Information about the `tidyverse`

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1 Code to Create this Document

```
rmarkdown::render("~/ST-558---Data-Science-in-R/Homeworks/Warren_ST 558 HW2_pdf.Rmd",
              output_format = "pdf_document",
              output_options = list(
                toc = TRUE,
                toc_depth = 2,
                number_sections = TRUE,
                df_print = "tibble"
                )
              )
```

2 R packages for data science

The tidyverse is an opinionated collection of R packages designed for data science. All packages share an underlying design philosophy, grammar, and data structures.

Install the complete tidyverse with:

```
install.packages("tidyverse")
```

3 Some Core Packages

The four *core* packages that we'll use the most are given below along with their purpose and a quick example of some functionality.

3.1 dplyr

`dplyr` is a grammar of data manipulation, providing a consistent set of verbs that help you solve the most common data manipulation challenges:

- `mutate()` adds new variables that are functions of existing variables
- `select()` picks variables based on their names.
- `filter()` picks cases based on their values.
- `summarise()` reduces multiple values down to a single summary.
- `arrange()` changes the ordering of the rows.

These all combine naturally with `group_by()` which allows you to perform any operation "by group". You can learn more about them in vignette("dplyr"). As well as these single-table verbs, dplyr also provides a variety of two-table verbs, which you can learn about in `vignette("two-table")`.

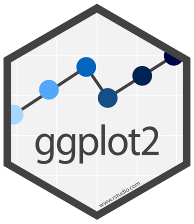
If you are new to dplyr, the best place to start is the data transformation chapter in R for data science.

```
library(dplyr)

starwars %>%
  filter(species == "Droid")
```

```
## # A tibble: 6 x 14
##   name   height  mass hair_color skin_color  eye_color birth_year sex   gender
##   <chr>   <int> <dbl> <chr>      <chr>       <chr>          <dbl> <chr> <chr>
## 1 C-3PO     167    75 <NA>       gold        yellow           112 none  masculi~
## 2 R2-D2      96    32 <NA>       white, blue red               33 none  masculi~
## 3 R5-D4      97    32 <NA>       white, red  red               NA none  masculi~
## 4 IG-88     200   140 none       metal       red               15 none  masculi~
## 5 R4-P17     96    NA none       silver, red red, blue         NA none  feminine
## 6 BB8        NA    NA none       none        black             NA none  masculi~
## # i 5 more variables: homeworld <chr>, species <chr>, films <list>,
## #   vehicles <list>, starships <list>
```

