

# Laboratory Exercises #4

## Matrix Diagram Plots

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Do this individually.

Create a matrix diagram plot.

Source Code: <https://github.com/kiyojiii/ITD112>

### Matrix Diagram for Plots

	Description	Uses	Design Practices	Example
A. Comparison Plots				
Line Chart	Line charts are used to display quantitative values over a continuous time period and show information as a series. They are ideal for time series data connected by straight-line segments. The value being measured is placed on the y-axis, while the x-axis represents the timescale.	Great for comparing multiple variables and visualizing trends for both single and multiple variables, especially for datasets with many time periods (more than 10).  Suitable for showing continuous data over time.	Avoid too many lines per chart to maintain clarity. Adjust the scale to make the trend clearly visible. Use a legend when plotting multiple variables to describe each variable.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Bar Chart	Bar charts use rectangular bars to represent data values. They are suitable for comparing different categories or discrete data points.	Ideal for comparing discrete data, such as comparing sales figures for different products or the performance of different teams.	Ensure that the bars are evenly spaced and of the same width. Label the bars or axes clearly to help with interpretation.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>

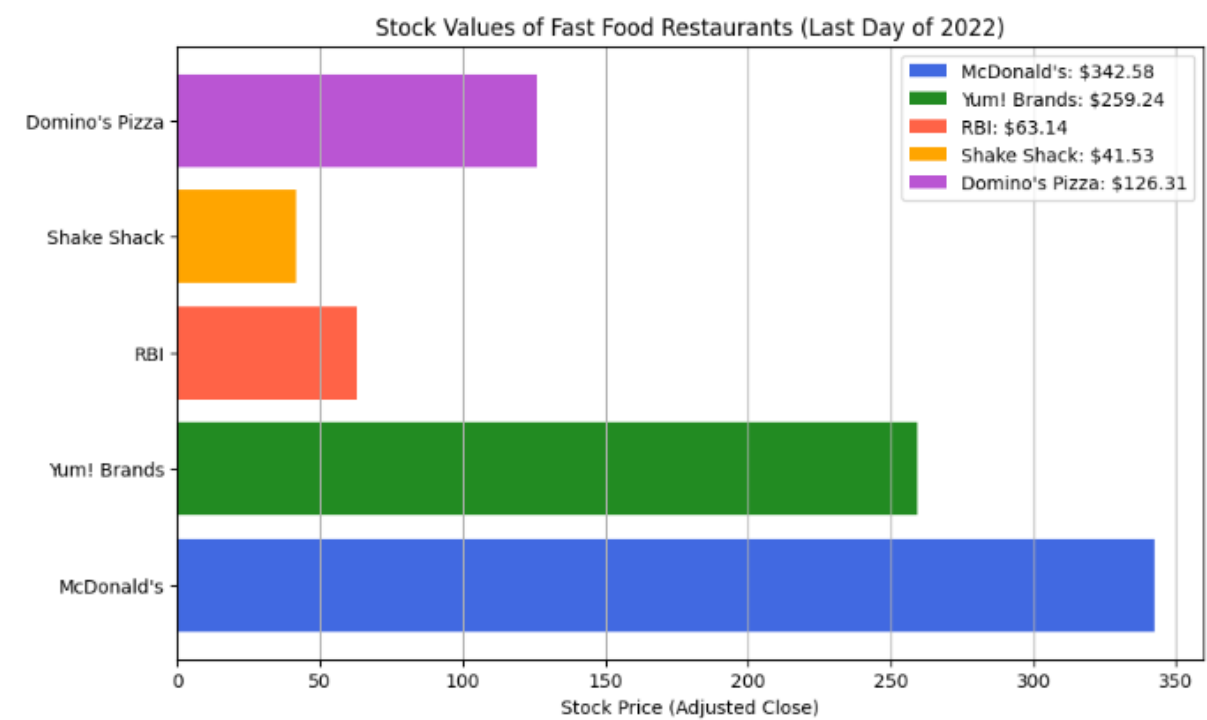
		Suitable for showing data distribution and composition.	Use colors or patterns to differentiate between bars.	
Radar Chart	Radar charts, also known as spider charts or star plots, use a circular grid to represent data. They are useful for comparing multiple variables on a common scale.	Comparing multivariate data, such as assessing the performance of different athletes in various sports categories.  Useful for visualizing data with multiple dimensions.	Ensure that the axis labels and scales are clearly defined. Plot multiple data series using different colors or styles for easy comparison. Avoid overcrowding the chart with too many variables.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
<b>B. Relation Plots</b>				
Scatter Plot	Scatter plots are used to visualize the relationship between two numerical variables. Each data point is represented as a point on the graph with its x and y coordinates.	To show the distribution and relationship between two continuous variables.  Identify patterns, clusters, or outliers in the data.  Explore correlations between variables.	Use clear labels for both axes to indicate what each variable represents. Adjust the color, size, or shape of the data points to display additional information, if needed. Add a title to describe the purpose of the scatter plot.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Bubble Plot	A bubble plot is an extension of the scatter plot, where a third variable is represented using the size of the data points. It's used to visualize the relationship between three numerical variables.	To show the relationship between two variables, similar to a scatter plot, with an additional dimension represented by the size of the bubbles.  Useful for highlighting the importance or magnitude of data points.	Use a clear legend to describe the meaning of the bubble sizes. Scale the bubble sizes appropriately to emphasize the third variable. Use color or transparency to convey additional information if needed.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Correlogram	A correlogram is a visual representation of the correlations between multiple numerical variables. It typically takes the form of a grid of correlation coefficients.	To understand how different variables are related to each other.  Identify strong positive or negative correlations.	Use a color scale to represent correlation strength. Label the variables on both axes for clarity.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>

