# `forcats`: working with categorical data

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The R package `forcats` is designed to make working with categorical variables easier and more efficient. It provides a set of functions that allow you to manipulate and analyze categorical data with ease. In this lesson, we'll cover the basics of the `forcats` package and some of its most useful functions.


## Categorical Variables

Let's review what categorical data is. Categorical data is a type of data that consists of categories or labels.

Examples of categorical data include:

- Colors (red, blue, green, etc.)
- Types of vehicles (sedan, SUV, truck)
- Educational degrees (high school, college, graduate school)

Categorical data can be further divided into two types: *nominal* and *ordinal*. Nominal data consists of categories that have no inherent order, while ordinal data consists of categories that have a natural order. For example, educational degrees are ordinal data because they can be ordered from least to most advanced.

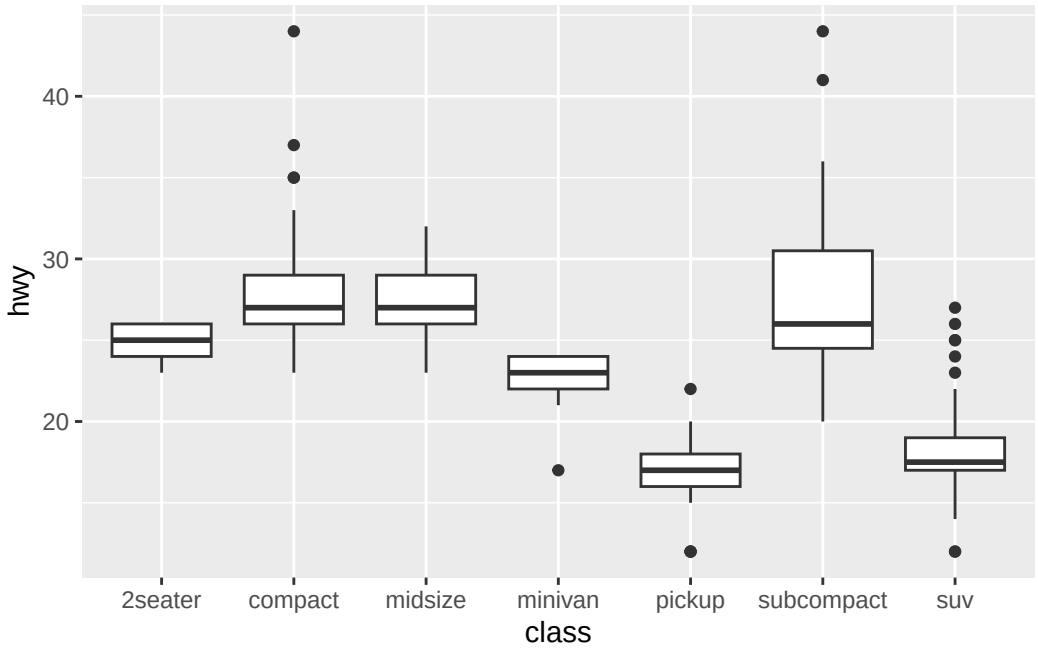
## `mpg` Data

We will play with different functions in the `forcats` packages using the `mpg` dataset from earlier in the semester.

```
library(forcats)
library(tidyverse)
data("mpg")
```

Recall our side-by-side boxplot:

```
mpg %>%
  ggplot(aes(x=class, y=hwy)) +
  geom_boxplot()
```




## Reordering Factor Levels

One of the most useful functions is fct_relevel(), which allows you to reorder the levels of a factor. This can be useful when you want to change the default ordering of the levels or when you want to group certain levels together.

Is `class` a factor?

```
mpg$class %>% is.factor()
```

```
[1] FALSE
```

Let's make it a factor!

```
mpg <- mpg %>%
  mutate(class = class %>%  as.factor())
```

Let's check the levels and their current ordering!

```
mpg$class %>%
  levels()
```

```
[1] "2seater"    "compact"    "midsize"    "minivan"    "pickup"
[6] "subcompact" "suv"
```

