Lab Program - 6

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2025-09-23

Data Visualisation with ggplot2 and Customisations

Objective: This program evaluates students' ability to create and customize complex data visualizations using the ggplot2 package.

```r
# Load necessary libraries
library(ggplot2)
library(dplyr)
```

```
Attaching package: 'dplyr'

The following objects are masked from 'package:stats':

    filter, lag

The following objects are masked from 'package:base':

    intersect, setdiff, setequal, union
```

```r
library(reshape2)

# Scatterplot with regression line and confidence intervals
data("mpg")

ggplot(mpg, aes(x = displ, y = hwy, color = class)) +
  geom_point(size = 3, alpha = 0.7) +
  geom_smooth(method = "lm", se = TRUE, linetype = "dashed") +
  labs(title = "Scatterplot of Engine Displacement vs Highway MPG with Regression Line",
       x = "Engine Displacement (liters)",
       y = "Highway MPG",
       color = "Vehicle Class") +
  theme_bw() +
  theme(plot.title = element_text(hjust = 0.5, size = 16, face = "bold"),
        axis.title = element_text(size = 14),
        legend.position = "bottom")
```

```
`geom_smooth()` using formula = 'y ~ x'
```

terplot of Engine Displacement vs Highway MPG with Regress
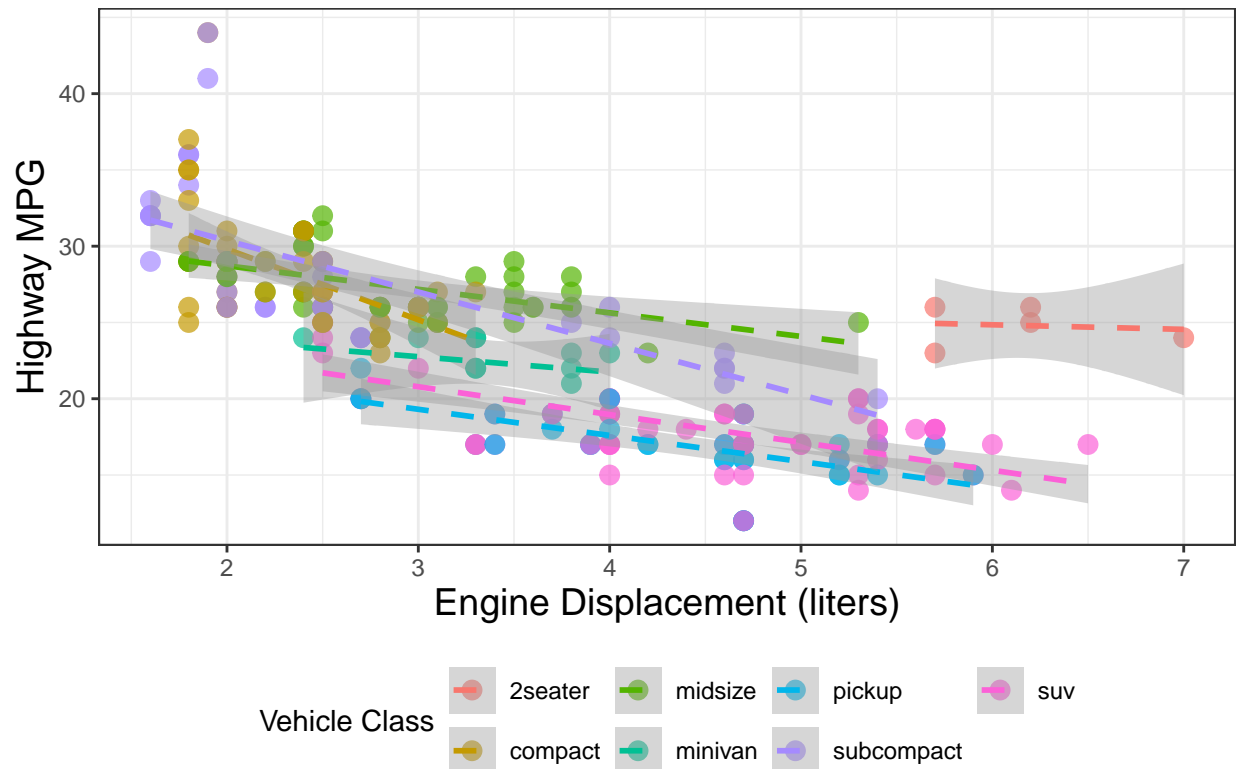

```r
# Multi-panel plot using Faceting
# Creating faceted scatter plots by vehicle class with enhanced aesthetics
ggplot(mpg, aes(x = displ, y = hwy)) +
  geom_point(color = "darkgreen", size = 2) +
  facet_wrap(~ class, ncol = 3) +
  labs(title = "Faceted Scatterplot of Engine Displacement vs Highway MPG by Vehicle Class",
       x = "Engine Displacement (liters)",
       y = "Highway MPG",
       color = "Drive Type") +
  theme_minimal() +
  theme(strip.text = element_text(size = 12, face = "italic"),
        plot.title = element_text(hjust = 0.5, size = 16))
```