		Useful for feature selection or identifying multicollinearity in statistics.	Use different colors or shading to make strong correlations stand out.	
Heatmap	A heatmap is a graphical representation of data in a two-dimensional format where individual values are represented as colors. It's commonly used to visualize complex data matrices.	To show data density, patterns, or relationships within a matrix. Commonly used for displaying correlation matrices, hierarchical clustering results, and more.	Use a color palette that effectively represents the data values. Label the rows and columns to provide context. Adjust the color scale for better interpretation.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
<b>C. Composition Plots</b>				
Pie Chart	A pie chart is a circular chart divided into slices, where each slice represents a proportion or percentage of the whole. It's used to visualize the composition of a whole in terms of its parts.	<p>Show the relative distribution of different categories within a dataset.</p> <p>Represent the composition of a whole as parts of a whole, where the sum of the parts equals 100%.</p>	<p>Label the slices with category names and percentages.</p> <p>Emphasize a limited number of categories to avoid clutter.</p> <p>Use colors to differentiate the slices and make it visually appealing.</p>	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Stacked Bar Chart	A stacked bar chart represents multiple data series in a single bar, with each bar divided into segments. It's used to visualize the composition of a whole category over multiple subcategories.	<p>Compare the total and relative contributions of subcategories to a common category.</p> <p>Show the composition of data with multiple dimensions.</p>	<p>Label the bars and subcategories clearly.</p> <p>Ensure that the total height of the bars represents the common category.</p> <p>Use colors to differentiate subcategories within each bar.</p>	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Stacked Area Chart	A stacked area chart is similar to a stacked bar chart but represents data over time, with the areas under the lines filled in to show the composition of each category.	<p>Visualize the composition of categories over time.</p> <p>Show the relative contributions of subcategories to a common category as it evolves.</p>	<p>Label the areas and categories clearly.</p> <p>Ensure that the areas stack on top of each other to represent the common category.</p> <p>Use colors to distinguish subcategories and make the chart visually appealing.</p>	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Venn Diagram	A Venn diagram is a graphical representation of the relationships	Illustrate the relationships between multiple sets and their intersections.	Label each set or group clearly.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>

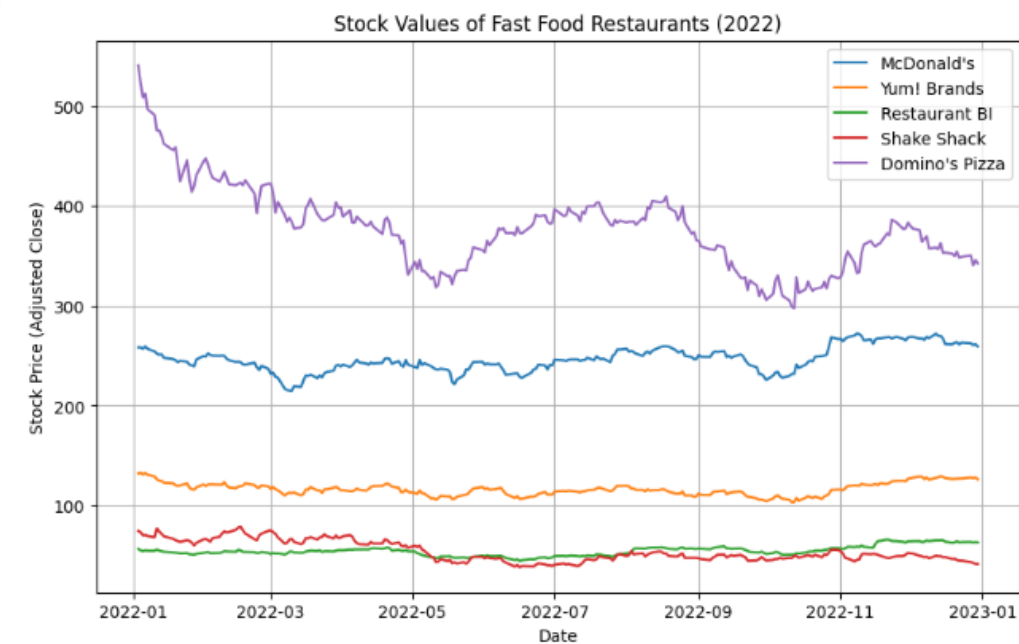
	between different sets. It consists of overlapping circles or ellipses to show the intersections and differences between sets.	Compare the commonalities and differences between groups or categories.	Use overlapping circles or ellipses to represent intersections. Use colors or shading to highlight differences and overlaps.	
<b>D. Distribution Plots</b>				
Histogram	A histogram is a graphical representation of the distribution of numerical data. It divides the data into bins or intervals and displays the frequency or count of data points in each bin.	Visualize the shape, central tendency, and spread of a dataset. Understand the frequency or distribution of values within specific ranges.	Choose an appropriate number of bins for the histogram. Label the axes and title clearly. Use colors or shading to make the histogram visually appealing.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Density Plot	A density plot, often created as a kernel density estimate (KDE) plot, estimates the probability density function of a continuous random variable. It provides a smoothed representation of the data's distribution.	Visualize the probability density of a continuous dataset. Show the shape of the distribution and the presence of multiple modes or peaks.	Choose the bandwidth parameter for the KDE appropriately. Label the axes and title clearly. Use colors or shading to make the density plot visually appealing.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Box Plot	A box plot, also known as a whisker plot, displays the summary statistics of a dataset, including the median, quartiles, and potential outliers.	Visualize the central tendency, spread, and skewness of a dataset. Detect outliers and compare the distribution of multiple variables.	Label the axes and title clearly. Use horizontal or vertical orientation as needed. Add notches to the boxes to visualize confidence intervals if required.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Violin Plot	A violin plot combines a box plot with a density plot, offering a more comprehensive representation of the data's distribution.	Visualize both the summary statistics and the probability density of a dataset. Compare distributions of multiple variables.	Label the axes and title clearly. Use colors or shading to make the violin plot visually appealing. Optionally, overlay individual data points or jittered points for added detail.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
<b>E. Geoplots</b>				
Dot Map	A dot map is a geographic representation where individual data points, often representing	Visualize the distribution and density of specific data points across a geographical area.	Use colors, sizes, or shapes to differentiate data points or clusters. Provide a clear legend to explain the meaning of the dots.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>

	locations or events, are plotted as dots on a map.	Display the occurrence of events, such as earthquakes, store locations, or population density.	Ensure the map's background and labels are not cluttered.	
Choropleth	A choropleth map is a thematic map in which areas, such as countries, regions, or districts, are shaded or patterned in proportion to the value of a variable being represented.	Show spatial variations and patterns in data across geographical regions. Visualize data like population density, election results, or economic indicators.	Choose a color scheme that effectively conveys the data. Ensure that data is aggregated appropriately for the geographical regions. Include a legend that explains the color-to-value mapping.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>
Connection Map	A connection map, often created using lines or arrows, visualizes the relationships or connections between geographic locations or nodes.	Show network connections, travel routes, or flow of goods and services between locations.  Display migration patterns, transportation networks, or trade routes.	Use different line styles, colors, or widths to indicate the type or strength of connections. Label the locations or nodes clearly. Ensure the map's layout is legible and conveys the intended connections.	<a href="https://github.com/kiyojiii/ITD112">https://github.com/kiyojiii/ITD112</a>

