attr("class", "bar")
    .attr("x", d => x(d.Country))
    .attr("width", x.bandwidth())
    .attr("y", d => y(d.Total_Plastic_Waste_MT))
    .attr("height", d => height - y(d.Total_Plastic_Waste_MT))
    .attr("fill", "steelblue")
    .on("mouseover", function(event, d) {
      tooltip.transition()
        .duration(200)
        .style("opacity", .9);
      tooltip.html(`${d.Country}<br/>${d.Total_Plastic_Waste_MT} MT`)
        .style("left", (event.pageX) + "px")
        .style("top", (event.pageY - 28) + "px");
    })
    .on("mouseout", function(d) {
      tooltip.transition()
        .duration(500)
        .style("opacity", 0);
    });

  // Add X axis
  svg.append("g")
    .attr("transform", `translate(0,${height})`)
    .call(d3.axisBottom(x))
    .selectAll("text")
```



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

```
.attr("transform", "rotate(-45)")
.style("text-anchor", "end");

// Add Y axis
svg.append("g")
  .call(d3.axisLeft(y));

// Add labels
svg.append("text")
  .attr("class", "axis-label")
  .attr("text-anchor", "middle")
  .attr("x", width/2)
  .attr("y", height + margin.bottom - 5)
  .text("Country");

svg.append("text")
  .attr("class", "axis-label")
  .attr("text-anchor", "middle")
  .attr("transform", "rotate(-90)")
  .attr("y", -margin.left + 20)
  .attr("x", -height/2)
  .text("Total Plastic Waste (MT)");
}

function createPieChart(data) {
  const width = document.getElementById('pie-chart').clientWidth;
  const height = 400;
  const radius = Math.min(width, height) / 2 - 40;

  const svg = d3.select("#pie-chart")
    .append("svg")
    .attr("width", width)
    .attr("height", height)
    .append("g")
    .attr("transform", `translate(${width/2},${height/2})`);

  // Aggregate data by Main_Sources
  const sourceData = Array.from(d3.group(data, d => d.Main_Sources),
    ([key, value]) => ({
      source: key,
      count: value.length
    }));

  const color = d3.scaleOrdinal()
    .domain(sourceData.map(d => d.source))
    .range(d3.schemeCategory10);

  const pie = d3.pie()
    .value(d => d.count);

  const arc = d3.arc()
    .innerRadius(0)
```



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

```
.outerRadius(radius);
```

```
// Add slices
```

```
const arcs = svg.selectAll("arc")
```

```
.data(pie(sourceData))
```

```
.enter()
```

```
.append("g");
```

```
arcs.append("path")
```

```
.attr("d", arc)
```

```
.attr("fill", d => color(d.data.source))
```

```
.attr("stroke", "white")
```

```
.style("stroke-width", "2px")
```

```
.on("mouseover", function(event, d) {
```

```
  tooltip.transition()
```

```
    .duration(200)
```

```
    .style("opacity", .9);
```

```
  tooltip.html( `${d.data.source}<br/>${d.data.count} countries` )
```

```
    .style("left", (event.pageX) + "px")
```

```
    .style("top", (event.pageY - 28) + "px");
```

```
})
```

```
.on("mouseout", function(d) {
```

```
  tooltip.transition()
```

```
    .duration(500)
```

```
    .style("opacity", 0);
```

```
});
```

```
// Add labels
```

```
const labelArc = d3.arc()
```

```
.innerRadius(radius * 0.6)
```

```
.outerRadius(radius * 0.6);
```

```
arcs.append("text")
```

```
.attr("transform", d => `translate(${labelArc.centroid(d)})`)
```

```
.attr("dy", "0.35em")
```

```
.text(d => d.data.source)
```

```
.style("text-anchor", "middle")
```

```
.style("font-size", "12px")
```

```
.style("fill", "fff");
```

```
}
```

```
function createScatterPlot(data) {
```

```
  const margin = {top: 20, right: 20, bottom: 60, left: 60};
```

```
  const width = document.getElementById('scatter-plot').clientWidth - margin.left -  
margin.right;
```

```
  const height = 400 - margin.top - margin.bottom;
```

```
  const svg = d3.select("#scatter-plot")
```

```
    .append("svg")
```

```
    .attr("width", width + margin.left + margin.right)
```

```
    .attr("height", height + margin.top + margin.bottom)
```

```
    .append("g")
```



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

```
.attr("transform", `translate(${margin.left},${margin.top})`);

const x = d3.scaleLinear()
  .domain([0, d3.max(data, d => +d.Recycling_Rate)])
  .range([0, width]);

const y = d3.scaleLinear()
  .domain([0, d3.max(data, d => +d.Per_Capita_Waste_KG)])
  .range([height, 0]);

