STOR 320 Data Import

Lecture 7

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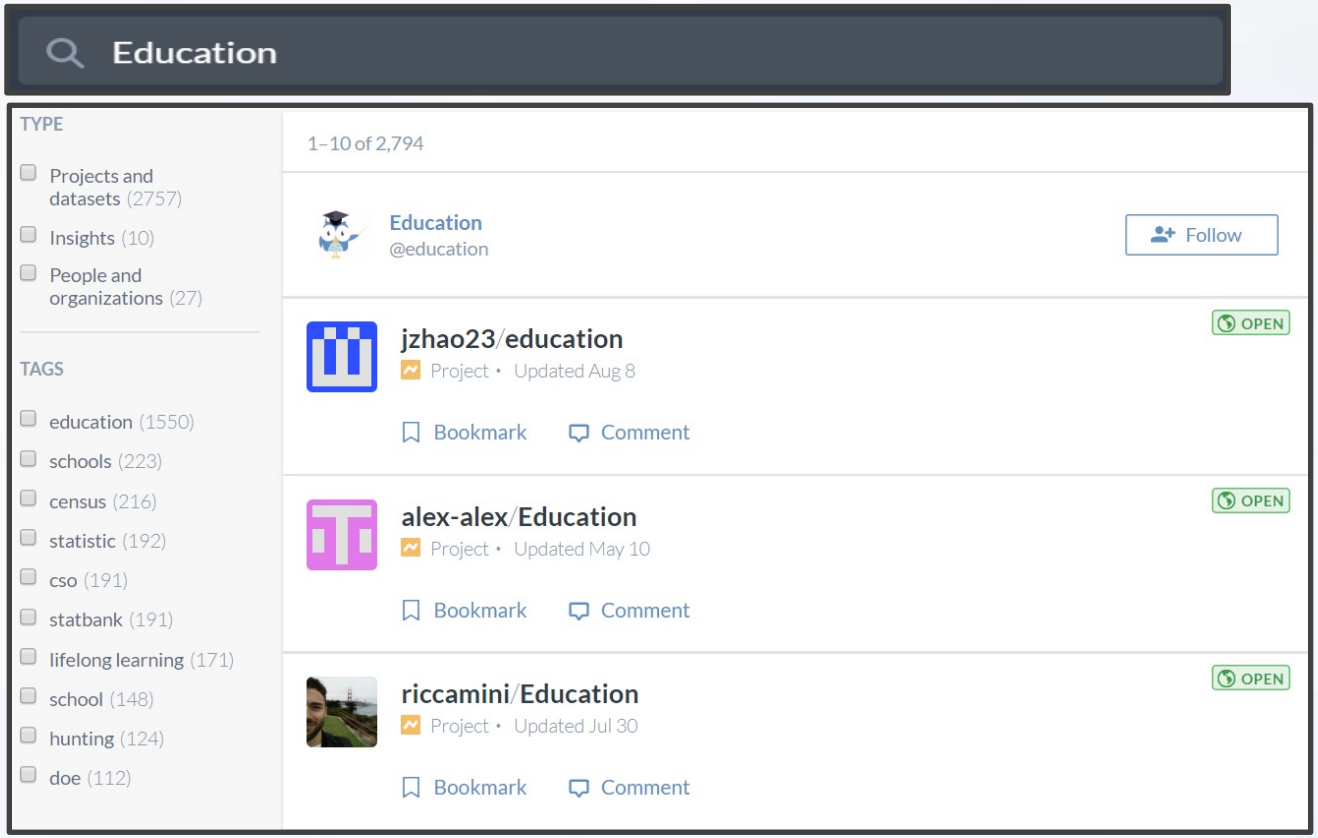
Finding Data

- Built-in Datasets in R Packages
  - Example: NYC Flights
    - `>library(nycflights13)`
    - 5 Different Data Sets
  - More Comprehensive List
    - Vincent Arel-Bundock
    - Link
    - Packages
    - Data Name
    - Variable Information
    - CSV Links for Download
    - DOC Links for Details