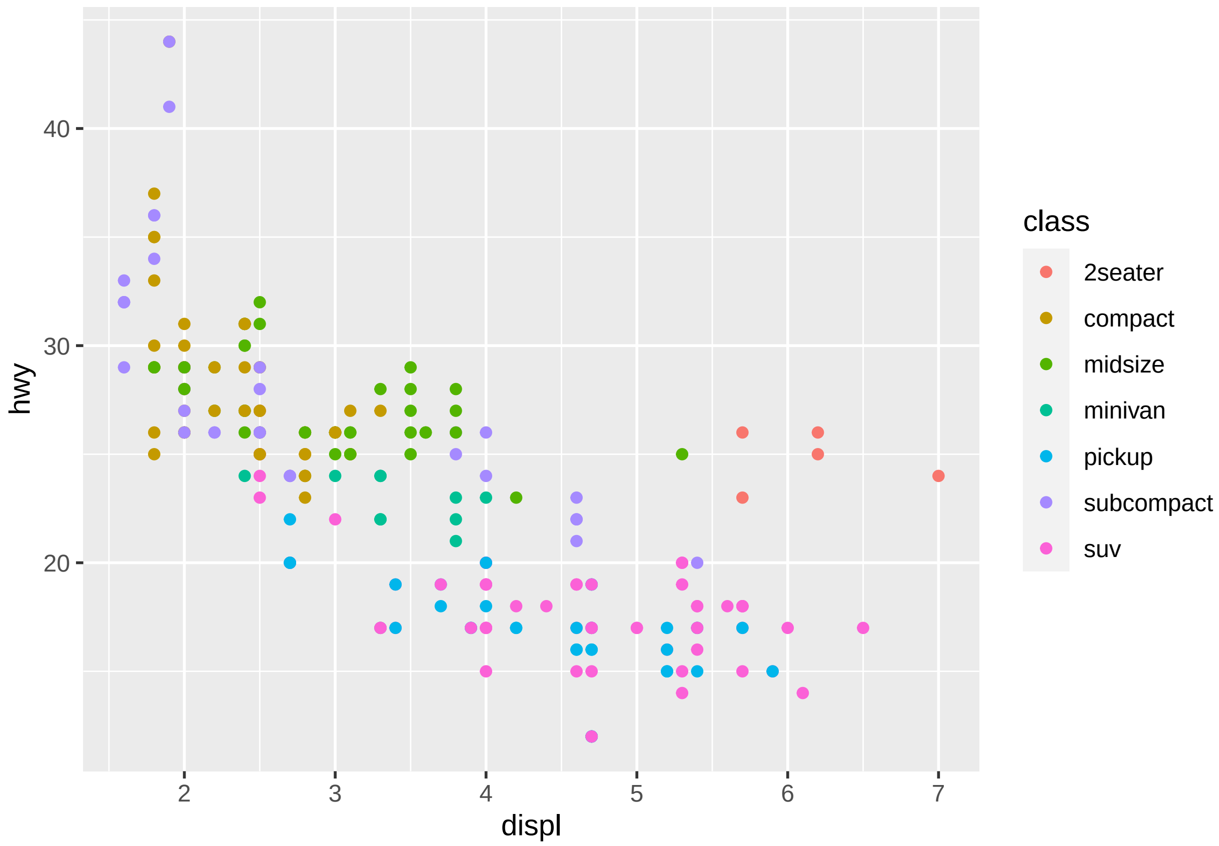
3.2 ggplot2



ggplot2 is a system for declaratively creating graphics, based on The Grammar of Graphics. You provide the data, tell ggplot2 how to map variables to aesthetics, what graphical primitives to use, and it takes care of the details.

```
library(ggplot2)

ggplot(mpg, aes(displ, hwy, colour = class)) +
  geom_point()
```



3.3 readr

The goal of readr is to provide a fast and friendly way to read rectangular data (like csv, tsv, and fwf). It is designed to flexibly parse many types of data found in the wild, while still cleanly failing when data unexpectedly changes. If you are new to readr, the best place to start is the data import chapter in R for data science.

3.4 tidyr

The goal of `tidyr` is to help you create tidy data. Tidy data is data where:

1. Every column is variable.
2. Every row is an observation.
3. Every cell is a single value.

Tidy data describes a standard way of storing data that is used wherever possible throughout the tidyverse. If you ensure that your data is tidy, you'll spend less time fighting with the tools and more time working on your analysis. Learn more about tidy data in `vignette("tidy-data")`.

```
library(tidyr)

relig_income
```

```
## # A tibble: 18 x 11
##    religion ‘<$10k‘ ‘$10-20k‘ ‘$20-30k‘ ‘$30-40k‘ ‘$40-50k‘ ‘$50-75k‘ ‘$75-100k‘
##    <chr>      <dbl>     <dbl>     <dbl>     <dbl>     <dbl>     <dbl>      <dbl>
##  1 Agnostic      27        34        60        81        76       137        122
##  2 Atheist       12        27        37        52        35        70         73
##  3 Buddhist      27        21        30        34        33        58         62
##  4 Catholic     418       617       732       670       638      1116        949
##  5 Don’t k~      15        14        15        11        10        35         21
##  6 Evangel~     575       869      1064       982       881      1486        949
##  7 Hindu          1         9         7         9        11        34         47
##  8 Histori~     228       244       236       238       197       223        131
##  9 Jehovah~      20        27        24        24        21        30         15
## 10 Jewish        19        19        25        25        30        95         69
## 11 Mainlin~     289       495       619       655       651      1107        939
## 12 Mormon        29        40        48        51        56       112         85
## 13 Muslim         6         7         9        10         9        23         16
## 14 Orthodox      13        17        23        32        32        47         38
## 15 Other C~       9         7        11        13        13        14         18
## 16 Other F~      20        33        40        46        49        63         46
## 17 Other W~       5         2         3         4         2         7          3
## 18 Unaffil~     217       299       374       365       341       528        407
## # i 3 more variables: ‘$100-150k‘ <dbl>, ‘>150k‘ <dbl>,
## #   ‘Don’t know/refused‘ <dbl>
```

```
relig_income %>%
  pivot_longer(-religion, names_to = "income", values_to = "frequency")
```

```
## # A tibble: 180 x 3
##    religion income             frequency
##    <chr>    <chr>                  <dbl>
##  1 Agnostic <$10k                     27
##  2 Agnostic $10-20k                   34
##  3 Agnostic $20-30k                   60
##  4 Agnostic $30-40k                   81
##  5 Agnostic $40-50k                   76
##  6 Agnostic $50-75k                  137
##  7 Agnostic $75-100k                 122
##  8 Agnostic $100-150k                109
##  9 Agnostic >150k                     84
## 10 Agnostic Don’t know/refused        96
## # i 170 more rows
```