# Census & Visualization

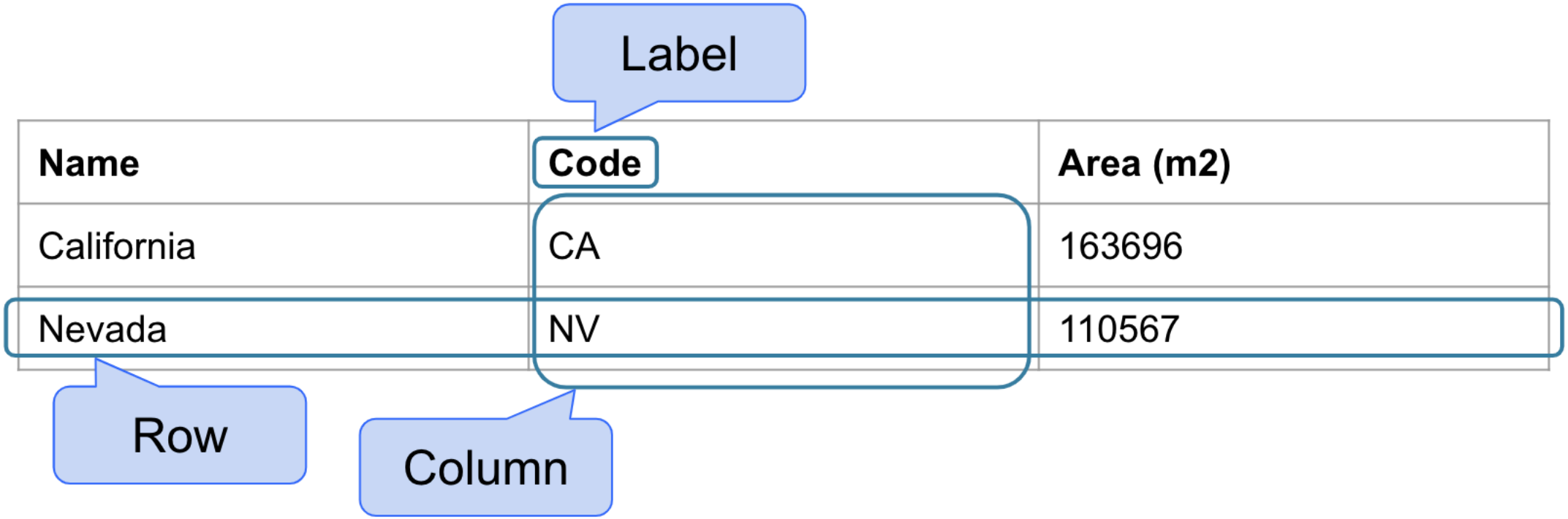
Prof. Abby Stylianou

# Logistics

- Quiz on “Using Metadata to Find Paul Revere” Thursday
  - Code snippets are in R but should be readable
- Assignment 2 out on Thursday, due the following Thursday
  - (could be Tuesday – Tuesday, depending on how much we get through)

# Tables

- A Table is a sequence of labeled columns
- Each row represents one individual
- Data within a column represents one attribute of the individuals



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- Creating new tables containing some of the original columns:
  - `select`, `drop`

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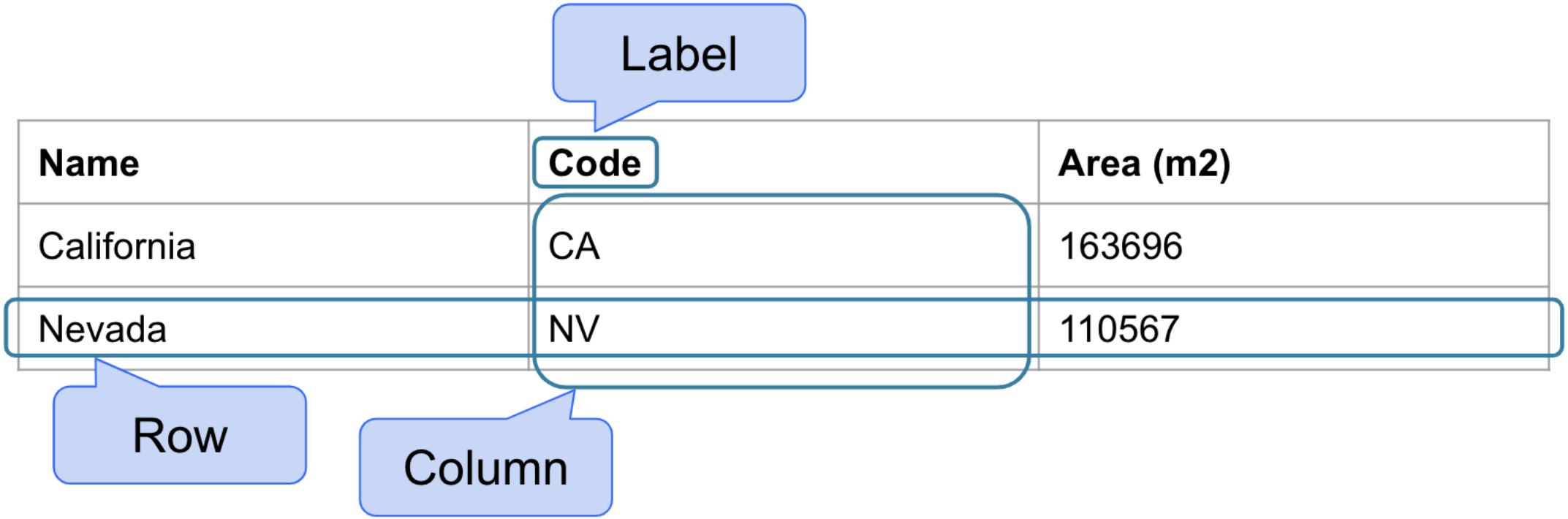
- `t.where(`*`column`*`, `*`value`*`)` keeps all rows for which a column's value equals some particular value
- `t.with_row(`*`list`*`)` makes a new table that has another row with values in *`list`*