// Add dots
svg.selectAll("dot")
  .data(data)
  .enter()
  .append("circle")
  .attr("cx", d => x(d.Recycling_Rate))
  .attr("cy", d => y(d.Per_Capita_Waste_KG))
  .attr("r", 5)
  .style("fill", d => {
    switch(d.Coastal_Waste_Risk) {
      case "Very_High": return "#ff0000";
      case "High": return "#ff9900";
      case "Medium": return "#ffff00";
      default: return "#00ff00";
    }
  })
  .style("opacity", 0.7)
  .on("mouseover", function(event, d) {
    tooltip.transition()
      .duration(200)
      .style("opacity", .9);
    tooltip.html(`${d.Country}<br/>Recycling: ${d.Recycling_Rate}%<br/>Per  
Capita: ${d.Per_Capita_Waste_KG} kg`)
      .style("left", (event.pageX) + "px")
      .style("top", (event.pageY - 28) + "px");
  })
  .on("mouseout", function(d) {
    tooltip.transition()
      .duration(500)
      .style("opacity", 0);
  });

// Add X axis
svg.append("g")
  .attr("transform", `translate(0,${height})`)
  .call(d3.axisBottom(x));

// Add Y axis
svg.append("g")
  .call(d3.axisLeft(y));

// Add labels
```



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

```
svg.append("text")
  .attr("class", "axis-label")
  .attr("text-anchor", "middle")
  .attr("x", width/2)
  .attr("y", height + margin.bottom - 5)
  .text("Recycling Rate (%)");

svg.append("text")
  .attr("class", "axis-label")
  .attr("text-anchor", "middle")
  .attr("transform", "rotate(-90)")
  .attr("y", -margin.left + 20)
  .attr("x", -height/2)
  .text("Per Capita Waste (kg)");
}

function createBubbleChart(data) {
  const margin = {top: 20, right: 20, bottom: 60, left: 60};
  const width = document.getElementById('bubble-chart').clientWidth - margin.left -
margin.right;
  const height = 400 - margin.top - margin.bottom;

  const svg = d3.select("#bubble-chart")
    .append("svg")
    .attr("width", width + margin.left + margin.right)
    .attr("height", height + margin.top + margin.bottom)
    .append("g")
    .attr("transform", `translate(${margin.left},${margin.top})`);

  const x = d3.scaleLinear()
    .domain([0, d3.max(data, d => +d.Total_Plastic_Waste_MT)])
    .range([0, width]);

  const y = d3.scaleLinear()
    .domain([0, d3.max(data, d => +d.Per_Capita_Waste_KG)])
    .range([height, 0]);

  const radius = d3.scaleSqrt()
    .domain([0, d3.max(data, d => +d.Total_Plastic_Waste_MT)])
    .range([4, 40]);

  // Add bubbles
  svg.selectAll("circle")
    .data(data)
    .enter()
    .append("circle")
    .attr("cx", d => x(d.Total_Plastic_Waste_MT))
    .attr("cy", d => y(d.Per_Capita_Waste_KG))
    .attr("r", d => radius(d.Total_Plastic_Waste_MT))
    .style("fill", d => {
      switch(d.Coastal_Waste_Risk) {
        case "Very_High": return "#ff0000";
```





Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

```
case "High": return "#ff9900";
case "Medium": return "#ffff00";
default: return "#00ff00";
}
})
.style("opacity", 0.7)
.on("mouseover", function(event, d) {
  tooltip.transition()
    .duration(200)
    .style("opacity", .9);
  tooltip.html(` ${d.Country}<br/>Total Waste: ${d.Total_Plastic_Waste_MT}
MT<br/>Per Capita: ${d.Per_Capita_Waste_KG} kg<br/>Risk: ${d.Coastal_Waste_Risk}`)
    .style("left", (event.pageX) + "px")
    .style("top", (event.pageY - 28) + "px");
})
.on("mouseout", function(d) {
  tooltip.transition()
    .duration(500)
    .style("opacity", 0);
});

// Add X axis
svg.append("g")
  .attr("transform", `translate(0,${height})`)
  .call(d3.axisBottom(x));

// Add Y axis
svg.append("g")
  .call(d3.axisLeft(y));

// Add labels

svg.append("text")
  .attr("class", "axis-label")
  .attr("text-anchor", "middle")
  .attr("x", width/2)
  .attr("y", height + margin.bottom - 5)
  .text("Total Plastic Waste (MT)");

svg.append("text")
  .attr("class", "axis-label")
  .attr("text-anchor", "middle")
  .attr("transform", "rotate(-90)")
  .attr("y", -margin.left + 20)
  .attr("x", -height/2)
  .text("Per Capita Waste (kg)");
}

</script>
</body>
</html>
```



Bharatiya Vidya Bhavan's

# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

## Output:



## Summary:

In this lab, we created an interactive dashboard using D3.js for data visualization on an Environment/Forest cover dataset. We explored both basic and advanced chart types and built a storytelling dashboard to provide insights into forest cover trends and distributions.

## Conclusion:

D3.js is a powerful library for creating dynamic, interactive data visualizations. By implementing various chart types, we could extract meaningful insights about forest cover, trends, and patterns.