



# Understanding 'mtcars' Data

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# Background

- The information in the 'mtcars' data set was extracted from the 1974 Motor Trend US magazine and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973-74 models).

# Cars Task

- From the 'mtcars' data frame, create a boxplot of miles per gallon (the mpg variable) grouped by the number of cylinders in the engine (the cyl variable). Do these box plots make sense? Also, use the summarize() and group\_by() functions to compute how many cars have four cylinders, how many have six, and how many have eight.
- Prepare a report (using MS Power Point or similar) with all of these elements and any code used to arrive at the results.



# Cylinders

- A cylinder is the chamber where the gasoline is burned and turned into power.
- Most cars and SUV engines have 4, 6, or 8 cylinders.
- Generally, an engine with more cylinders produces more power, while an engine with fewer cylinders gets better fuel economy.



# View the 'mtcars' Data Frame

Code to view data:

```
library("dplyr")
```

```
View(mtcars)
```

```
head(mtcars)
```

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear
Mazda RX4	21.0	6	160	110	3.90	2.620	16.46	0	1	4
Mazda RX4 Wag	21.0	6	160	110	3.90	2.875	17.02	0	1	4
Datsun 710	22.8	4	108	93	3.85	2.320	18.61	1	1	4
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3
Hornet Sportabout	18.7	8	360	175	3.15	3.440	17.02	0	0	3
Valiant	18.1	6	225	105	2.76	3.460	20.22	1	0	3

# Cars

## Understanding the 'mtcars' Data Frame

Code to help  
understanding of data:

```
help(mtcars)
```

Format

A data frame with 32 observations on 11 (numeric) variables.

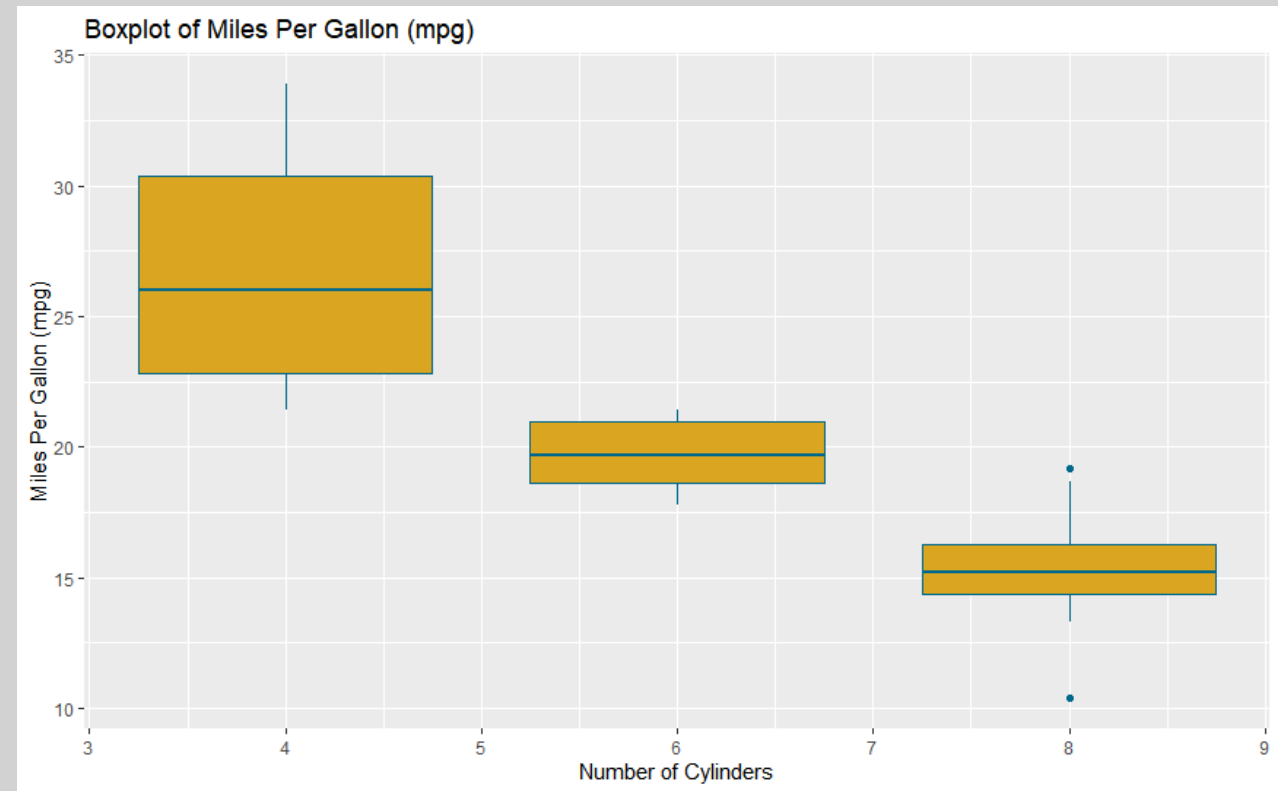
[, 1]	mpg	Miles/(US) gallon
[, 2]	cyl	Number of cylinders
[, 3]	disp	Displacement (cu.in.)
[, 4]	hp	Gross horsepower
[, 5]	drat	Rear axle ratio
[, 6]	wt	Weight (1000 lbs)
[, 7]	qsec	1/4 mile time
[, 8]	vs	Engine (0 = V-shaped, 1 = straight)
[, 9]	am	Transmission (0 = automatic, 1 = manual)
[,10]	gear	Number of forward gears
[,11]	carb	Number of carburetors