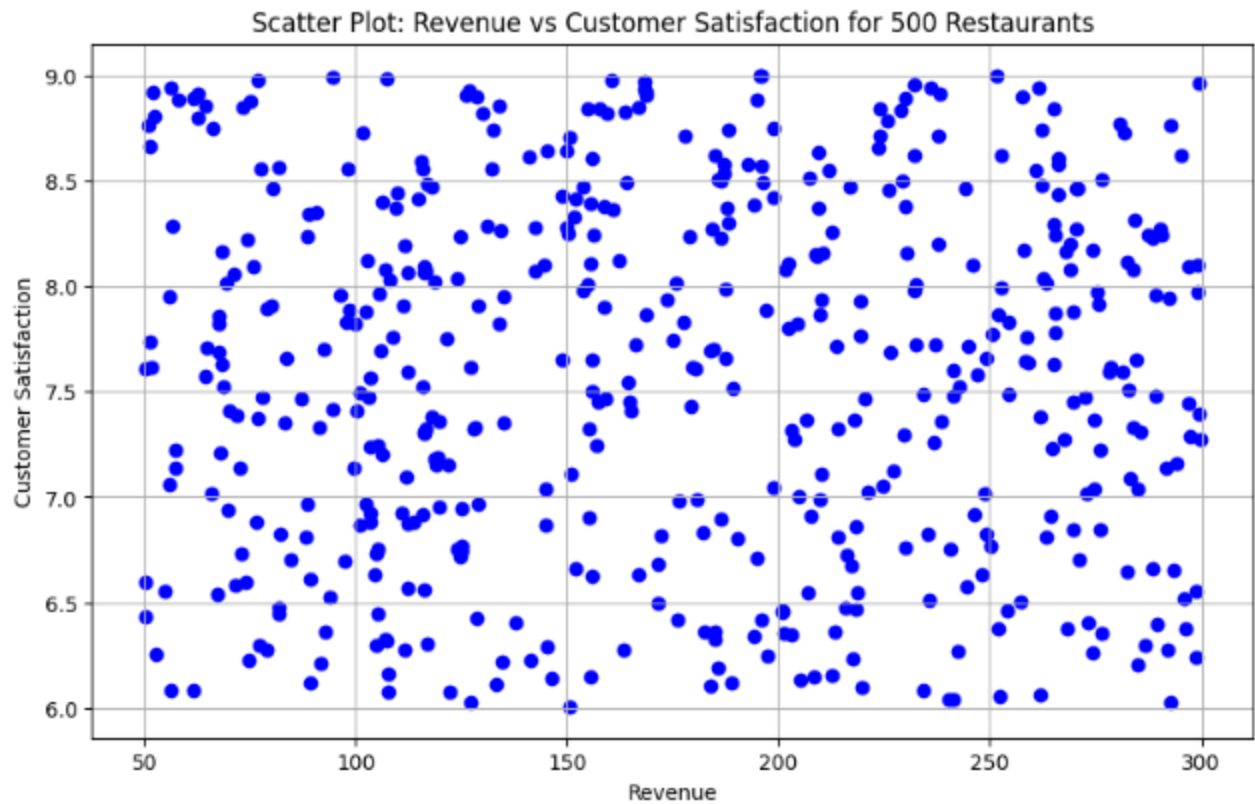
Example Images:



