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# Week 3 Homework - Applying Good Design Principles using mtcars

## Load the dataset

data("mtcars")

## Step 1: Understand the relationship between horsepower and fuel efficiency

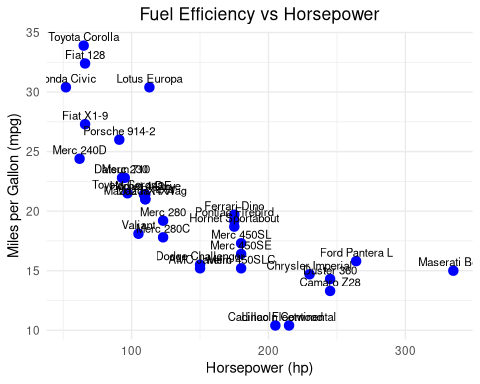
summary(mtcars[, c("mpg", "hp")])

## mpg hp   
## Min. :10.40 Min. : 52.0   
## 1st Qu.:15.43 1st Qu.: 96.5   
## Median :19.20 Median :123.0   
## Mean :20.09 Mean :146.7   
## 3rd Qu.:22.80 3rd Qu.:180.0   
## Max. :33.90 Max. :335.0

## Step 2: Create a scatter plot to visualize the relationship

### Principle 1: Clarity - Scatter plot showing how mpg (fuel efficiency) relates to hp (horsepower)

library(ggplot2)  
ggplot(mtcars, aes(x = hp, y = mpg, label = rownames(mtcars))) +  
 geom\_point(color = "blue", size = 3) +  
 geom\_text(vjust = -0.5, size = 3) + # Add car names to the points  
 theme\_minimal() +  
 labs(title = "Fuel Efficiency vs Horsepower",   
 x = "Horsepower (hp)",   
 y = "Miles per Gallon (mpg)") +  
 theme(plot.title = element\_text(hjust = 0.5))



## Step 3: Simple Analysis

### Principle 2: Simplicity - We filter cars with higher-than-average mpg and horsepower

avg\_mpg <- mean(mtcars$mpg)  
avg\_hp <- mean(mtcars$hp)  
  
efficient\_powerful\_cars <- subset(mtcars, mpg > avg\_mpg & hp > avg\_hp)  
  
cat("\nCars that provide a balance of good fuel efficiency and power:\n")

##   
## Cars that provide a balance of good fuel efficiency and power:

print(efficient\_powerful\_cars)

## [1] mpg cyl disp hp drat wt qsec vs am gear carb  
## <0 rows> (or 0-length row.names)

## Step 4: Visualize best cars

### Principle 3: Consistency - A consistent format is used to highlight selected cars

ggplot(efficient\_powerful\_cars, aes(x = hp, y = mpg, label = rownames(efficient\_powerful\_cars))) +  
 geom\_point(color = "green", size = 4) +  
 geom\_text(vjust = -0.5, size = 3) + # Add car names  
 theme\_minimal() +  
 labs(title = "High Efficiency & Power Cars",   
 x = "Horsepower (hp)",   
 y = "Miles per Gallon (mpg)") +  
 theme(plot.title = element\_text(hjust = 0.5))

