Week 4: Distributions

Fall 2017

Matthew Turk

Broadcasting

go.ischool.illinois.edu/meet2

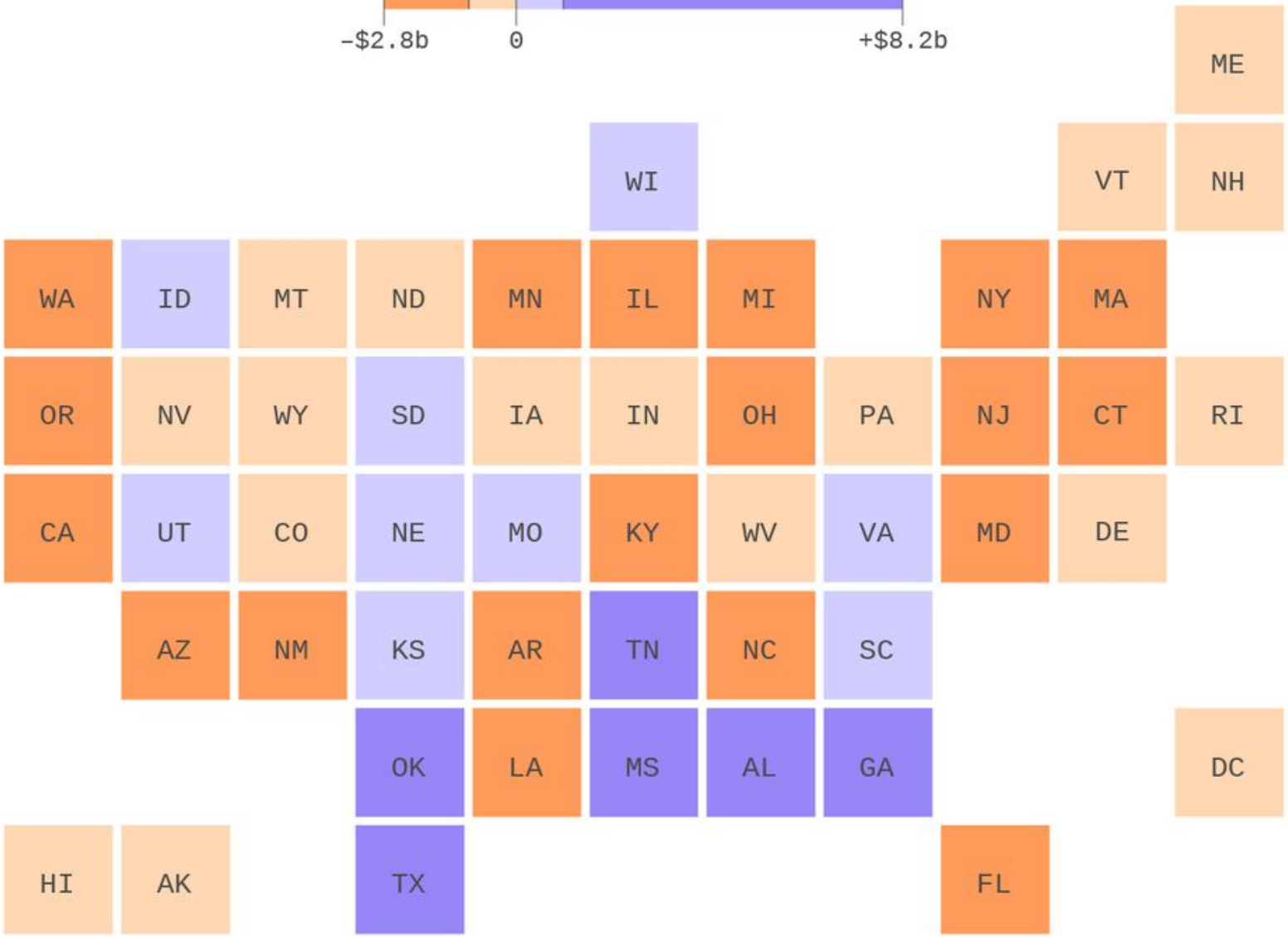
This Week

- Guest Discussion: Jill Naiman
- Aggregating Distributions
  - Principles
  - Weighting and Averaging
  -

Warm-Up Activity

1. What is the visualization trying to show?
2. What are its methods?
3. What are the strengths / weaknesses?
4. (Bonus) How was the data collected?

Estimated federal funding change in 2026



Andrew Witherspoon, Axios

https://www.axios.com/vitals-2486505861.html

GitHub

- Reminder: http://github.com/UIUC-iSchool-DataViz/fall2017/
- Lecture notes will be placed there, and available in your JupyterHub instances in data-readonly/fall2017/weekXX .
- Copy the notebooks to your directory before using them.