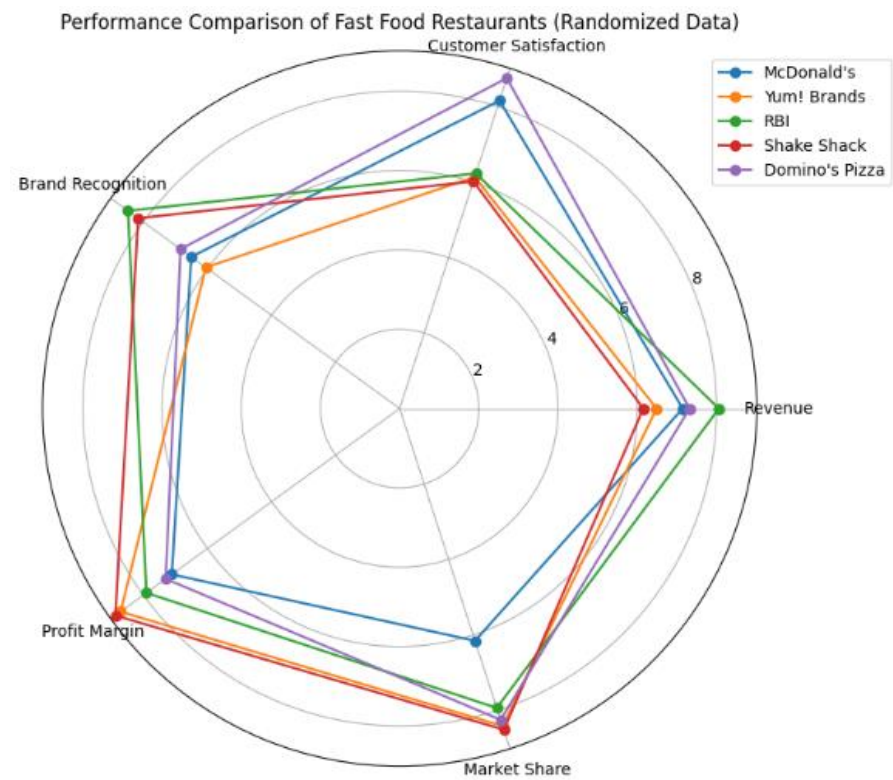
A. Comparison Plot: Bar Chart



A. Comparison Plot: Line Chart



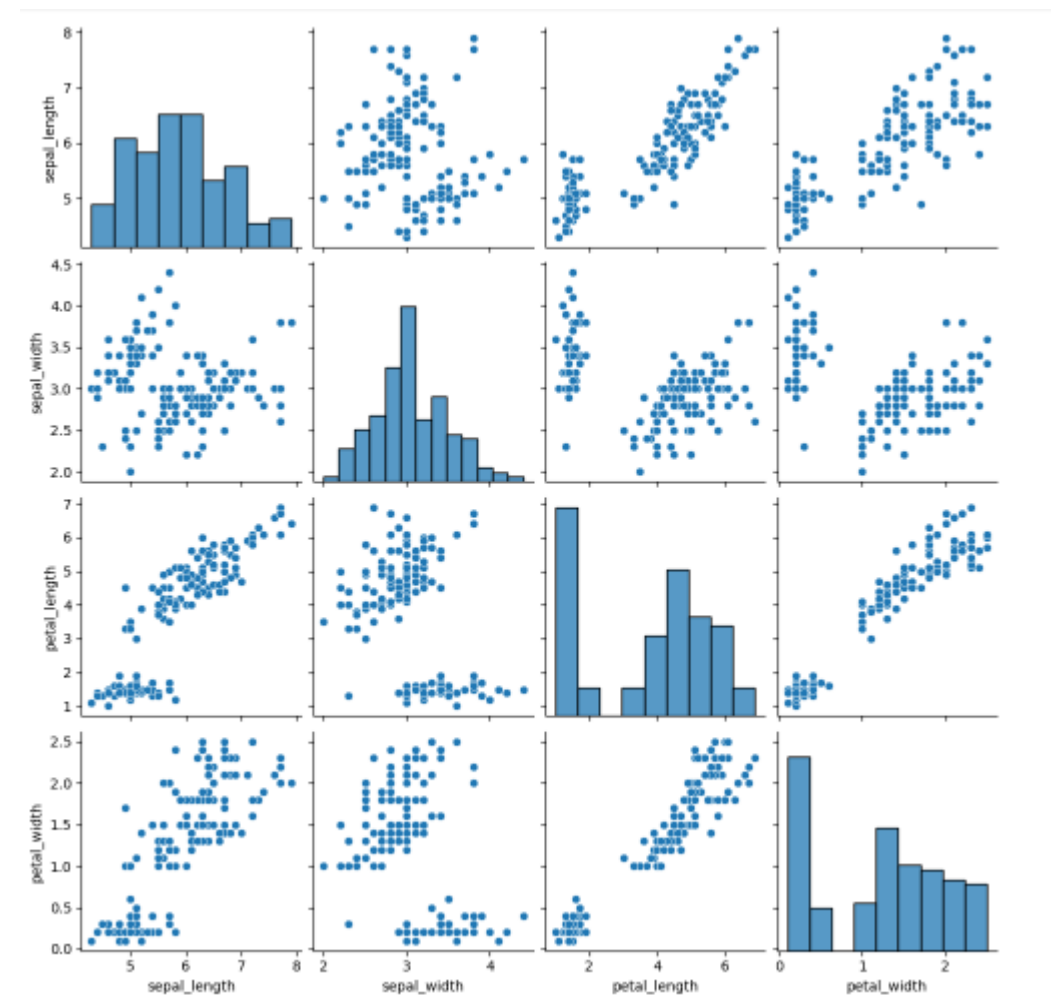
B. Relation Plot: Scatter Plot



A. Comparison Plot: Radar Chart

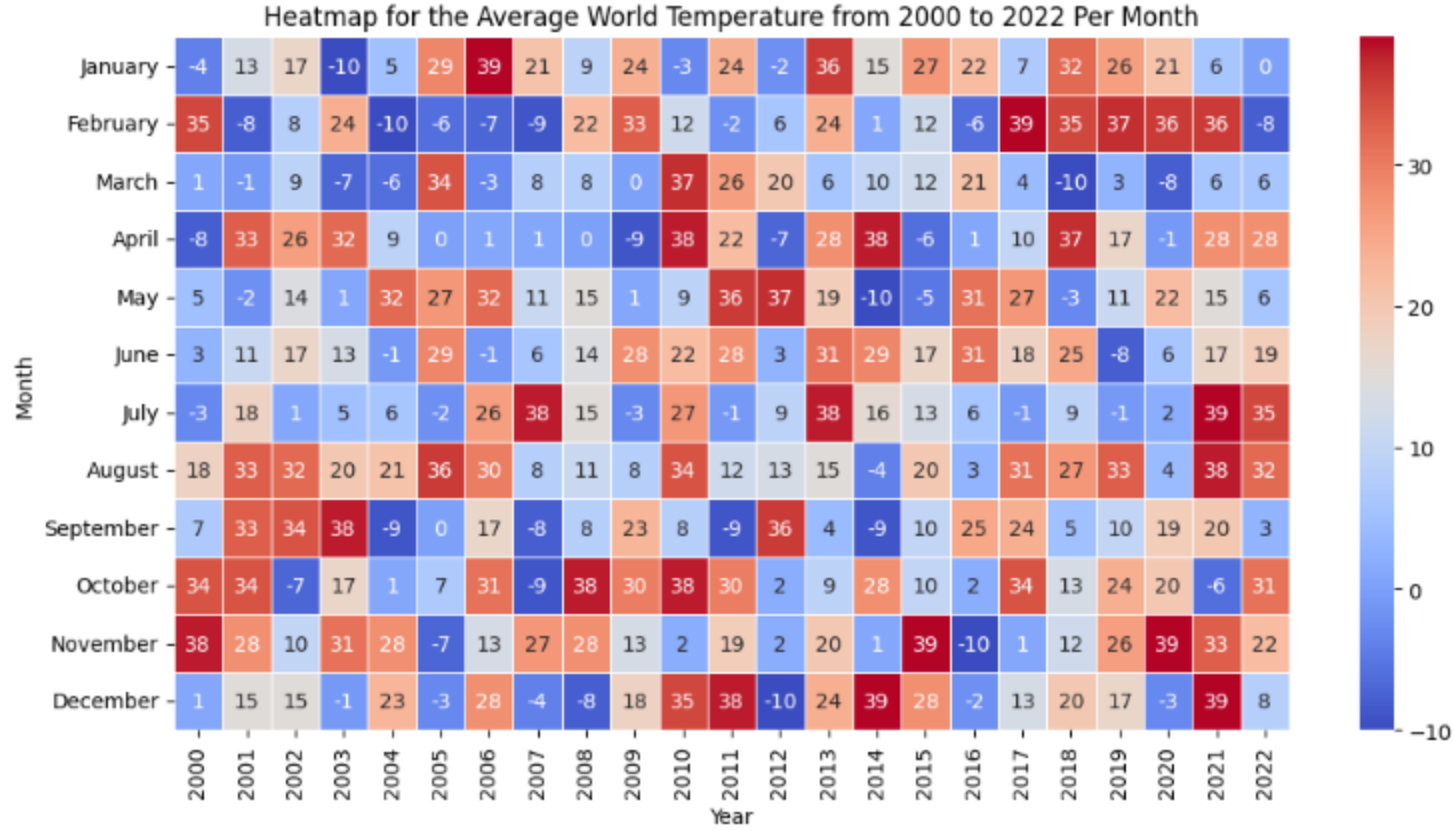


