**various programs on Plotting with ggplot2**

1. **Install the ggplot2 Package**

install.packages("ggplot2")

1. **Load the ggplot2 Library**

Once the package is installed, load it into your R session:

library(ggplot2)

**3. Run the ggplot Code Again**

Now, you should be able to use ggplot without errors:

1. **Basic Scatter Plot**

# Load the ggplot2 library

library(ggplot2)

# Create a simple scatter plot with `mtcars` dataset

ggplot(data = mtcars, aes(x = wt, y = mpg)) +

geom\_point()

1. **Scatter Plot with Color and Size Aesthetics**

# Scatter plot with color and size mapped to variables

ggplot(data = mtcars, aes(x = wt, y = mpg, color = cyl, size = hp)) +

geom\_point() +

labs(title = "Car Weight vs. Mileage", x = "Weight", y = "Miles per Gallon")

1. **Adding a Smooth Line (Regression)**

# Scatter plot with a regression line

ggplot(data = mtcars, aes(x = wt, y = mpg)) +

geom\_point() +

geom\_smooth(method = "lm", col = "blue") +

labs(title = "Regression Line for Weight vs. Mileage", x = "Weight", y = "Miles per Gallon")

4. **Bar Plot**

# Create a bar plot of the number of cylinders in mtcars

ggplot(data = mtcars, aes(x = factor(cyl))) +

geom\_bar(fill = "skyblue", color = "black") +

labs(title = "Count of Cars by Cylinder", x = "Cylinders", y = "Count")

**5.Customizing Theme and Labels**

# Customize plot with theme and labels

ggplot(data = mtcars, aes(x = wt, y = mpg)) +

geom\_point(color = "darkgreen", size = 3) +

labs(title = "Car Weight vs. Mileage", x = "Weight (1000 lbs)", y = "Miles per Gallon") +

theme\_minimal() +

theme(plot.title = element\_text(hjust = 0.5, face = "bold"))

6. Boxplot

# Create a boxplot of miles per gallon by number of cylinders

ggplot(data = mtcars, aes(x = factor(cyl), y = mpg)) +

geom\_boxplot(fill = "lightblue", color = "darkblue") +

labs(title = "Miles per Gallon by Cylinder", x = "Cylinders", y = "Miles per Gallon")

7. **Histogram**

# Create a histogram of car weight

ggplot(data = mtcars, aes(x = wt)) +

geom\_histogram(binwidth = 0.5, fill = "orange", color = "black") +

labs(title = "Histogram of Car Weight", x = "Weight (1000 lbs)", y = "Count")

8. **Facet Wrap (Multiple Plots)**

# Create multiple scatter plots based on the number of cylinders

ggplot(data = mtcars, aes(x = wt, y = mpg)) +

geom\_point() +

facet\_wrap(~ cyl) +

labs(title = "Scatter Plot of Weight vs. Mileage by Cylinder Count")

9. **Pie Chart (Using Bar Plot)**

# Pie chart based on the proportion of cylinders

ggplot(data = mtcars, aes(x = "", fill = factor(cyl))) +

geom\_bar(width = 1) +

coord\_polar(theta = "y") +

labs(title = "Proportion of Cylinders", fill = "Cylinders")

10. **Line Plot**

# Create a line plot using the economics dataset

ggplot(data = economics, aes(x = date, y = unemploy)) +

geom\_line(color = "blue") +

labs(title = "Unemployment Over Time", x = "Year", y = "Unemployment")

if you have any issues from 6th Program onwards,please run the following code

# Close any existing graphics devices

dev.off()

# Recreate the plot

p <- ggplot(data = mtcars, aes(x = factor(cyl), y = mpg)) +

geom\_boxplot(fill = "lightblue", color = "darkblue") +

labs(title = "Miles per Gallon by Cylinder", x = "Cylinders", y = "Miles per Gallon")

# Print the plot explicitly

print(p)

# Save the plot as a file

ggsave("my\_boxplot.png", plot = p)

Exercise Programs

### **Exercise 1: Basic Scatter Plot**

* **Problem:** Create a scatter plot using the iris dataset to show the relationship between Sepal.Length and Sepal.Width. Color the points based on the Species of the flower.
* **Goal:** Learn how to create a basic scatter plot and add color based on categorical data.

**Answer**

library(ggplot2)

# Create a scatter plot using the iris dataset

ggplot(data = iris, aes(x = Sepal.Length, y = Sepal.Width, color = Species)) +

geom\_point() +

labs(title = "Sepal Length vs Sepal Width by Species")

**Exercise 2: Customizing Scatter Plot**

* **Problem:** Using the mtcars dataset, create a scatter plot of wt (weight) vs mpg (miles per gallon). Map the cyl (number of cylinders) to color and the hp (horsepower) to the size of the points.
* **Goal:** Learn to customize scatter plots with additional aesthetics such as color and size.

