Data I/O + Structure

Data Wrangling in R

What did I just read in?

- `nrow()` displays the number of rows of a data frame
- `ncol()` displays the number of columns
- `dim()` displays a vector of length 2: # rows, # columns

```
nrow(ufo)
```

```
[1] 88875
```

```
ncol(ufo)
```

```
[1] 11
```

```
dim(ufo)
```

```
[1] 88875    11
```

All Column Names

- `colnames()` displays the column names

```r
colnames(ufo)
```

```
 [1] "datetime"             "city"                 "state"
 [4] "country"              "shape"                "duration (seconds)"
 [7] "duration (hours/min)" "comments"             "date posted"
[10] "latitude"             "longitude"
```

Structure using `str()`

```
str(ufo)
```

```
spec_tbl_df [88,875 × 11] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
 $ datetime            : chr [1:88875] "10/10/1949 20:30" "10/10/1949 21:00" "
 $ city                : chr [1:88875] "san marcos" "lackland afb" "chester (u
 $ state               : chr [1:88875] "tx" "tx" NA "tx" ...
 $ country             : chr [1:88875] "us" NA "gb" "us" ...
 $ shape               : chr [1:88875] "cylinder" "light" "circle" "circle" ..
 $ duration (seconds)  : num [1:88875] 2700 7200 20 20 900 300 180 1200 180 12
 $ duration (hours/min): chr [1:88875] "45 minutes" "1-2 hrs" "20 seconds" "1/
 $ comments            : chr [1:88875] "This event took place in early fall ar
 $ date posted         : chr [1:88875] "4/27/2004" "12/16/2005" "1/21/2008" "1
 $ latitude            : chr [1:88875] "29.8830556" "29.38421" "53.2" "28.978
 $ longitude           : chr [1:88875] "-97.9411111" "-98.581082" "-2.916667"
 - attr(*, "spec")=
  .. cols(
  ..   datetime = col_character(),
  ..   city = col_character(),
  ..   state = col_character(),
  ..   country = col_character(),
  ..   shape = col_character(),
  ..   `duration (seconds)` = col_double(),
  ..   `duration (hours/min)` = col_character(),
  ..   comments = col_character(),
  ..   `date posted` = col_character(),
  ..   latitude = col_character(),
  ..   longitude = col_character()
```

Data Input

- Sometimes you get weird messages when reading in data.
- The problems()` function shows you any issues with the data read-in.

```
head(problems(ufo))
```

```
# A tibble: 6 × 5
    row   col expected   actual     file
  <int> <int> <chr>      <chr>      <chr>
1   878    12 11 columns 12 columns /Users/avahoffman/Dropbox/JHSPH/Data-Wrang
2  1713    12 11 columns 12 columns /Users/avahoffman/Dropbox/JHSPH/Data-Wrang
3  1815    12 11 columns 12 columns /Users/avahoffman/Dropbox/JHSPH/Data-Wrang
4  2858    12 11 columns 12 columns /Users/avahoffman/Dropbox/JHSPH/Data-Wrang
5  3734    12 11 columns 12 columns /Users/avahoffman/Dropbox/JHSPH/Data-Wrang
6  4756    12 11 columns 12 columns /Users/avahoffman/Dropbox/JHSPH/Data-Wrang
```