# Tables

- We've worked with small datasets (and some bigger ones last class!)
- No matter how well a large table is organized, it can be difficult to interpret



# The Decennial Census

- Every 10 years, the Census Bureau counts # of people in the US
- In between censuses, the Bureau estimates how many people there are each year
- Article 1, Section 2 of the United States Constitution:
  - "Representatives and direct Taxes shall be apportioned among the several States … according to their respective numbers …"

# The Decennial Census

- Demo!

cs1070.com → Demos → new notebook

# Census Table Description

- Values have column-dependent interpretations
  - The SEX column: 1 = male, 2 = Female
- In this table, some rows are sums of other rows
  - The SEX column: 0 is Total ( male + female )
  - The AGE column: 999 is Total ( all ages )
- Numeric codes are often used for storage efficiency
- Values in a column may have the same type but not be directly comparable (AGE 999 vs AGE 12, AGE 100 – everyone > 100)

http://www2.census.gov/programs-surveys/popest/datasets/2010-2015/national/asrh/nc-est2015-agesex-res.pdf

# Growth Rate

- Growth rate = g (for example 3%, or 0.03)
- Initial value x, final value y after t periods of time

| | | | |
|---|---|---|---|
| Value after 1 period | = | x + xg | = x * (1+g) |
| 2 periods | = | x(1+g)(1+g) | = x * (1+g) ** 2 |
| t periods | = | y | = x * (1+g) ** t |

# Computing the Growth Rate

$(1+g) ** t = y/x$

$1 + g = (y/x) ** (1/t)$

$g = (y/x) ** (1/t) - 1$

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  - **Numerical –** each value is from a numerical scale
    - Numerical measurements are ordered
    - Differences are meaningful
  - **Categorical –** each value is from a fixed inventory
    - May or may not have an ordering
    - Categories are the same or different

# “Numerical” Data

- Just because the values are numbers doesn’t mean the variable is numerical
  - Census example had numerical SEX code (0, 1 and 2)
  - It doesn’t make sense to perform arithmetic on these “numbers”, e.g., 1 - 0 or (0+1+2)/3 are meaningless