B. Relation Plot: Bubble Plot

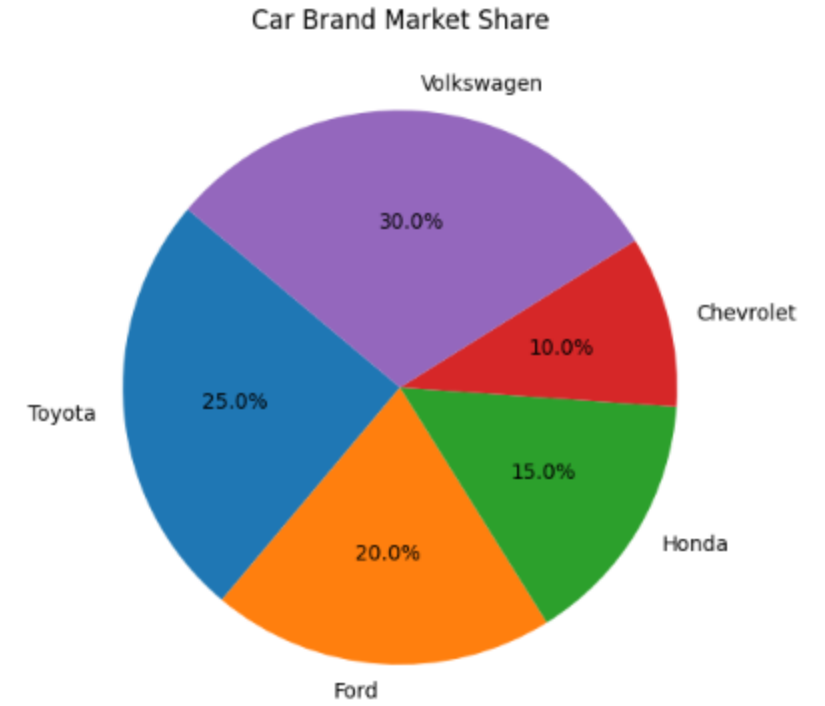


B. Relation Plot: Correlogram

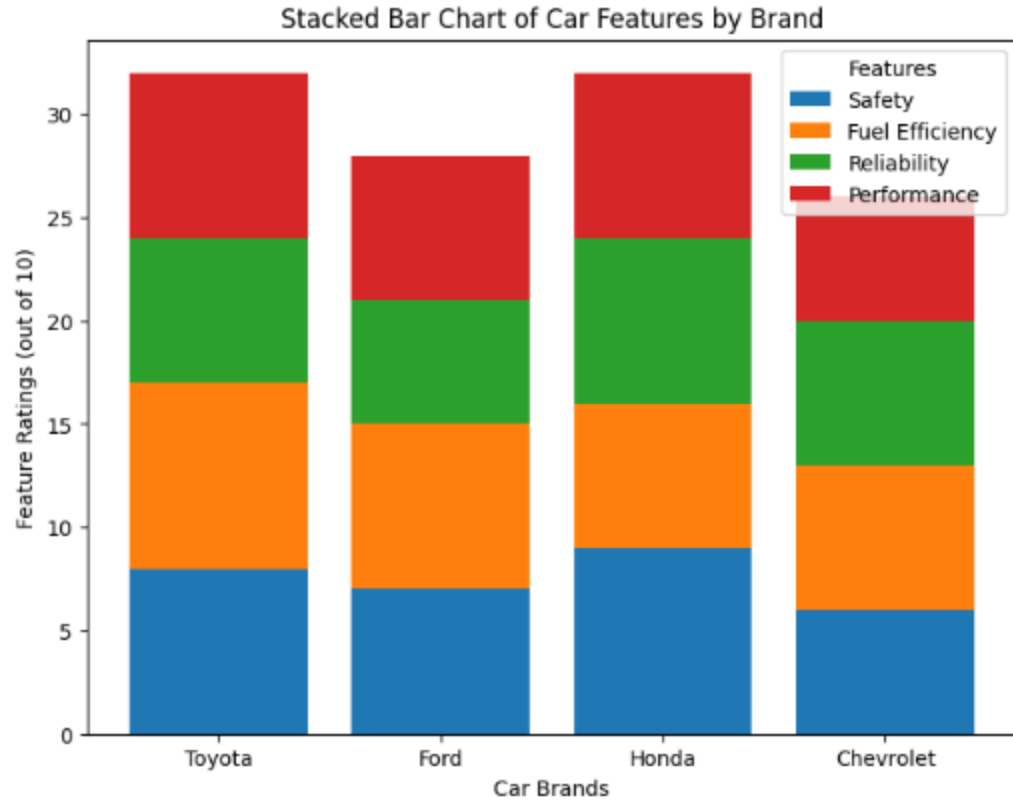




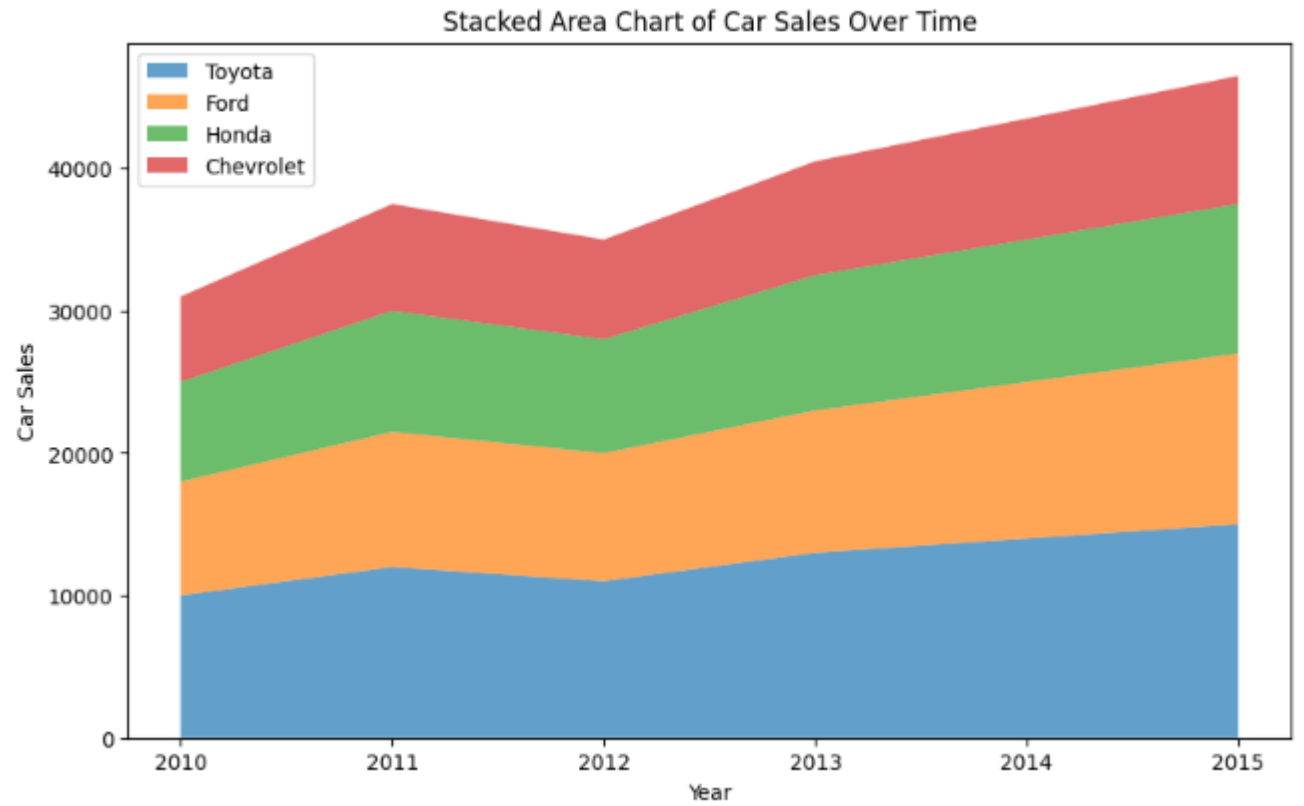
B. Relation Plot: Heat Map