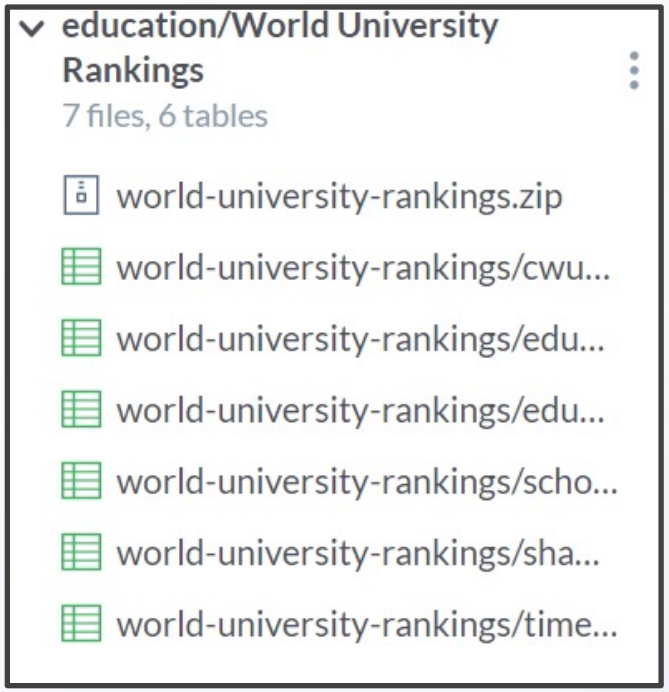
Finding Data

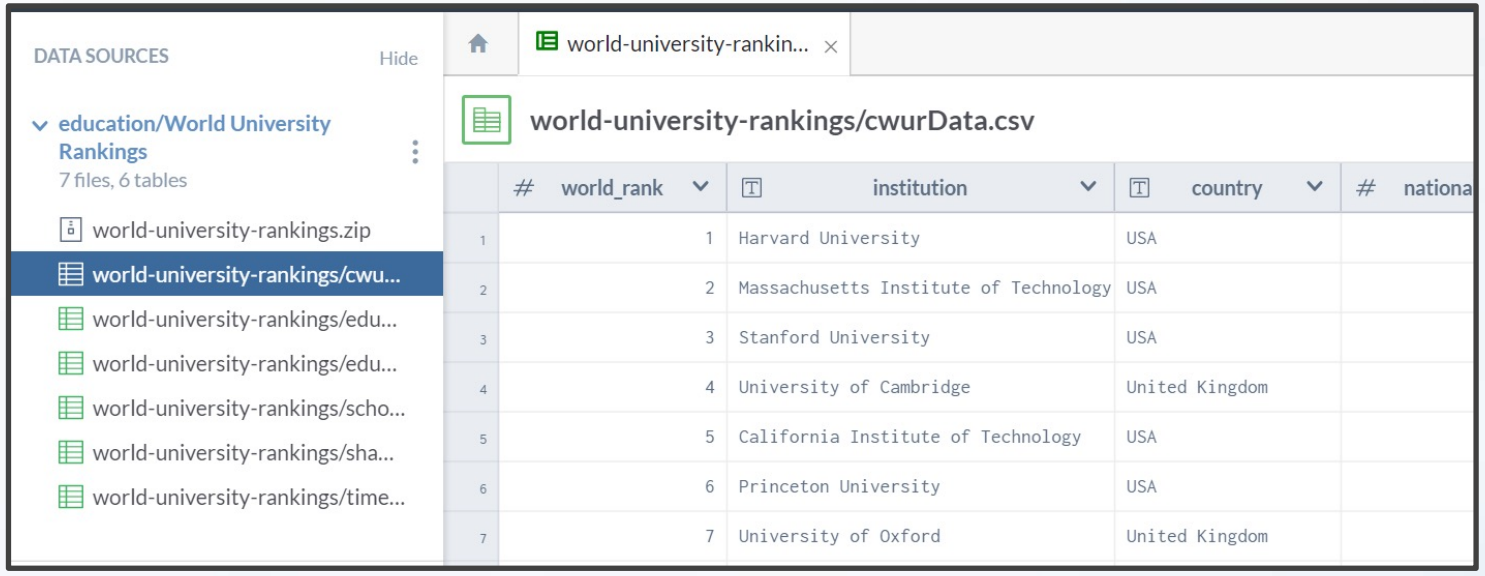
- Online Websites
  - Data.World
    - Requires Sign-up
    - Search for Topic



Finding Data

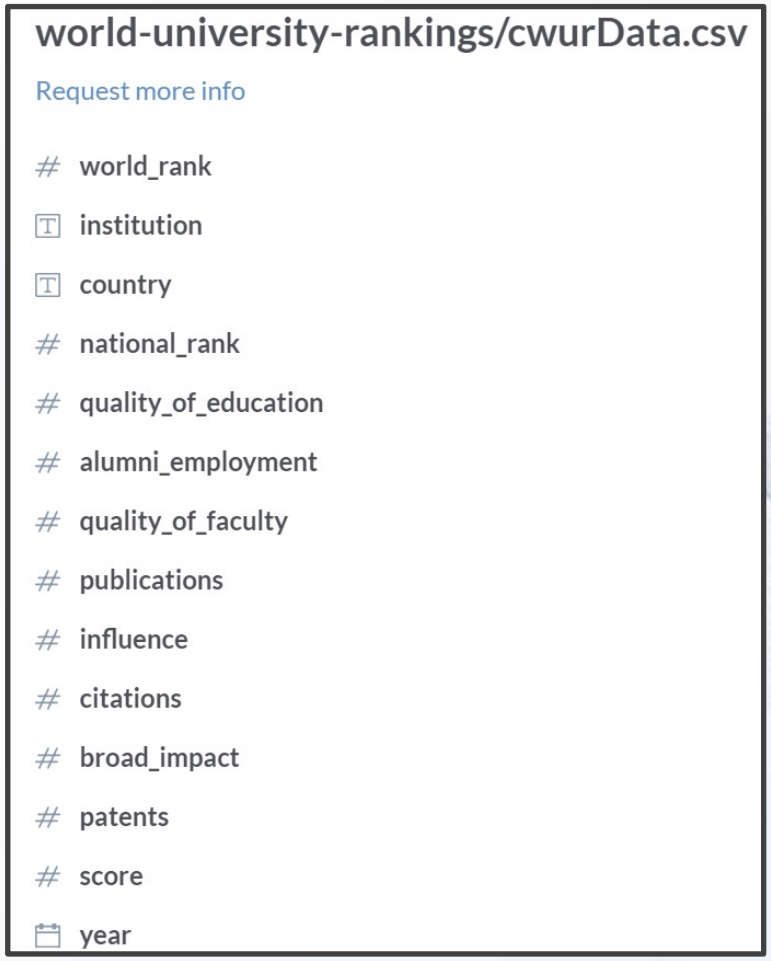
- Online Websites
  - Data.World
    - Inspect Data