# ⊦ted Scatterplot of Engine Displacement vs Highway MPG by Vehic
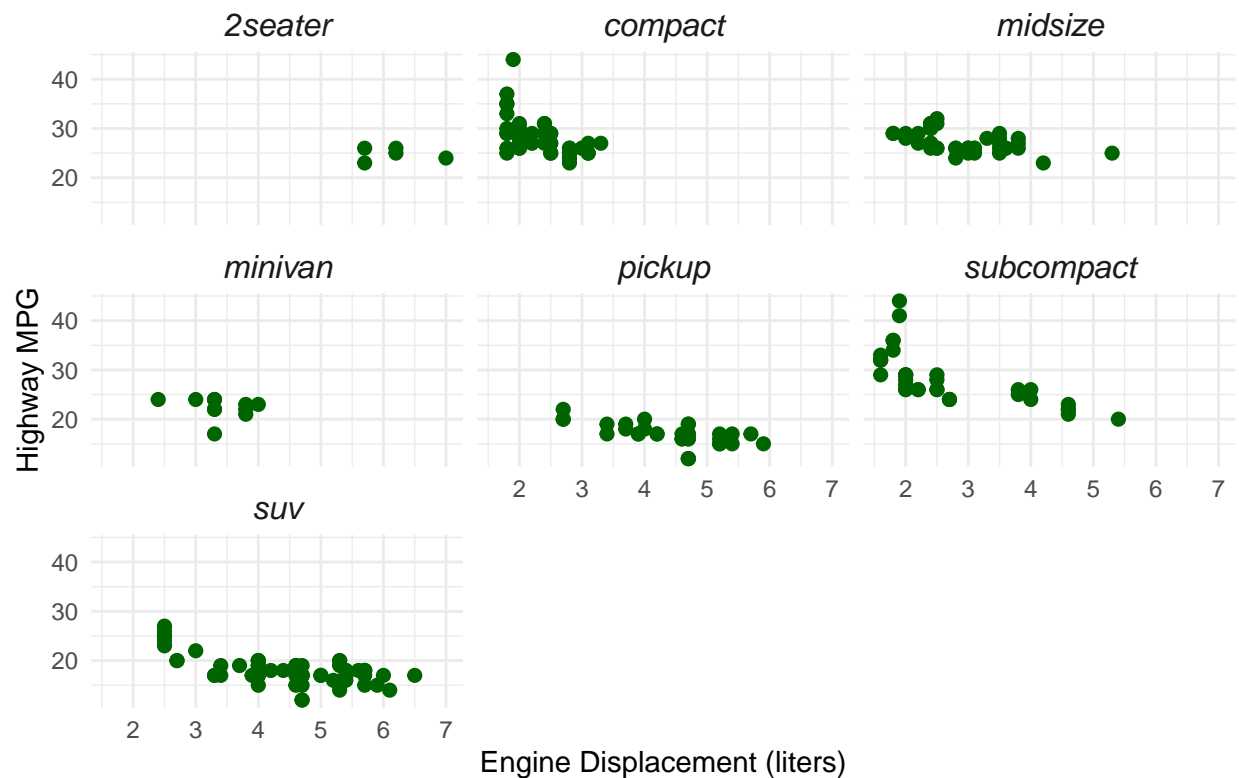

```r
# Heatmap of correlatio matrix
data("diamonds")

# Calculate correlation matrix for numeric variables
cor_matrix <- cor(diamonds[sapply(diamonds, is.numeric)], use = "complete.obs")

#Convert to tidy format
cor_melt <- melt(cor_matrix)

# Create heatmap
ggplot(cor_melt, aes(Var1, Var2, fill = value)) +
  geom_tile(color = "white") +
  scale_fill_gradient2(low = "blue", high = "red", mid = "white",
                       midpoint = 0, limit = c(-1, 1), space = "Lab",
                       name = "Correlation") +
  labs(title = "Heatmap of Correlation Matrix for Diamonds Dataset",
       x = "Variables",
       y = "Variables") +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 12),
        axis.text.y = element_text(size = 12),
        plot.title = element_text(hjust = 0.5, size = 16))
```