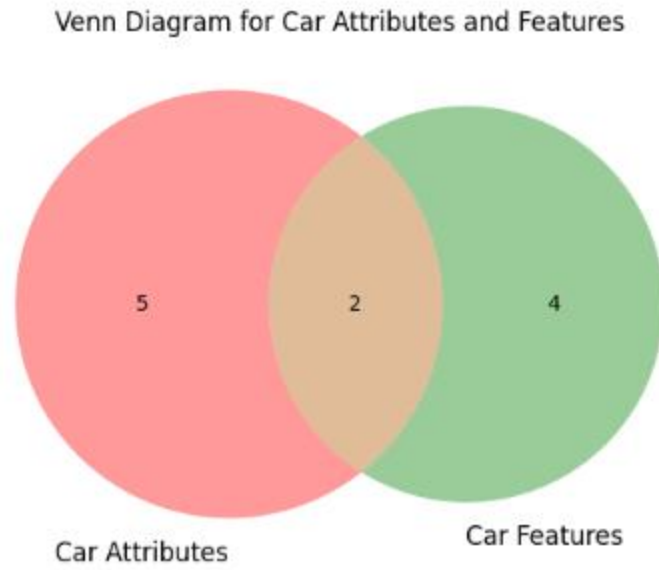
C. Composition Plot: Pie Chart



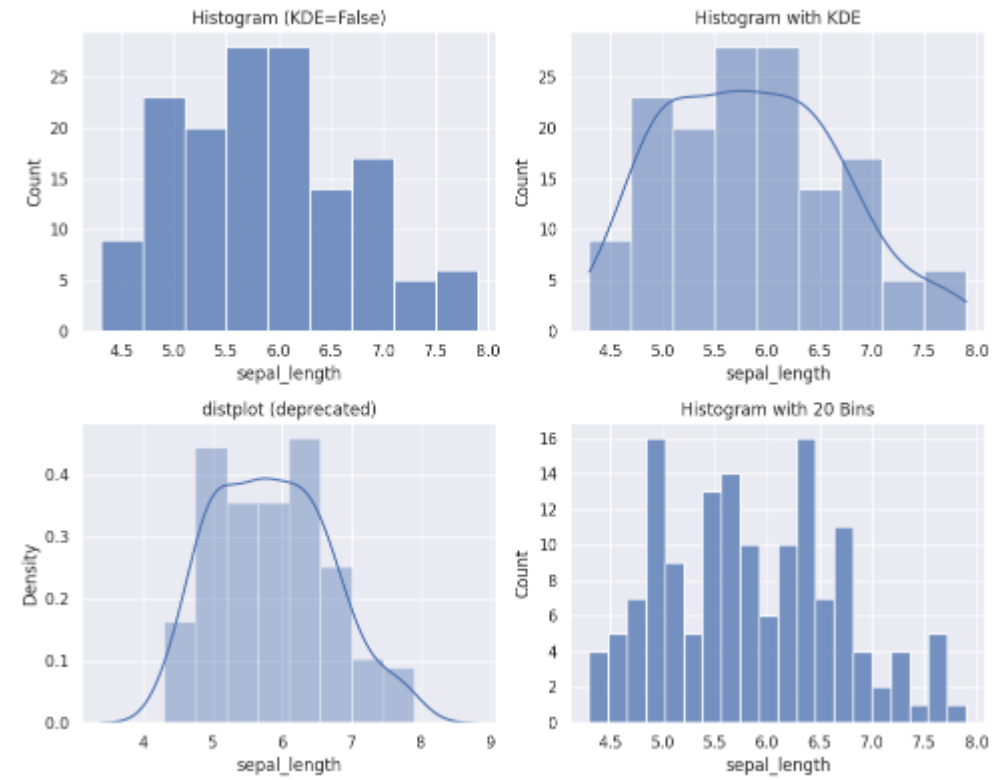
C. Composition Plot: Stacked Bar Chart



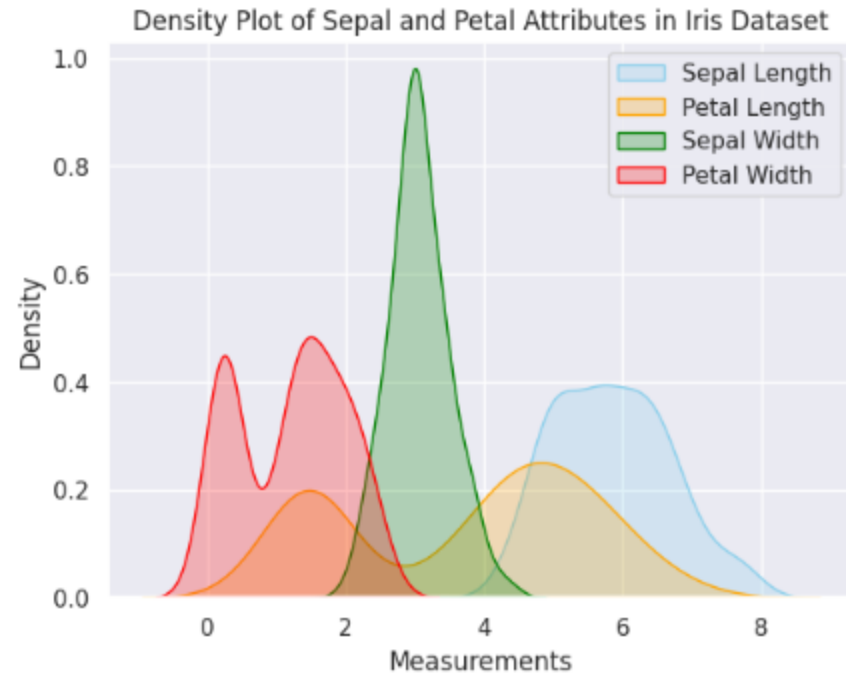
C. Composition Plot: Stacked Area Chart