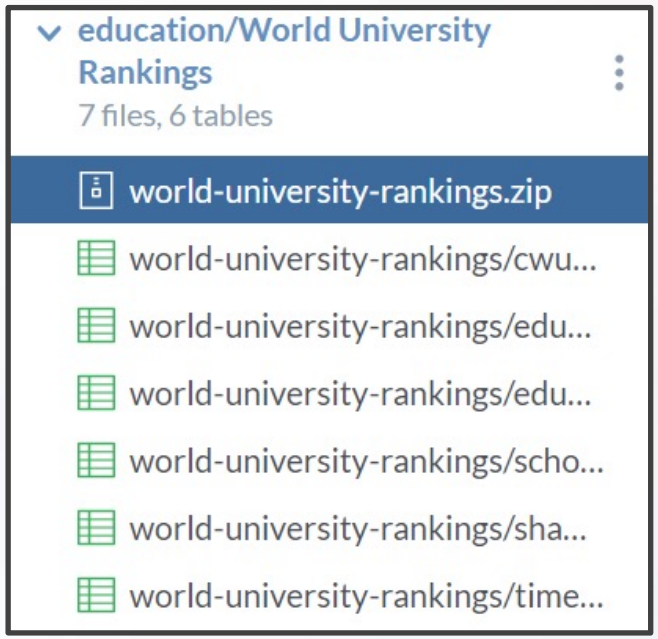
Finding Data

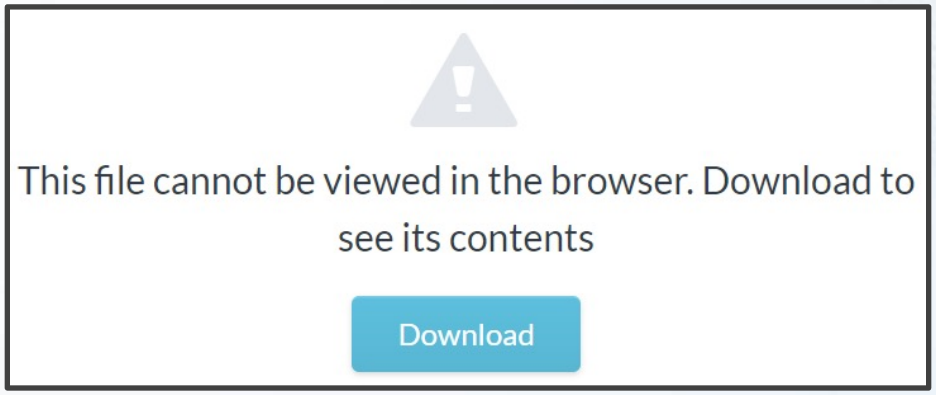
- Online Websites
  - Data.World
    - Read Data Dictionary