Heatmap of Correlation Matrix for Diamonds Dataset
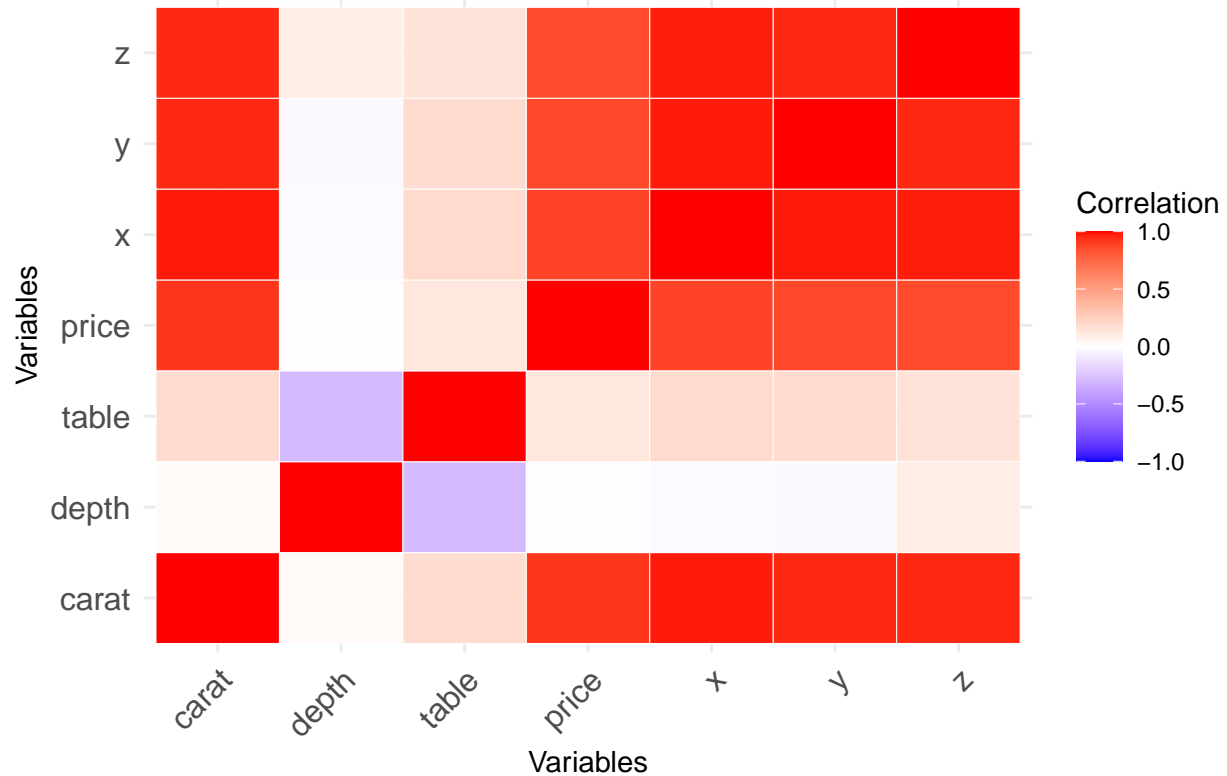

```
# Enhancing the scatterplot with annotations
ggplot(mpg, aes(x = displ, y = hwy, color = "class")) +
  geom_point(size = 3, shape = 21, fill = "lightblue", alpha = 0.8) +
  theme_light() +
  scale_color_brewer(palette = "Set2") +
  labs(title = "Customised scatter plot with Aesthetic Enhancements",
       x = "Engine Displacement (liters)",
       y = "Highway MPG",
       color = "Vehicle Class") +
  theme(plot.title = element_text(face = "bold", size = 18),
        axis.title = element_text(size = 14),
        legend.background = element_rect(fill = "gray90"))
```