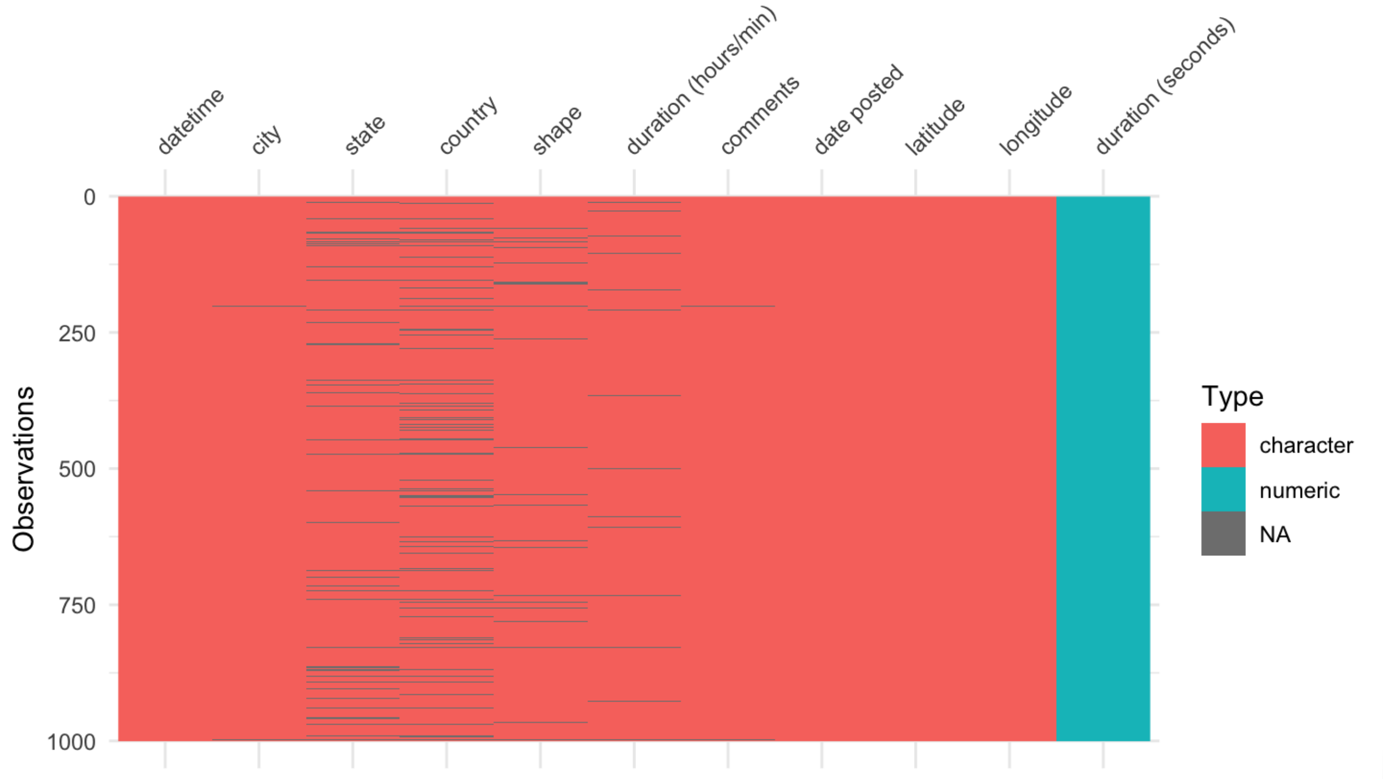
```
dim(problems(ufo))
```

```
[1] 199   5
```