Answer

# Create a scatter plot with custom aesthetics

ggplot(data = mtcars, aes(x = wt, y = mpg, color = factor(cyl), size = hp)) +

geom\_point() +

labs(title = "Car Weight vs MPG", x = "Weight (1000 lbs)", y = "Miles per Gallon")

**Exercise 3: Adding Regression Line to Scatter Plot**

* **Problem:** Using the mtcars dataset, create a scatter plot for wt vs mpg, and add a linear regression line to the plot. Customize the color of the regression line.
* **Goal:** Understand how to add a smooth line (regression) to a scatter plot.

Answer

# Scatter plot with a regression line

ggplot(data = mtcars, aes(x = wt, y = mpg)) +

geom\_point() +

geom\_smooth(method = "lm", color = "blue") +

labs(title = "Regression Line for Weight vs MPG", x = "Weight (1000 lbs)", y = "Miles per Gallon")

**Exercise 4: Bar Plot**

* **Problem:** Create a bar plot using the diamonds dataset to show the distribution of diamonds based on their cut. Use a different fill color for each cut.
* **Goal:** Learn to create a bar plot and use different fill colors for different categories.

# Bar plot of diamond cuts

ggplot(data = diamonds, aes(x = cut, fill = cut)) +

geom\_bar() +

labs(title = "Distribution of Diamond Cuts", x = "Cut", y = "Count")

**Exercise 5: Box Plot**

* **Problem:** Using the iris dataset, create a box plot of Sepal.Length grouped by Species. Change the fill color of the boxes to be different for each species.
* **Goal:** Understand how to create a box plot and group the data by a categorical variable.

**Answer**

# Box plot of Sepal Length grouped by Species

ggplot(data = iris, aes(x = Species, y = Sepal.Length, fill = Species)) +

geom\_boxplot() +

labs(title = "Box Plot of Sepal Length by Species", x = "Species", y = "Sepal Length")

**Exercise 6: Histogram**

* **Problem:** Create a histogram of mpg using the mtcars dataset. Set the binwidth to 2 and change the color and fill of the bars.
* **Goal:** Learn how to create and customize histograms.

# Histogram of MPG with binwidth set to 2

ggplot(data = mtcars, aes(x = mpg)) +

geom\_histogram(binwidth = 2, fill = "orange", color = "black") +

labs(title = "Histogram of Miles per Gallon", x = "Miles per Gallon", y = "Count")

**Exercise 7: Facet Wrap (Multiple Plots)**

* **Problem:** Create a scatter plot of mpg vs wt using the mtcars dataset. Then, facet the plot by the number of cylinders (cyl) so that each facet represents a different number of cylinders.
* **Goal:** Understand how to create facet plots to show multiple subsets of data.

# Scatter plot with facets for each cylinder type

ggplot(data = mtcars, aes(x = wt, y = mpg)) +

geom\_point() +

facet\_wrap(~ cyl) +

labs(title = "Scatter Plot of MPG vs Weight by Cylinder Count")

**Exercise 8: Pie Chart**

* **Problem:** Using the mtcars dataset, create a pie chart to represent the proportion of cars with different numbers of cylinders (cyl).
* **Goal:** Learn to create pie charts using ggplot2 (via geom\_bar() and coord\_polar()).

# Pie chart showing the proportion of cars with different numbers of cylinders

ggplot(data = mtcars, aes(x = "", fill = factor(cyl))) +

geom\_bar(width = 1) +

coord\_polar(theta = "y") +

labs(title = "Proportion of Cars by Cylinder Count", fill = "Cylinders")

**Exercise 9: Line Plot**

* **Problem:** Using the economics dataset, create a line plot to show how unemploy (number of unemployed) changes over time (date).
* **Goal:** Understand how to create line plots to show trends over time.

# Line plot showing unemployment over time

ggplot(data = economics, aes(x = date, y = unemploy)) +

geom\_line(color = "blue") +

labs(title = "Unemployment Over Time", x = "Date", y = "Number of Unemployed")

**Exercise 10: Customize Themes and Labels**

* **Problem:** Create a scatter plot of hp vs mpg using the mtcars dataset. Customize the plot by applying the theme\_minimal() theme, changing the title font size and center-aligning the title.
* **Goal:** Learn how to customize plot themes, titles, and labels.

# Scatter plot with customized theme and labels

ggplot(data = mtcars, aes(x = hp, y = mpg)) +

geom\_point() +

labs(title = "Horsepower vs MPG", x = "Horsepower", y = "Miles per Gallon") +

theme\_minimal() +

theme(plot.title = element\_text(hjust = 0.5, face = "bold", size = 14))