Finding Data

- Online Websites
  - Data.World
    - Download .zip Folder

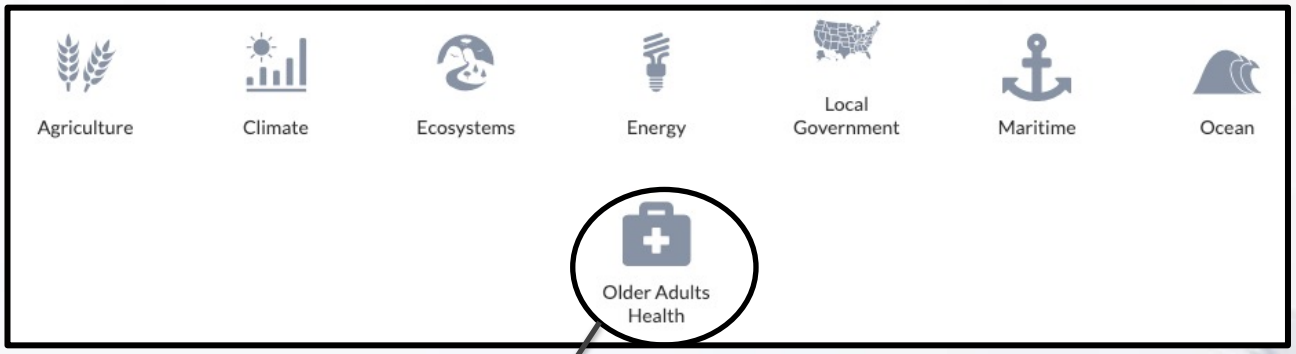


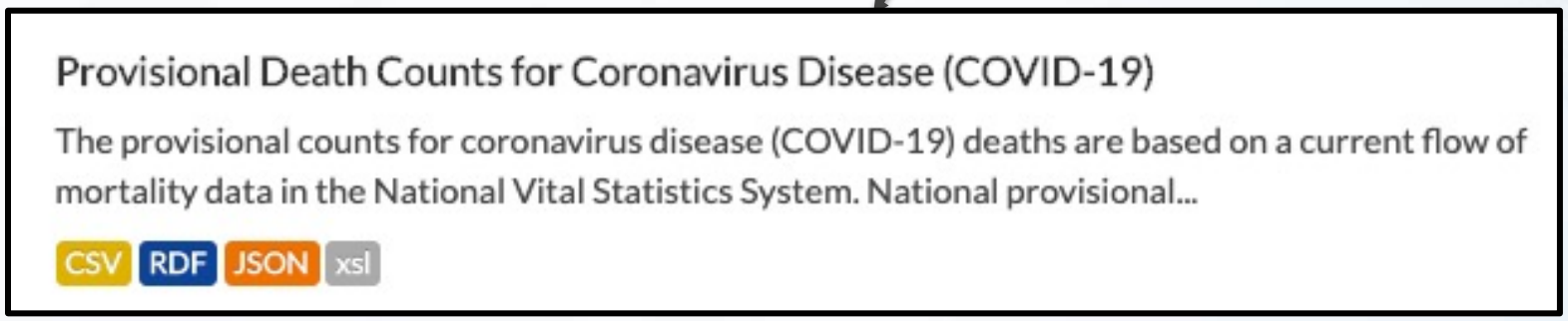


Finding Data

- Online Websites
  - Data.Gov
    - Logo

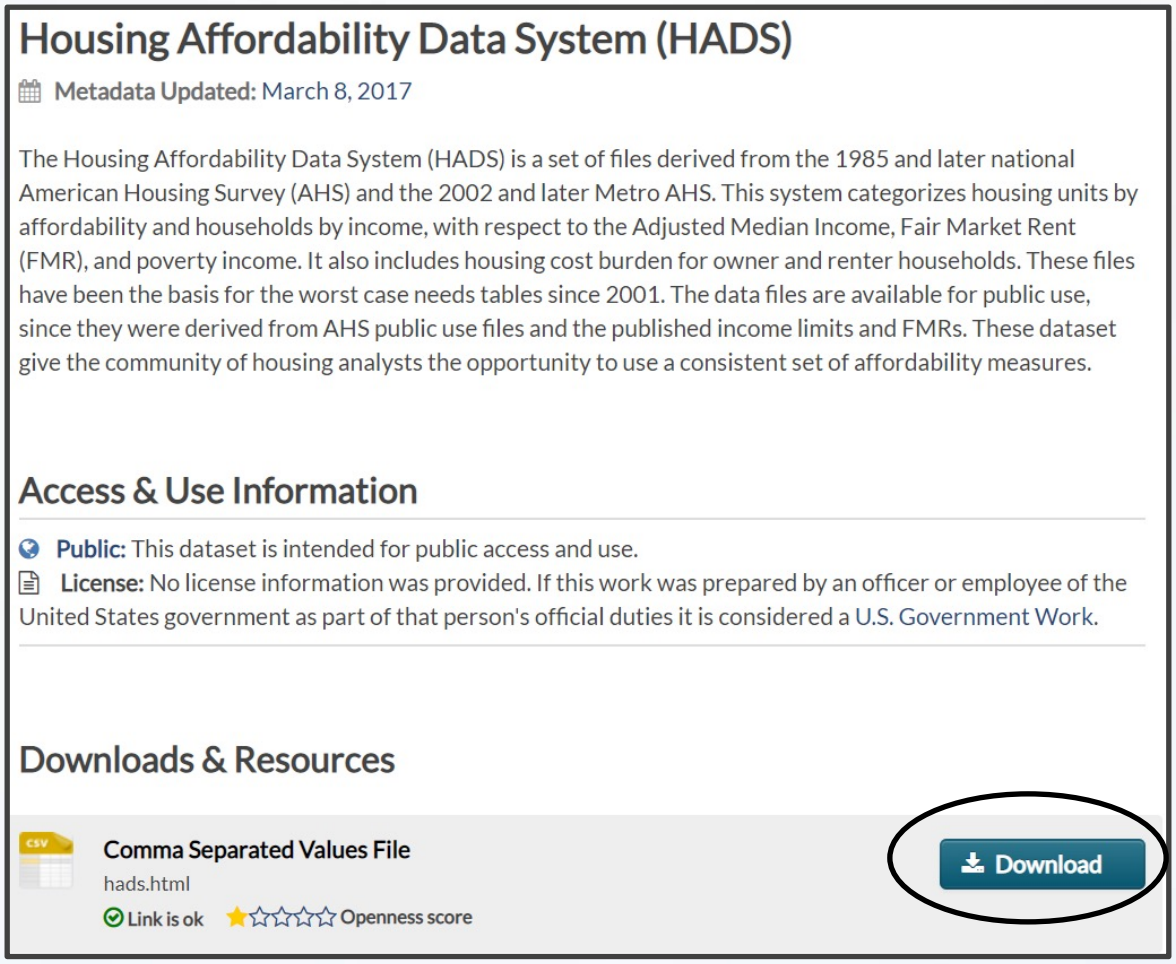
    - Topics List





Finding Data

- Online Websites
  - Data.Gov
    - Check Description



Housing Affordability Data System (HADS)

Metadata Updated: March 8, 2017

The Housing Affordability Data System (HADS) is a set of files derived from the 1985 and later national American Housing Survey (AHS) and the 2002 and later Metro AHS. This system categorizes housing units by affordability and households by income, with respect to the Adjusted Median Income, Fair Market Rent (FMR), and poverty income. It also includes housing cost burden for owner and renter households. These files have been the basis for the worst case needs tables since 2001. The data files are available for public use, since they were derived from AHS public use files and the published income limits and FMRs. These dataset give the community of housing analysts the opportunity to use a consistent set of affordability measures.

Access & Use Information

Public: This dataset is intended for public access and use.

License: No license information was provided. If this work was prepared by an officer or employee of the United States government as part of that person's official duties it is considered a U.S. Government Work.

Downloads & Resources

Comma Separated Values File

hads.html

Link is ok ☆☆☆☆☆ Openness score

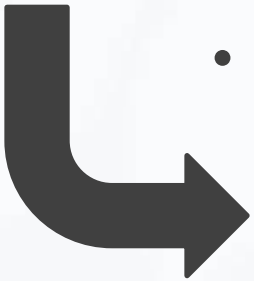
Download

Finding Data

- Online Websites
  - Data.Gov
    - Find Documentation

Download the HADS documentation file (*.pdf, 159 KB)

The Housing Affordability Data System (HADS) is a set of housing-unit level datasets that measures the affordability of housing *units* and the housing cost burdens of *households*, relative to area median incomes, poverty level incomes, and Fair Market Rents. The purpose of these datasets is to provide housing analysts with consistent measures of affordability and burdens over a long period. The datasets are based on the American Housing Survey (AHS) national files from 1985 through 2009 and the metropolitan files from 2002 through 2009. Users can link records in HADS files to AHS records, allowing access to all of the AHS variables.



- Important Info About Data
  - Purpose of Data
  - Survey Data
  - Two Sets of Files
  - Years Included