Missing data with the **`vizdat`**/**`naniar`** packages

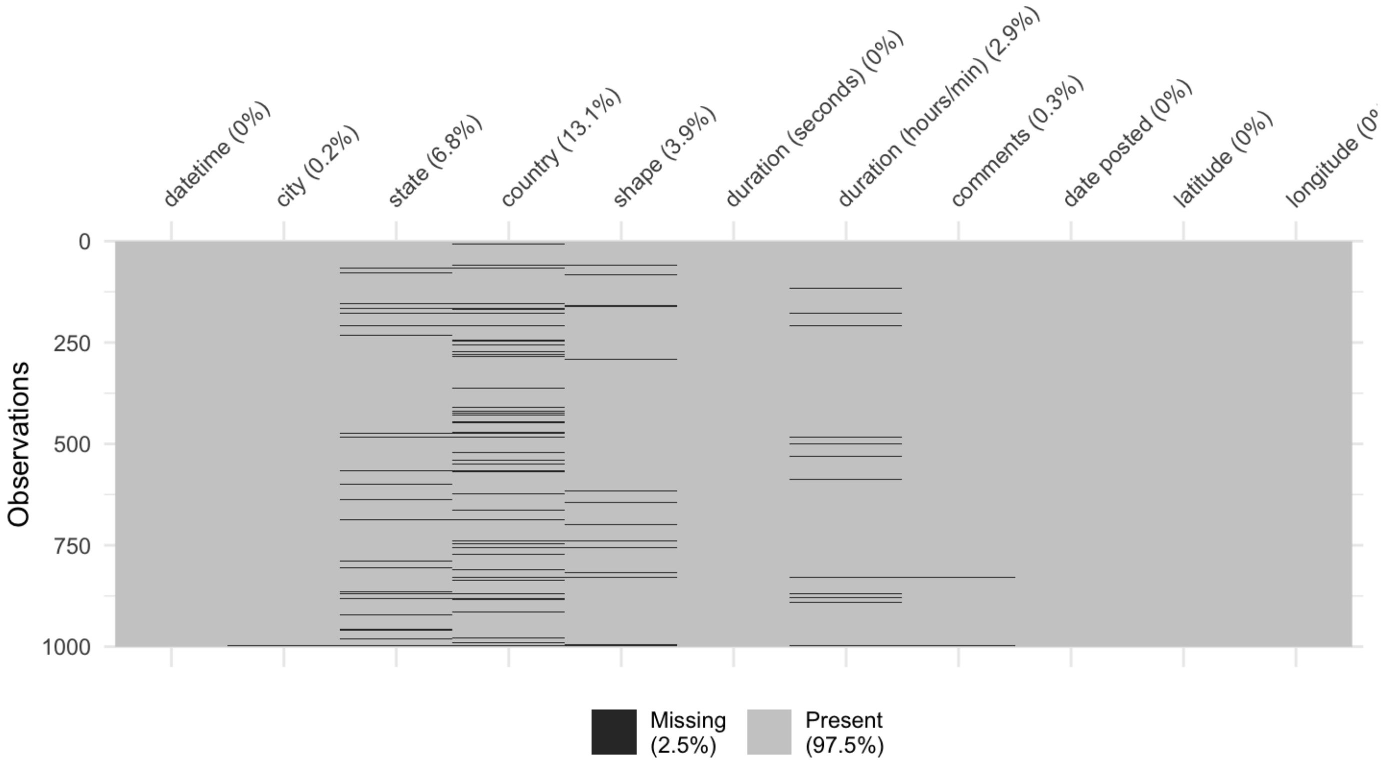
The `vis_dat` function can give you an overview

```
library(visdat)
ufo_samp <- ufo %>% sample_n(size = 1000) # Subset for big data
vis_dat(ufo_samp)
```



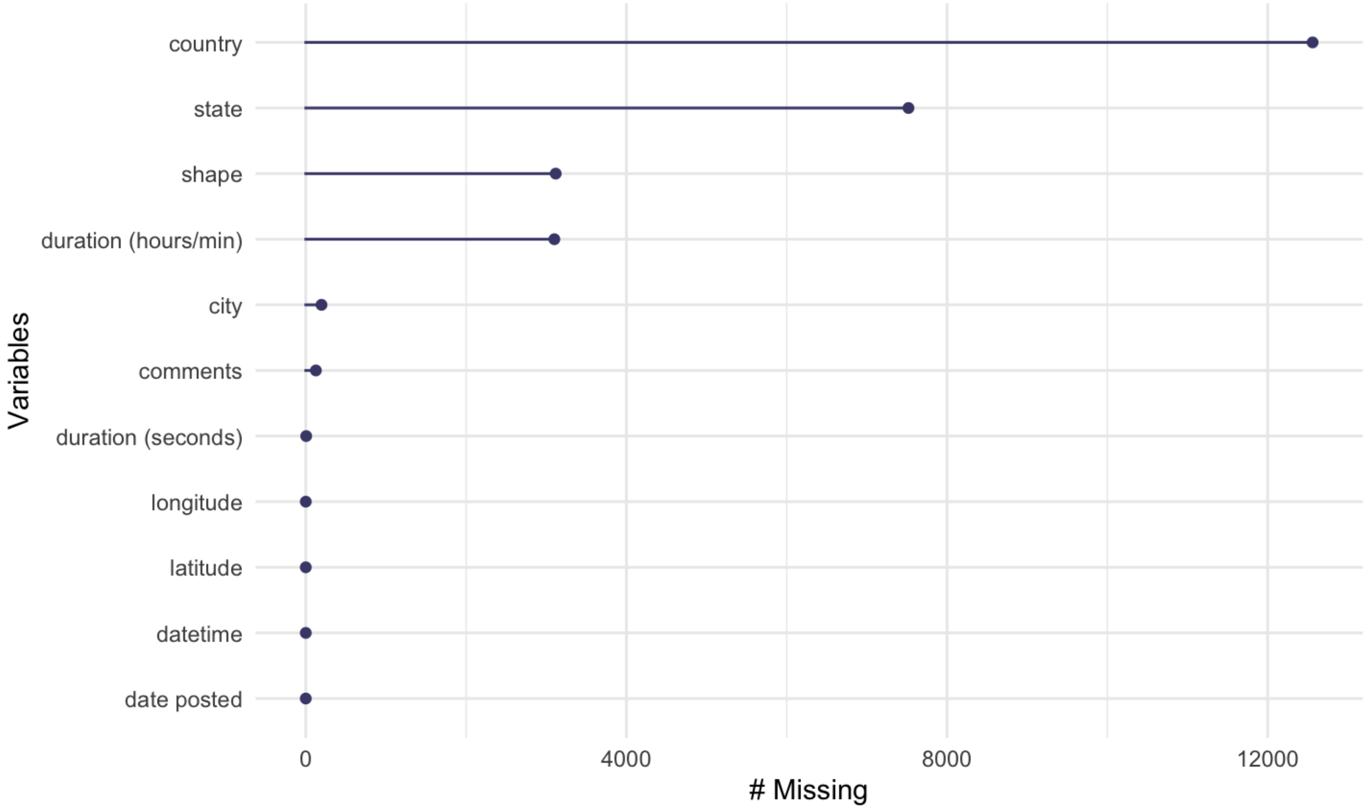
Missing data with the `vizdat`/`naniar` packages

```
vis_miss(ufo_samp)
```