Concepts of Visualization

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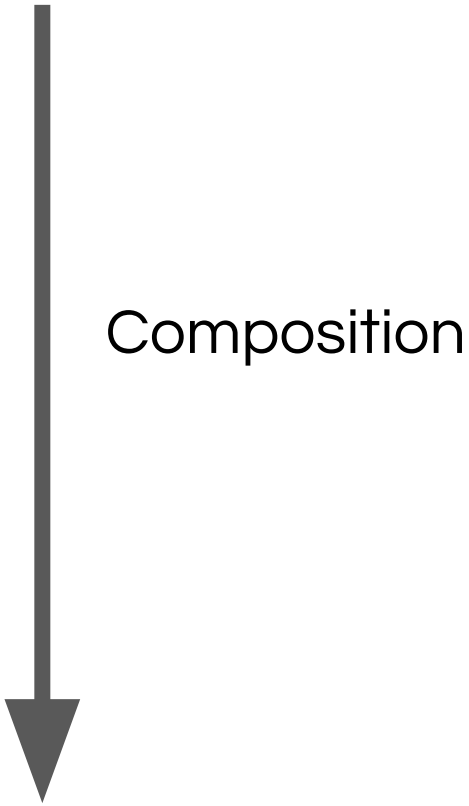
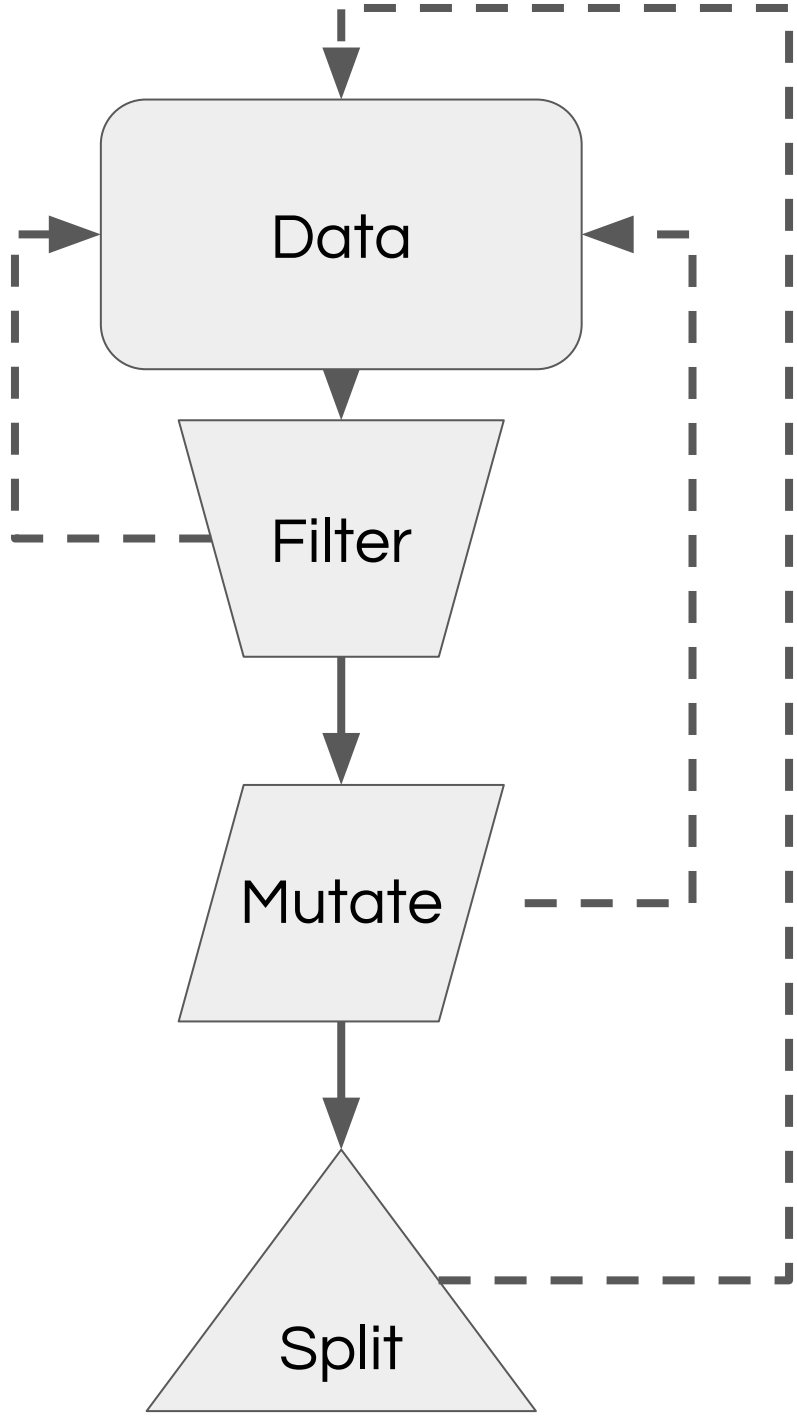
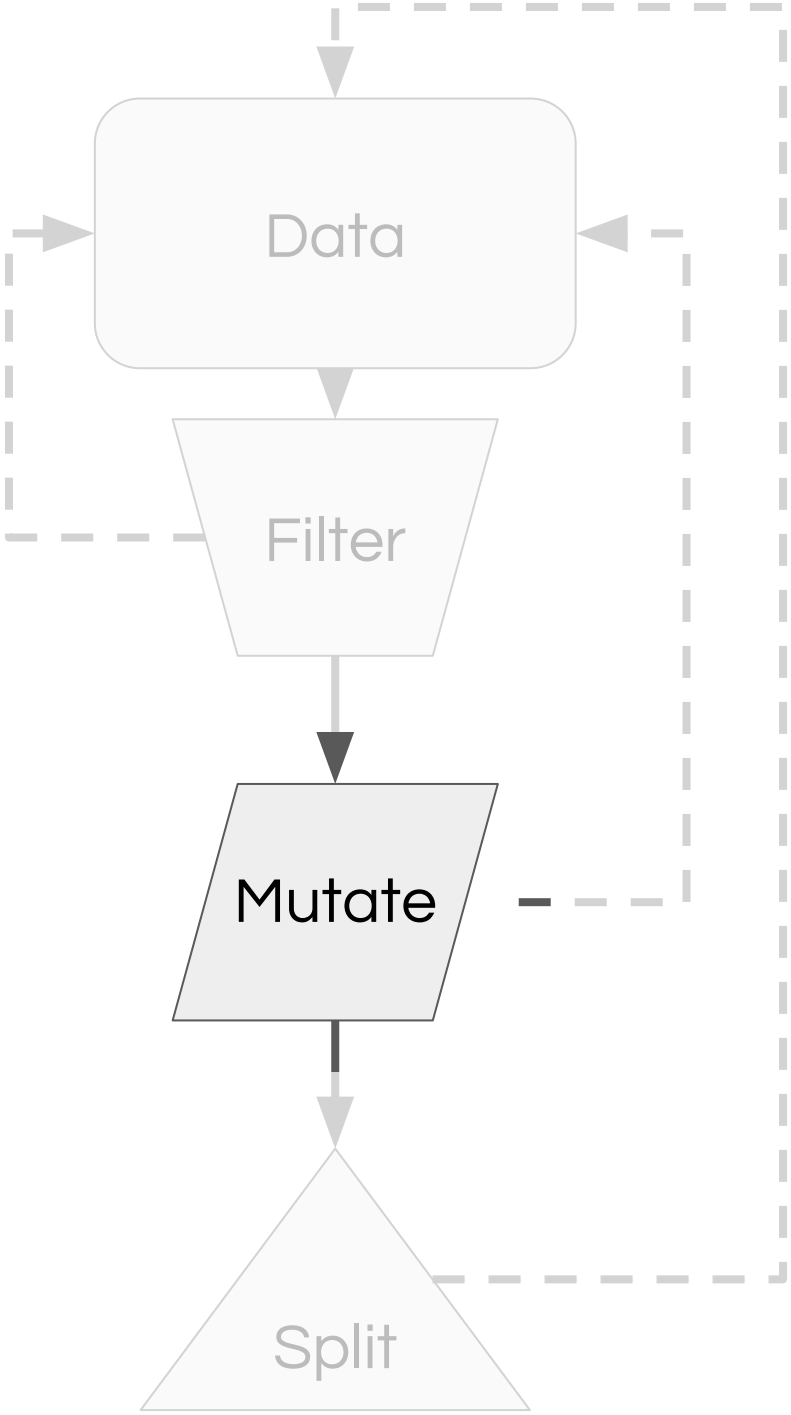