Finding Data

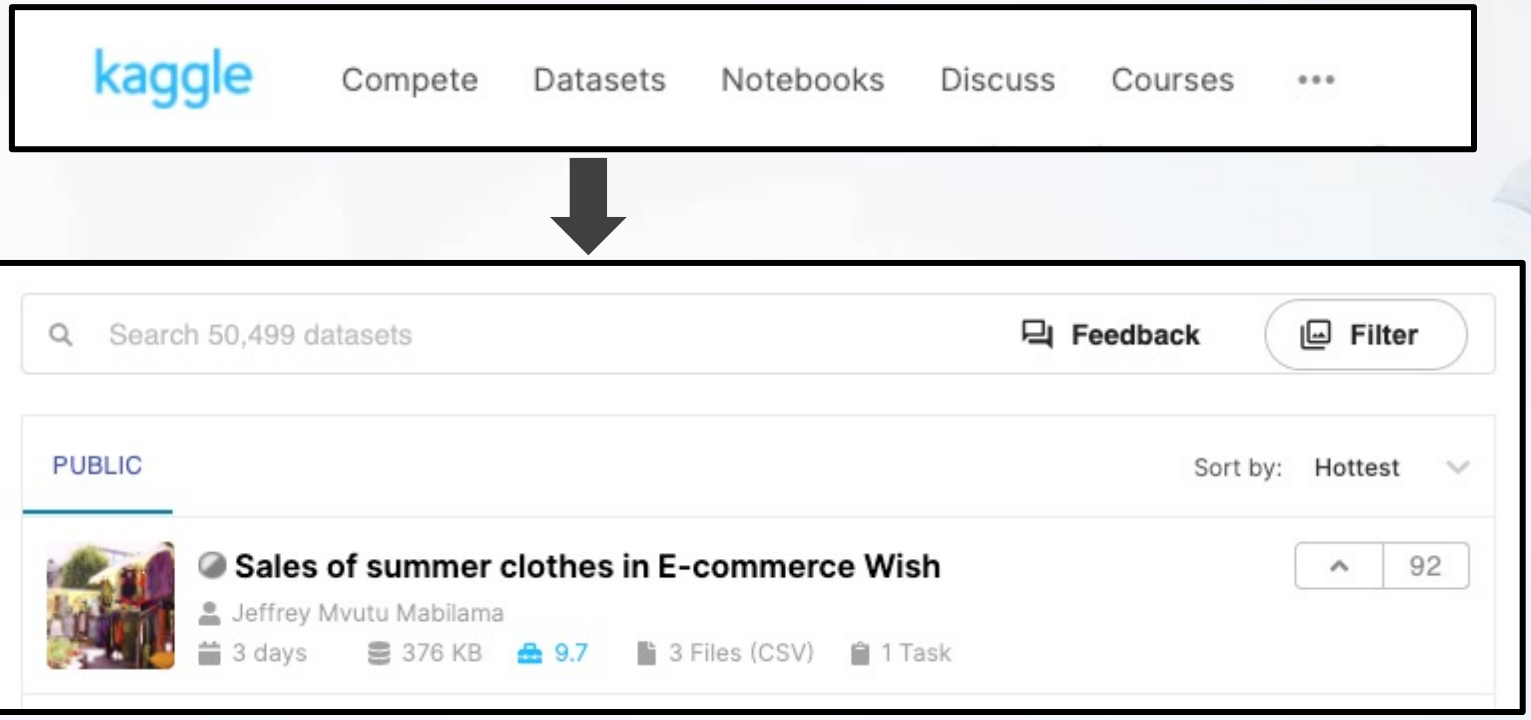
- Online Websites
  - Data.Gov
    - Download Links

HADS Data derived from AHS National Data		
Year	**ASCII version**	**SAS version**
2013	*.zip (11.3 MB)	*.zip (18.8 MB)
2011	*.zip (22.3 MB)	*.zip (28.6 MB)

HADS Data derived from AHS Metro Data		
Year	**ASCII version**	**SAS version**
2013	*.zip (9.4 MB)	*.zip (12.3 MB)
2009	Seattle Data (654 KB)	Seattle Data (727 KB)

Finding Data

- Online Websites
  - Kaggle
    - Requires Sign-up
    - Check Datasets



Finding Data

- Online Websites
  - Kaggle
    - Requires Sign-up
    - Overview and Question

Data Overview Kernels Discussion Activity

Competition Description

Ask a home buyer to describe their dream house, and they probably won't begin with the height of the basement ceiling or the proximity to an east-west railroad. But this playground competition's dataset proves that much more influences price negotiations than the number of bedrooms or a white-picket fence.

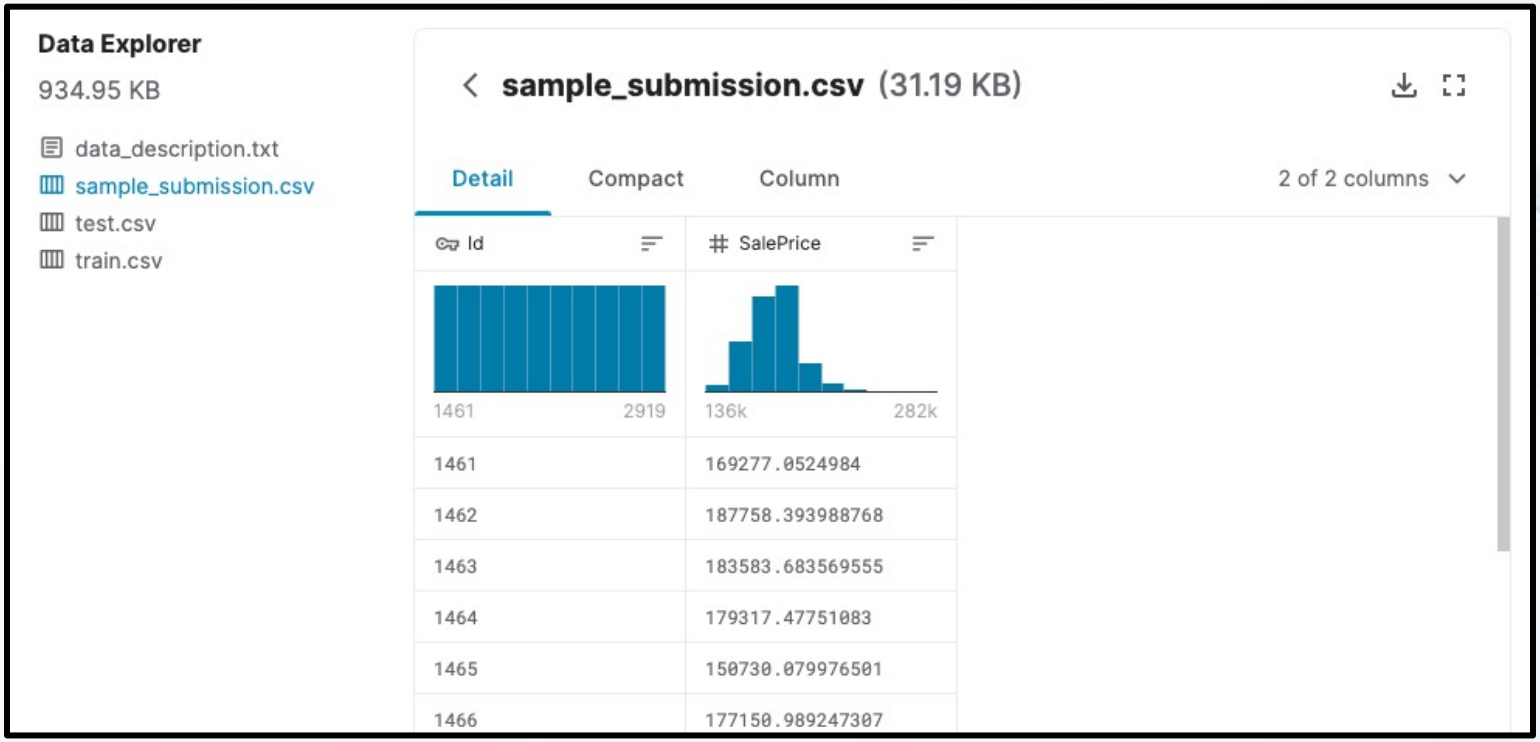
With 79 explanatory variables describing (almost) every aspect of residential homes in Ames, Iowa, this competition challenges you to predict the final price of each home.