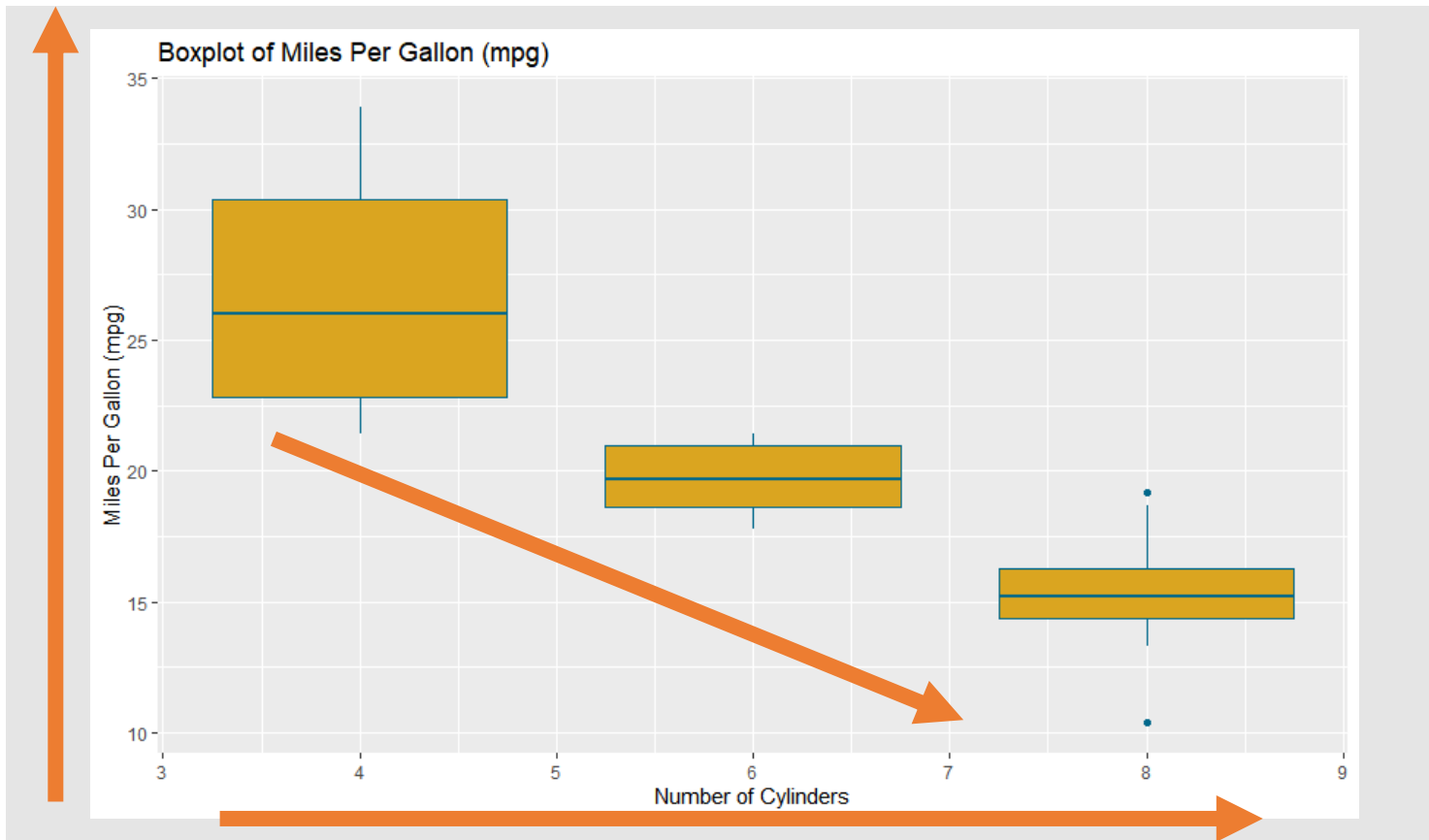
# Boxplot: Number of Cylinders vs. Mileage

Code to create this boxplot:

```
# Boxplot
```

```
ggplot(mtcars, aes(x = cyl, y = mpg)) +  
  geom_boxplot(aes(group = cyl), fill =  
    "goldenrod", color = "deepskyblue4") +  
  ggtitle("Boxplot of Miles Per Gallon  
(mpg)") +  
  xlab("Number of Cylinders") +  
  ylab("Miles Per Gallon (mpg)")
```





- The boxplot shows that the cars with fewer cylinders have a better fuel economy than the cars with more cylinders.
- In other words, the boxplot shows a negative correlation between the number of cylinders and the cars' fuel economy (miles per gallon).

# Analysis



# Cars Count of Cars by Number of Cylinders

Code to count cars by  
their number of cylinders:

```
mtcars %>% group_by(cyl)  
%>% summarize(Count =  
n())
```

# A tibble: 3 x 2

cyl Count

<dbl> <int>

1 4 11

2 6 7

3 8 14

# Cars Analysis

- There are 32 cars in the 'mt cars data set'.
- Of these 32 cars, 11 of them have 4 cylinders, 7 of them have 6 cylinders, and 14 of them have 8 cylinders.
- 8-cylinder cars have the highest count.
- However, the cost of the cars in the data frame have less than 8 cylinders.

# A tibble: 3 x 2

cyl Count

<dbl> <int>

1 4 11

2 6 7

3 8 14

# Conclusion

- Due to their fuel economy, most drivers might prefer 4-cylinder cars to 6- and 8-cylinder cars.
- However, 8-cylinder cars are useful for high-power applications such as racing.