Customised scatter plot with Aesthetic Enhanceme
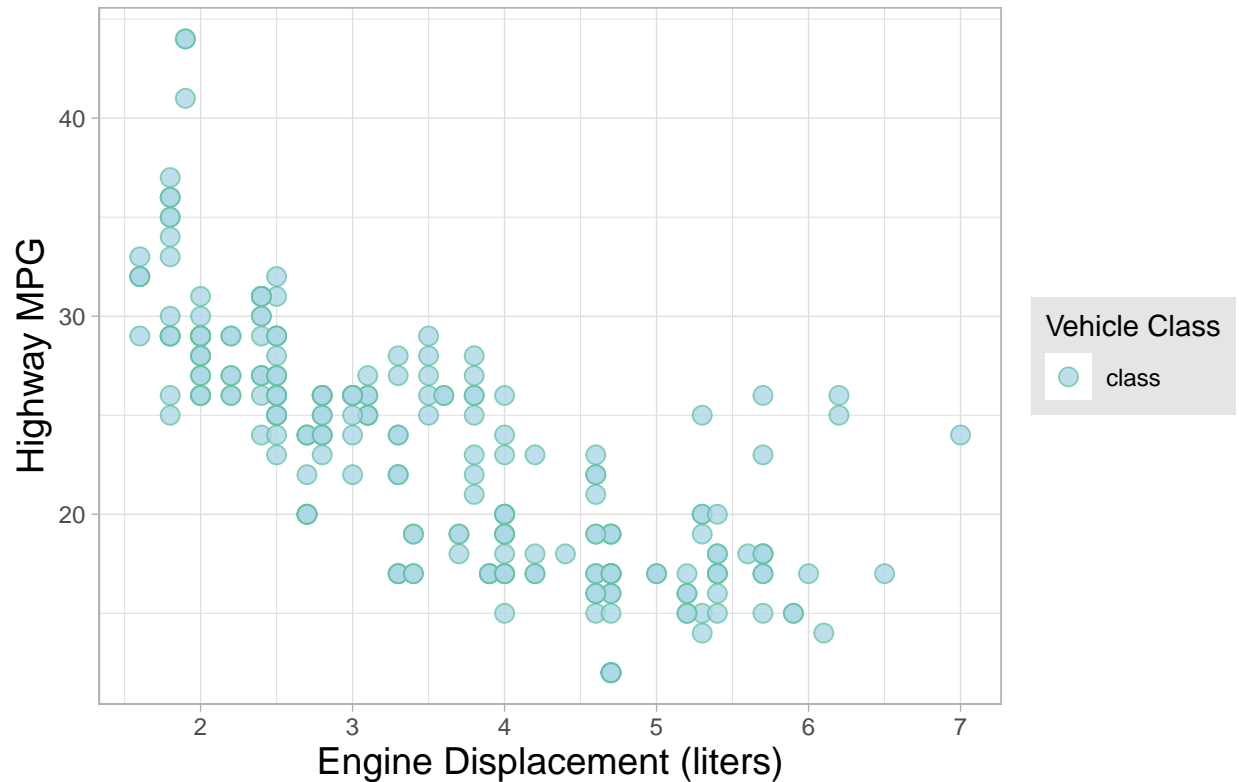

```r
# Annonate plots and save as image files
annotated_plot <- ggplot(mpg, aes(x = displ, y = hwy)) +
  geom_point(size = 3, color = "purple") +
  geom_smooth(method = "lm", se = TRUE, linetype = "dashed") +
  labs(title = "A",
       x = "Engine Displacement (liters)",
       y = "Highway MPG",
       color = "Vehicle Class") +
  theme_bw() +
  theme(plot.title = element_text(hjust = 0.5, size = 16, face = "bold"),
        axis.title = element_text(size = 14),
        legend.position = "bottom") +
  annotate("text", x = 4, y = 40, label = "High Effeciency Zone",
           color = "red", size = 5, angle = 15) +
  annotate("rect", xmin = 1, xmax = 2, ymin = 30, ymax = 45,
           alpha = 0.2, fill = "yellow", color = "orange")

ggsave("annotated_scatterplot.png", plot = annotated_plot, width = 8, height = 6)
```

`geom_smooth()` using formula = 'y ~ x'