Goal

It is your job to predict the sales price for each house. For each Id in the test set, you must predict the value of the SalePrice variable.

Finding Data

- Online Websites
  - Kaggle
    - Requires Sign-up
    - Data Info and Download



File Types

- Read Chapter 11
  - Package for Importing
  - Functions for Loading Data

```
>library(readr)
```

- File Types
  - Different Delimiters
    - Comma, Tab, Space, Semicolon, Period
  - Different File Types
    - CSV – Comma
    - XLSX or XLS – Tab
    - TXT – Anything Possible
    - HTML – Anything Possible
  - Inspect Raw Data File

Data Import

- Importing CSV – Most Common
  - read_csv()

```
```{r}
UniRank=read_csv(file="/Users/yaoli/Documents/ACADEMIC/Academic
Semesters/2020FALL/STOR320.1/Lectures/Lecture06/Example/cwurData.csv",
                 col_names=T)
glimpse(UniRank)
```
```

```
Observations: 2,198
Variables: 14
$ world_rank           <int> 1, 2, 3, 4, 5, 6, 7, 8, 9...
$ institution          <chr> "Harvard University", "Ma...
$ country              <chr> "USA", "USA", "USA", "Uni...
$ national_rank        <int> 1, 2, 3, 1, 4, 5, 2, 6, 7...
$ quality_of_education <int> 7, 9, 17, 10, 2, 8, 13, 1...
$ alumni_employment    <int> 9, 17, 11, 24, 29, 14, 28...
$ quality_of_faculty   <int> 1, 3, 5, 4, 7, 2, 9, 12, ...
$ publications         <int> 1, 12, 4, 16, 37, 53, 15,...
$ influence            <int> 1, 4, 2, 16, 22, 33, 13, ...
$ citations            <int> 1, 4, 2, 11, 22, 26, 19, ...
$ broad_impact         <int> NA, NA, NA, NA, NA, NA, N...
$ patents              <int> 5, 1, 15, 50, 18, 101, 26...
$ score                <dbl> 100.00, 91.67, 89.50, 86....
$ year                 <int> 2012, 2012, 2012, 2012, 2...
```

- Auto Use of Column Names
- Autodetects Variable Types
- File Path Requires “/”

Data Import

- Importing CSV – column specification

```r
UniRank=read_csv(file="/Users/yaoli/Documents/ACADEMIC/Academic Semesters/2020FALL/STOR320.1/Lectures/Lecture06/Example/cwurData.csv",
                 col_names=T)
glimpse(UniRank)
```

```
Rows: 2200 Columns: 14
── Column specification ────────────────────────────────────────────────────────
Delimiter: ","
chr  (2): institution, country
dbl (12): world_rank, national_rank, quality_of_education, alumni_employment...
```

Autodetect Info

```r
spec(UniRank)
```

```
cols(
  world_rank = col_double(),
  institution = col_character(),
  country = col_character(),
  national_rank = col_double(),
  quality_of_education = col_double(),
  alumni_employment = col_double(),
  quality_of_faculty = col_double(),
  publications = col_double(),
  influence = col_double(),
  citations = col_double(),
  broad_impact = col_double(),
  patents = col_double(),
  score = col_double(),
  year = col_double()
)
```

- Always Check Tibble After Import
- Observe That Variable Types are What You Want

Data Import

- Other Types
  - read_delim() for General

```
read_delim(PATH, delim='\')
```

  - XLS or XLSX

```
>library(readxl)
```

- Check Missing Values
  - See if NA's are Appropriately Recorded
  - Too Many NA's
  - Not Enough NA's
  - Crosscheck Raw Data and Data Documentation