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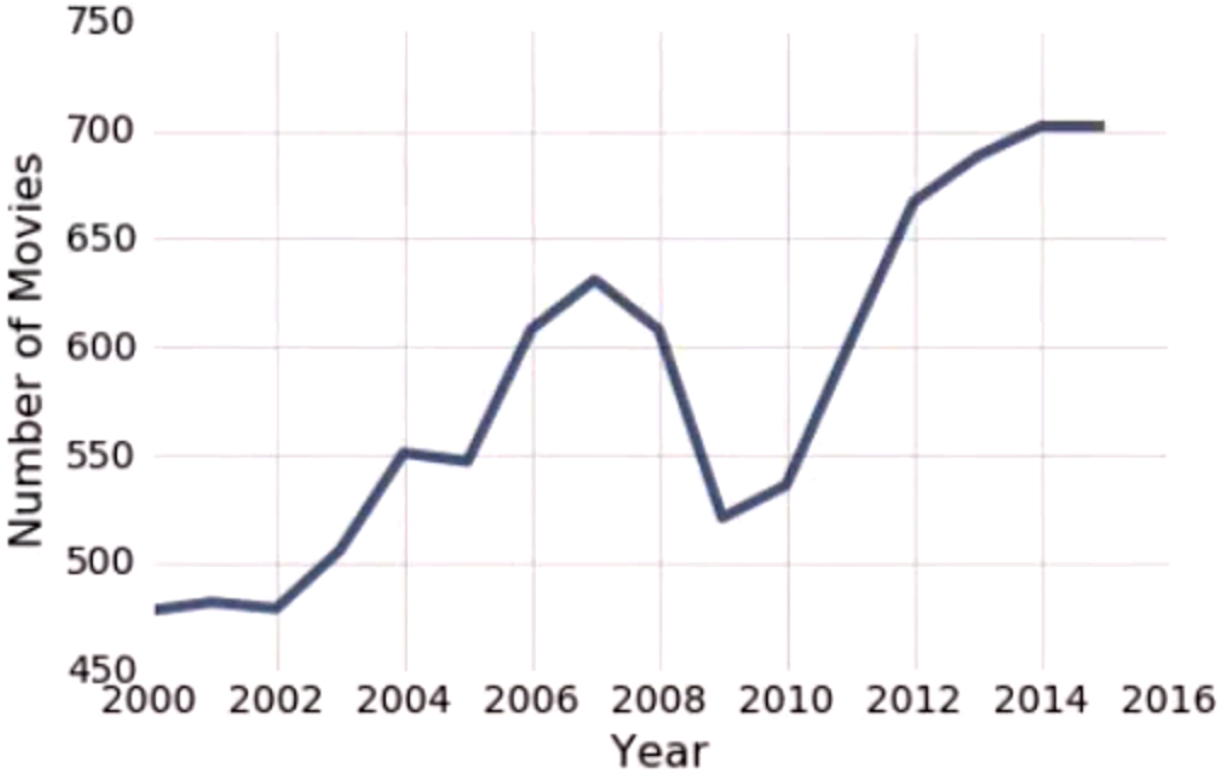
  - Census example had numerical SEX code (0, 1 and 2)
  - It doesn’t make sense to perform arithmetic on these “numbers”, e.g., 1 - 0 or (0+1+2)/3 are meaningless
- The variable SEX is still categorical even though they’re numbers

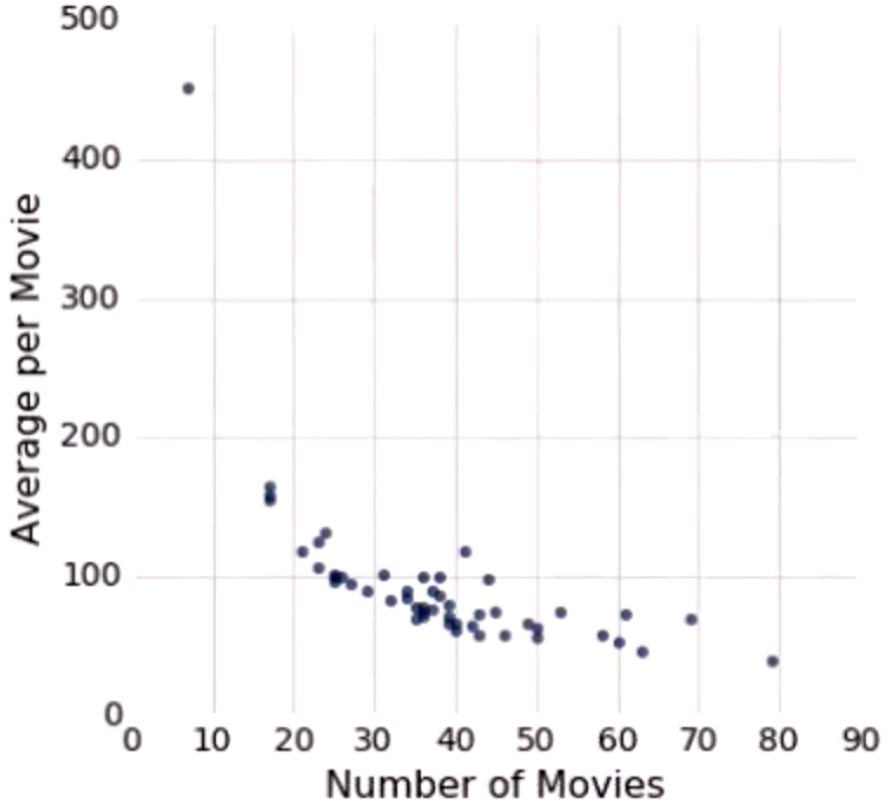
# Plotting Two Numerical Variables

## Line graph: `plot`




How something changes as the X-axis changes (often chronologically)

## Scatter plot: `scatter`




Comparing two numerical variables

Anthony Daniels
(actor)