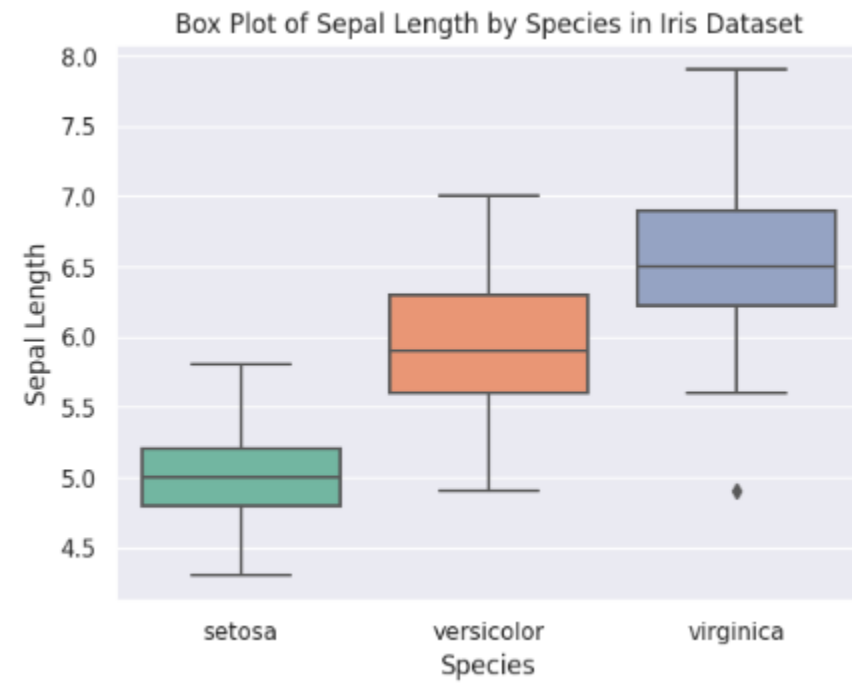
C. Composition Plot: Venn Diagram



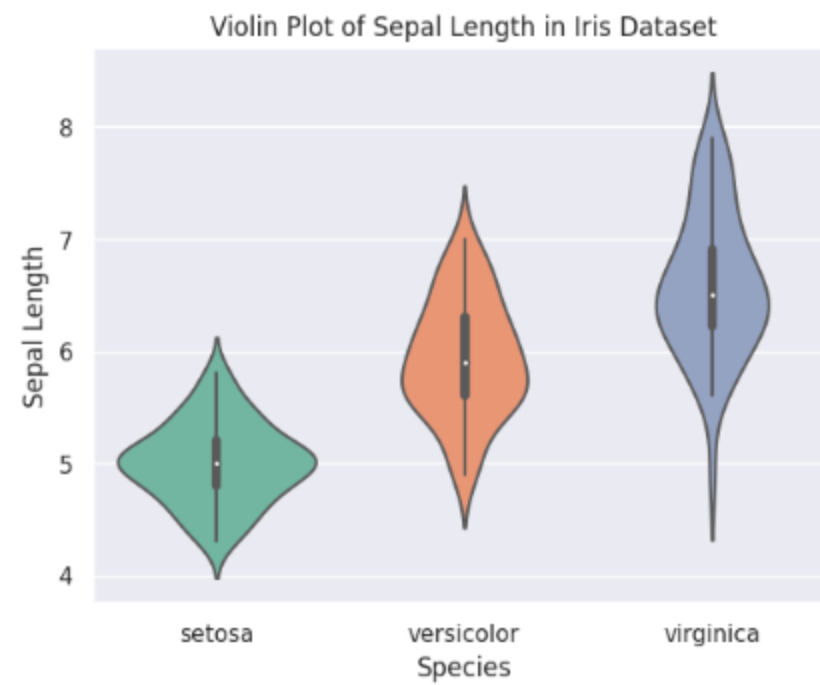
D. Distribution Plot: Histogram



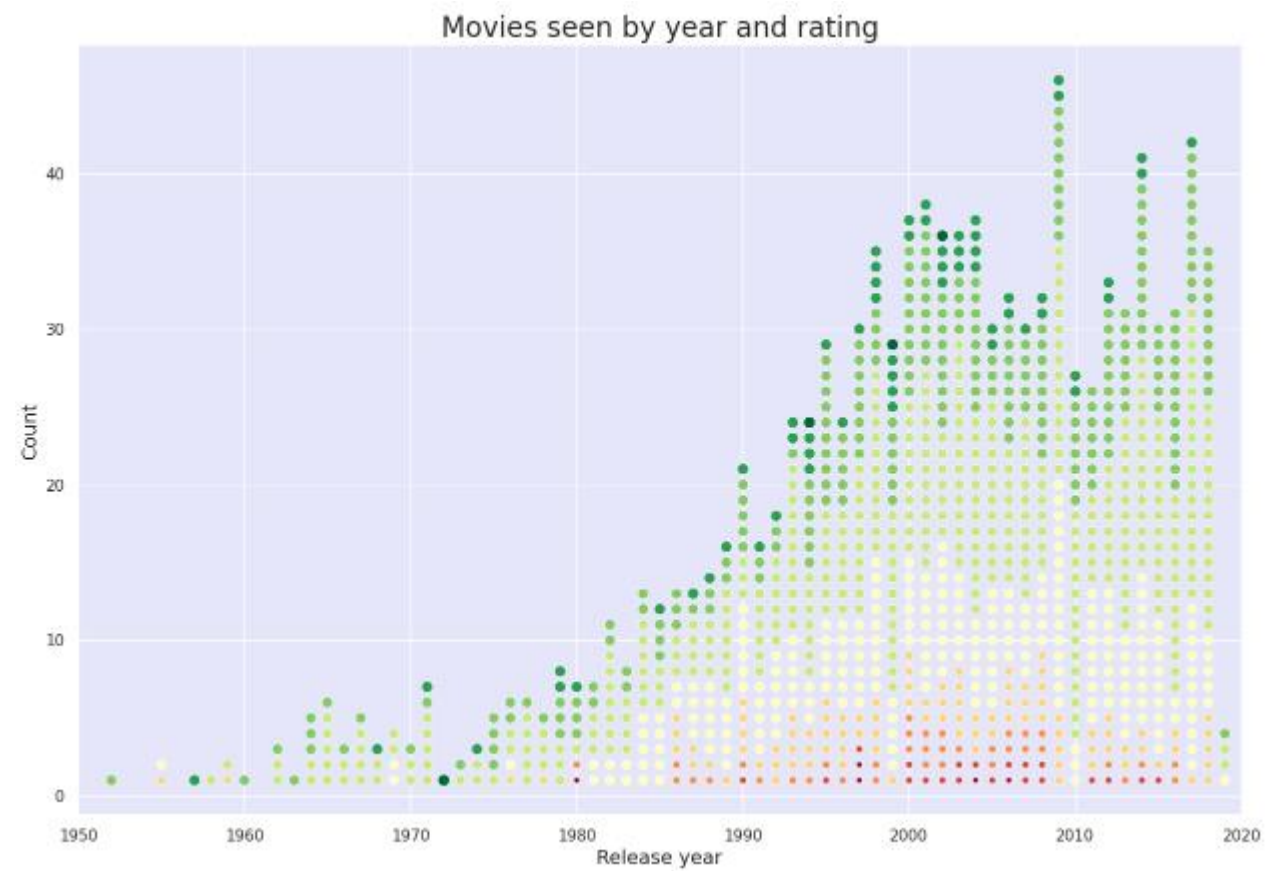
D. Distribution Plot: Density Plot