Example

- HADS Data From Data.Gov

```
```{r,message=F}
Housing=read_csv(file="Example/thads2013n.txt")
head(Housing,5)
```
```

```
Housing=read_csv(file="Example/thads2013n.txt")
head(Housing,5)
```

```
## # A tibble: 5 x 99
##   CONTROL  AGE1 METRO3 REGION  LMED   FMR   L30   L50   L80  IPOV BEDRMS
##   <chr>   <int> <chr>  <chr>  <int> <int> <int> <int> <int> <int>  <int>
## 1 '10000~    82 '3'    '1'    73738   956 15738 26213 40322 11067      2
## 2 '10000~    50 '5'    '3'    55846  1100 17165 28604 45744 24218      4
## 3 '10000~    53 '5'    '3'    55846  1100 13750 22897 36614 15470      4
## 4 '10000~    67 '5'    '3'    55846   949 13750 22897 36614 13964      3
## 5 '10000~    26 '1'    '3'    60991   737 14801 24628 39421 15492      2
## # ... with 88 more variables: BUILT <int>, STATUS <chr>, TYPE <int>,
## #   VALUE <int>, VACANCY <int>, TENURE <chr>, NUNITS <int>, ROOMS <int>,
## #   WEIGHT <dbl>, PER <int>, ZINC2 <int>, ZADEQ <chr>, ZSMHC <int>,
## #   STRUCTURETYPE <int>, OWNRENT <chr>, UTILITY <dbl>, OTHERCOST <dbl>,
## #   COST06 <dbl>, COST12 <dbl>, COST08 <dbl>, COSTMED <dbl>, TOTSAL <int>
```

Example

- HADS Data From Data.Gov
  - Crosscheck

```r
```{r,message=F}
Housing2=read_csv(file="Example/thads2013n.txt") %>%
          select(BUILT,TOTSAL,VALUE,BURDEN)
Housing2
```
```

BUILT <dbl>	TOTSAL <dbl>	VALUE <dbl>	BURDEN <dbl>
2004	0	60000	0.22640619
2003	0	40000	0.07631935
1990	0	290000	0.04674121
1990	0	230000	0.12203823
2005	150000	260000	0.05674155
1990	0	280000	0.16979326
2004	69353	110000	0.17742005
1980	-9	-6	-9.00000000
2007	200000	330000	0.12745657
2012	100000	90000	0.09565243

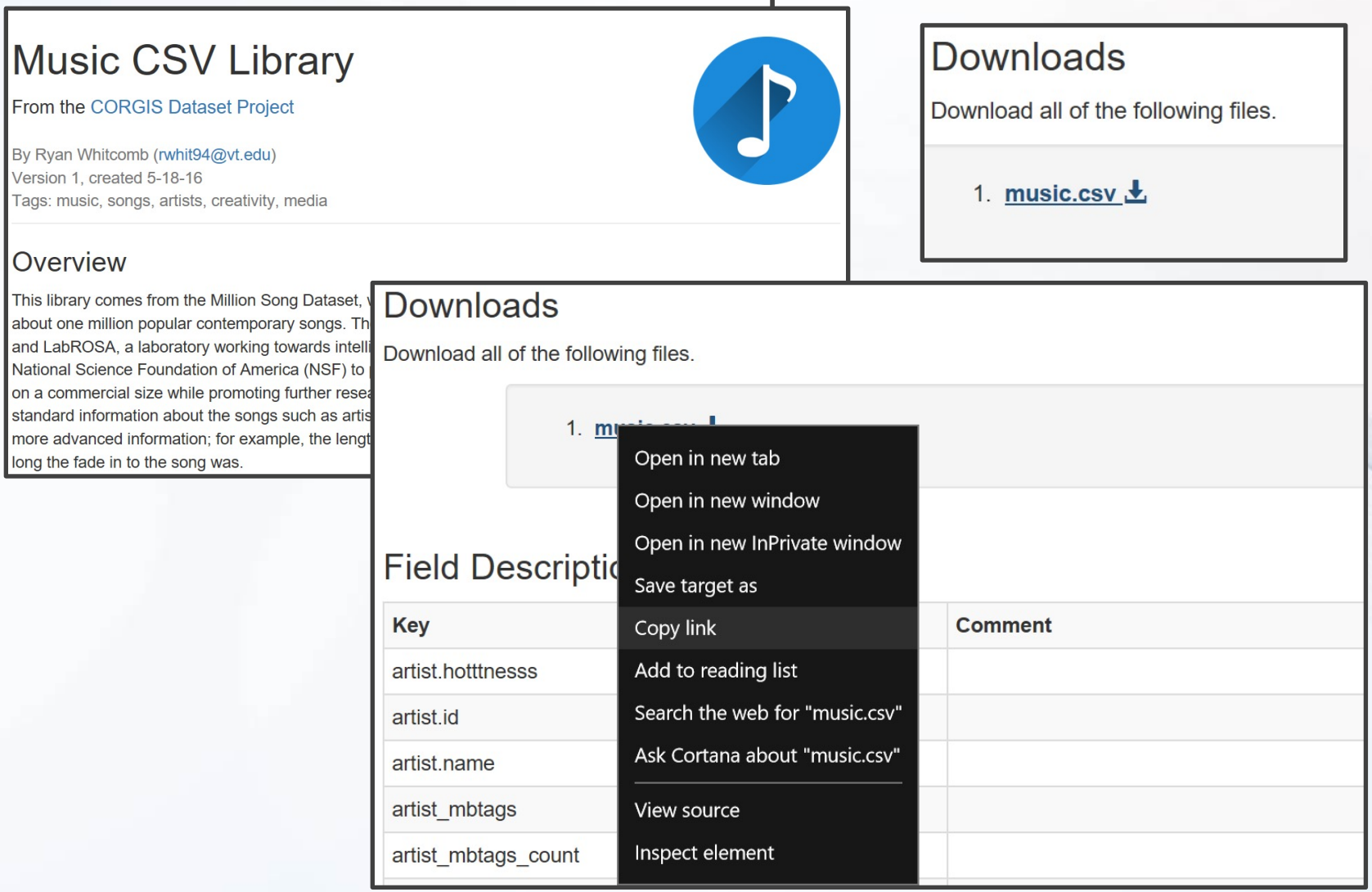
Errors or Missing Should Become NA

Total salary income (TotSal) is useful for identifying the "working poor" and measuring the labor force attachment of a household. This variable is simply the sum of wage and salary income (Sal) over all members of the household.[15]