Missing data with the `vizdat`/`naniar` packages

```
library(naniar)
gg_miss_var(ufo)
```



Missing data with the `vizdat`/`naniar` packages

`miss_case_summary` which rows have missing data in order

```
miss_case_summary(ufo)
```

```
# A tibble: 88,875 × 3
    case n_miss pct_miss
   <int>  <int>    <dbl>
 1   877      6     54.5
 2  1712      6     54.5
 3  5613      6     54.5
 4  7515      6     54.5
 5  7625      6     54.5
 6 10156      6     54.5
 7 16634      6     54.5
 8 18240      6     54.5
 9 19813      6     54.5
10 19908      6     54.5
# … with 88,865 more rows
```

Missing data with the `vizdat/naniar` packages

`miss_var_summary` which variables have missing data

```
miss_var_summary(ufo)
```

```
# A tibble: 11 × 3
   variable             n_miss pct_miss
   <chr>                 <int>    <dbl>
 1 country               12561 14.1
 2 state                  7519  8.46
 3 shape                  3118  3.51
 4 duration (hours/min)   3101  3.49
 5 city                    196  0.221
 6 comments                126  0.142
 7 duration (seconds)        5  0.00563
 8 datetime                  0  0
 9 date posted               0  0
10 latitude                  0  0
11 longitude                 0  0
```

After hours of cleaning…

More ways to save: write_rds

If you want to save **one** object, you can use `readr::write_rds` to save to a compressed `rds` file:

```
write_rds(ufo, file = "ufo_dataset.rds", compress = "xz")
```

More ways to save: **`read_rds`**

To read this back in to R, you need to use `read_rds`, but **need to assign it**:

```
ufo3 <- read_rds(file = "ufo_dataset.rds")
identical(ufo, ufo3) # test if they are the same
```

```
[1] FALSE
```

More ways to save: `save`

The `save` command can save a set of `R` objects into an “R data file”, with the extension `.rda` or `.RData`.

```r
x = 5
save(ufo, x, file = "ufo_data.rda")
```

More ways to save: load

The opposite of `save` is `load`. The `ls()` command lists the items in the workspace/environment and `rm()` removes them

```
load(file = "ufo_data.rda")
```

Data Output

While its nice to be able to read in a variety of data formats, it’s equally important to be able to output data somewhere.

`write_delim()`: Write a data frame to a delimited file “This is about twice as fast as write.csv(), and never writes row names.”

Data Output

`x`: A data frame to write to disk

`file`: the file name where you want to R object written. It can be an absolute path, or a filename (which writes the file to your working directory)

`delim`: what character separates the columns?

- `","` = .csv - Note there is also a `write_csv()` function
- `"\t"` = tab delimited

Data Output

For example, we can write back out just the first 100 lines of the `ufo` dataset:

```
write_delim(ufo[1:100,], file = "ufo_first100.csv", delim = ",")
```