D. Distribution Plot: Box Plot

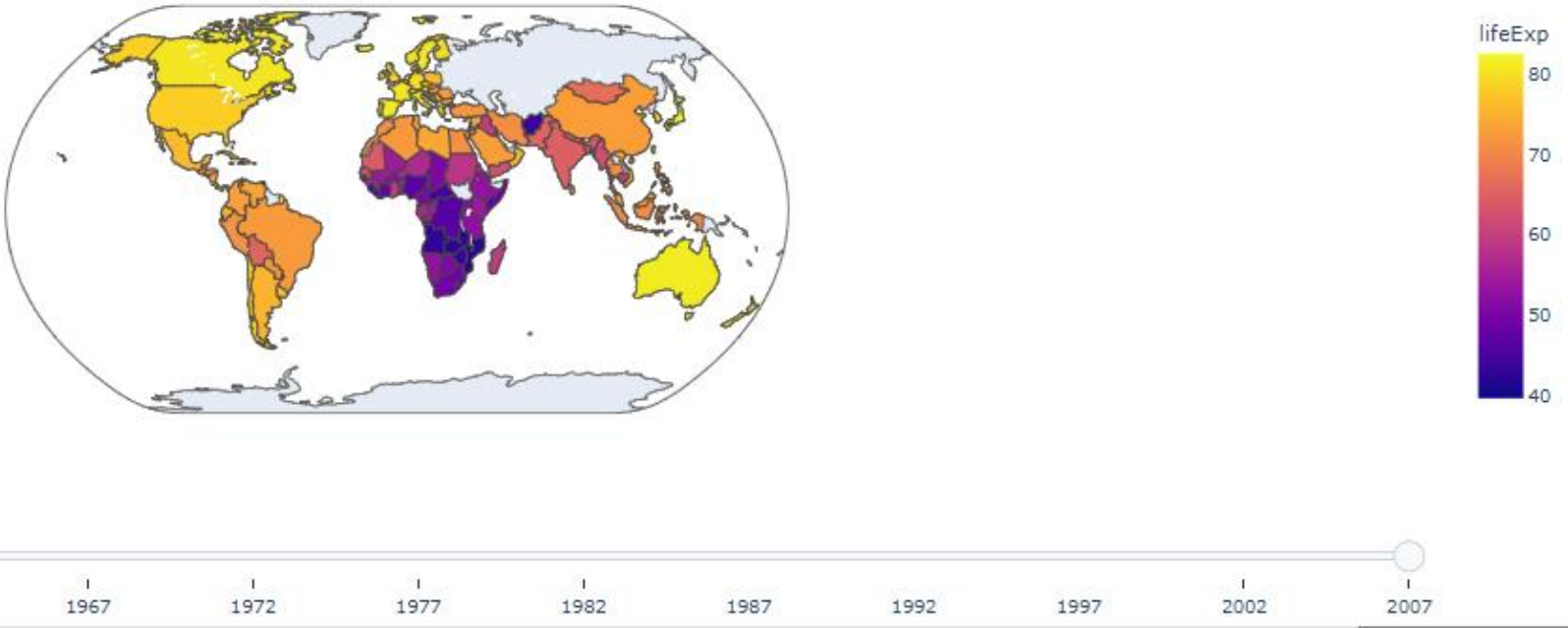


D. Distribution Plot: Violin Plot



E. Geoplot: Dot Map

Life Expectancy Over Time



E. Geoplot: Chloropeth

E. Geoplot: Connection Map

Brazil Flights Connection Map