VALUE	Current market value of unit
BURDEN	Housing cost as a fraction of income

URL to R

- Benefit: Don't Need Data on PC
- Problem: Links Change
- Example



URL to R

- Example

Field Descriptions

Key	List of...	Comment	Example Value
artist.hotttnesss	Real number		0.401997543
artist.id	String		"ARD7TVE1187B99BFB1"
artist.name	String		"Casual"
artist_mbtags	String		""
artist_mbtags_count	Real number		0.0

```r
```{r,message=F}
FreshBeats=read_csv(url("https://corgis-edu.github.io/corgis/datasets/csv/music/music.csv"))

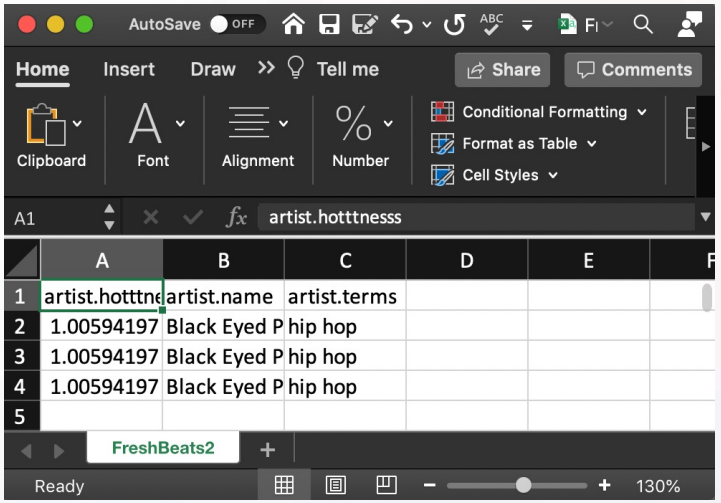
FreshBeats %>%
  filter(artist.name=="Black Eyed Peas") %>%
  arrange(desc(artist.hotttnesss)) %>%
  select(artist.hotttnesss,artist.name,artist.terms)
```
```

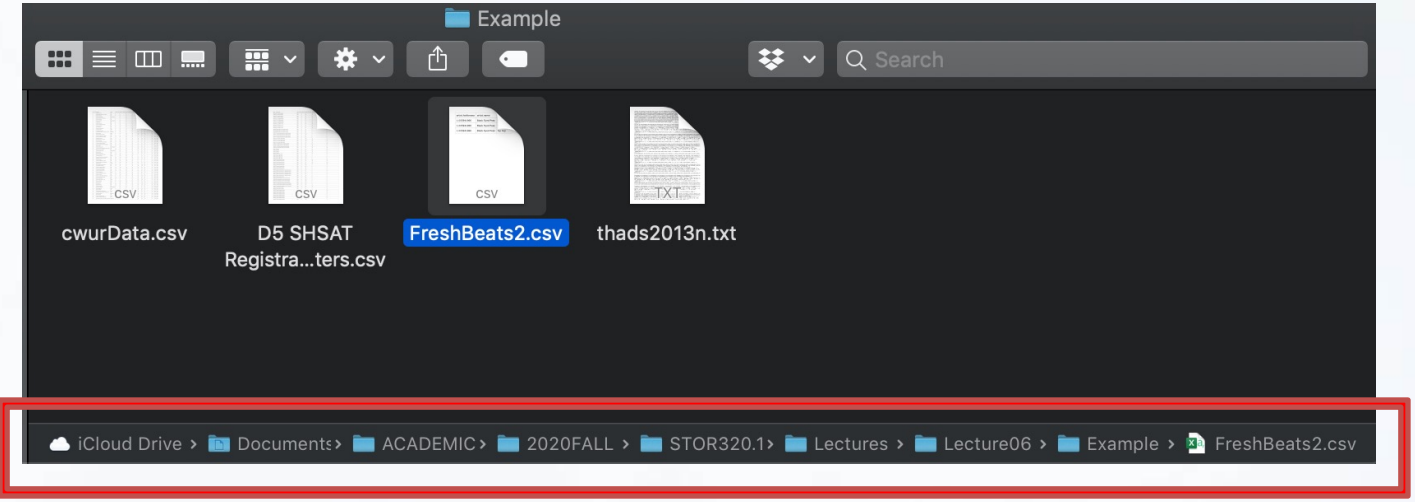
artist.hotttnesss <dbl>	artist.name <chr>	artist.terms <chr>
1.005942	Black Eyed Peas	hip hop
1.005942	Black Eyed Peas	hip hop
1.005942	Black Eyed Peas	hip hop

Writing Data

- write_csv()
  - Saves R Tibble to Computer

```r
setwd("Example")
write_csv(FreshBeats,"FreshBeats.csv")
```





Tibble

- Read Chapter 10
  - as_tibble()
  - tibble()
  - tribble()
  - tibble vs. data.frame

```
DATA=tribble(
  ~x, ~y, ~z,
  #--/--/--
  "a",2,3.6,
  "b",1,8.5
)
DATA
```

```
## # A tibble: 2 x 3
##   x         y     z
##   <chr> <dbl> <dbl>
## 1 a         2   3.6
## 2 b         1   8.5
```

- Subsetting Info

```
#Extract by Variable Name
DATA$x
```

```
## [1] "a" "b"
```

```
DATA[[1]]
```

```
## [1] "a" "b"
```

```
DATA[["y"]]
```

```
## [1] 2 1
```

```
DATA[,c("x","y")]
```

```
## # A tibble: 2 x 2
##   x         y
##   <chr> <dbl>
## 1 a         2
## 2 b         1
```

```
DATA[,3]
```

```
## # A tibble: 2 x 1
##    `:(`
##   <dbl>
## 1   3.6
## 2   8.5
```

```
DATA[2,]
```

```
## # A tibble: 1 x 3
##   x         y  `:(`
##   <chr> <dbl> <dbl>
## 1 b         1   8.5
```

```
DATA[2,2:3]
```

```
## # A tibble: 1 x 2
##       y  `:(`
##   <dbl> <dbl>
## 1     1   8.5
```