To reorder the levels with `fct_relevel()`

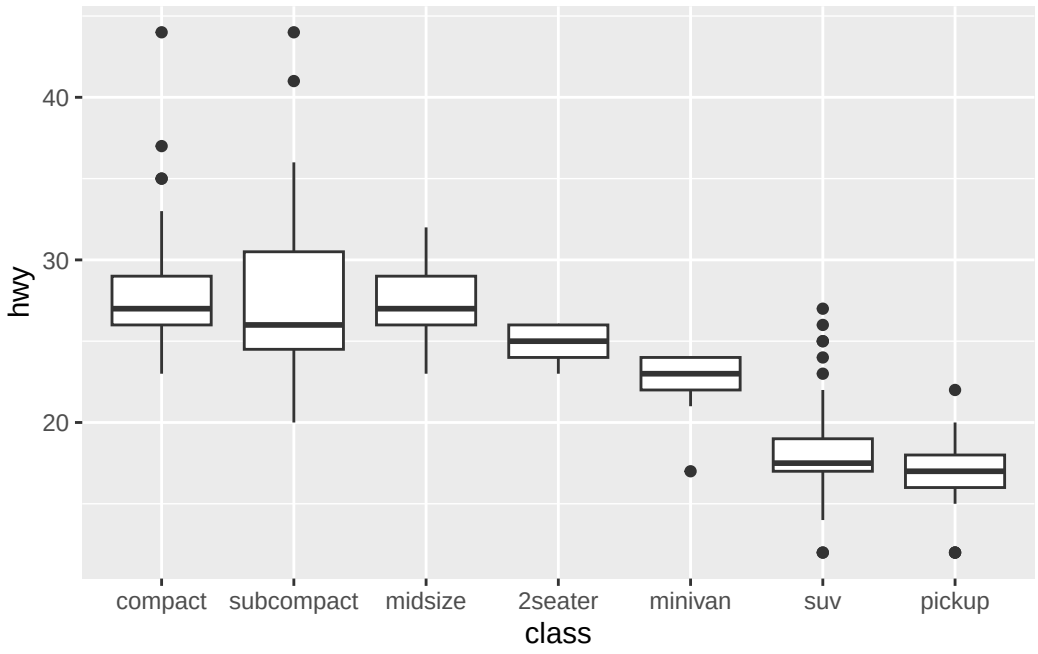
```
mpg <- mpg %>%
  mutate(class = class %>%  fct_relevel( "compact","subcompact","midsize","2seater","miniv

mpg$class %>%
  levels()
```

```
[1] "compact"    "subcompact" "midsize"    "2seater"    "minivan"
[6] "suv"        "pickup"
```

Let's recreate our side-by-side boxplot now:

```
mpg %>%
  ggplot(aes(x=class, y=hwy)) +
  geom_boxplot()
```




Rather than reordering them manually by typing the order, you could also re-level by some numeric criteria using `fct_reorder()`. For example:

```
mpg <- mpg %>%
  mutate(class = class %>% fct_reorder(hwy, median))

mpg$class %>%
  levels()
```

```
[1] "pickup"     "suv"        "minivan"    "2seater"    "subcompact"
[6] "compact"    "midsize"
```

### Renaming Factor levels with `fct_recode`

Sometimes you might not like the way the levels are named.

```
mpg <- mpg %>%
  mutate(class = class %>%  fct_recode("two-seater" = "2seater"))

## NEW NAME = OLD NAME

mpg$class %>%
```

```
  levels()
```

```
[1] "pickup"     "suv"        "minivan"    "two-seater" "subcompact"
[6] "compact"    "midsize"
```

### Factor Collapsing with `fct_collapse()`

Let's say we wanted to create only two categories – cars and larger vehicles.

```
mpg <- mpg %>%
  mutate(class_two = class %>%  fct_collapse( cars = c("compact", "subcompact", "midsize",

mpg$class_two %>%
  levels()
```

```
[1] "big"  "cars"
```

### Lumping into an other category

- `fct_lump_min()`: lumps levels that appear fewer than min times.
- `fct_lump_prop()`: lumps levels that appear in fewer than (or equal to) prop * n times.
- `fct_lump_n()` lumps all levels except for the n most frequent (or least frequent if n < 0)

```
mpg %>%
  count(manufacturer)
```

```
# A tibble: 15 x 2
   manufacturer     n
   <chr>        <int>
 1 audi            18
 2 chevrolet       19
 3 dodge           37
 4 ford            25
 5 honda            9
 6 hyundai         14
 7 jeep             8
 8 land rover       4
```

```
 9 lincoln          3
10 mercury          4
11 nissan          13
12 pontiac          5
13 subaru          14
14 toyota          34
15 volkswagen      27
```

Let's say we wanted only the manufacturers with at least 15 cars produced. Everything else we want to just be other:

```
mpg <- mpg %>%
  mutate(class_lumped = class %>% fct_lump_min(15))

mpg$manufacturer %>%
  levels()
```

```
NULL
```

Create a table using kableExtra:

```
library(kableExtra)

mpg %>%
  count(manufacturer) %>%
  kbl() %>%
  kable_styling()
```

| manufacturer | n |
|---|---|
| audi | 18 |
| chevrolet | 19 |
| dodge | 37 |
| ford | 25 |
| honda | 9 |
| hyundai | 14 |
| jeep | 8 |
| land rover | 4 |
| lincoln | 3 |
| mercury | 4 |
| nissan | 13 |
| pontiac | 5 |
| subaru | 14 |
| toyota | 34 |
| volkswagen | 27 |