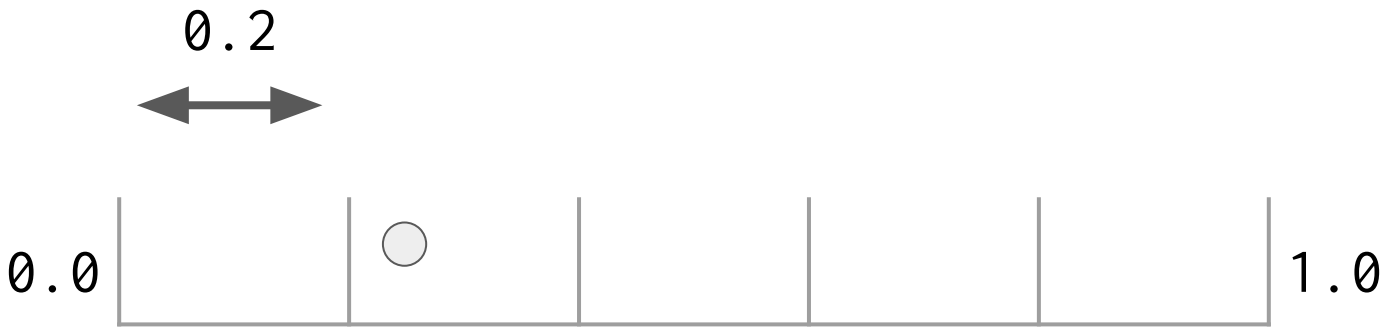
Concepts of Visualization


Data
Filter
Mutate
Split


Data
Filter
Mutate
Split


0.0
1.0


0.0
1.0

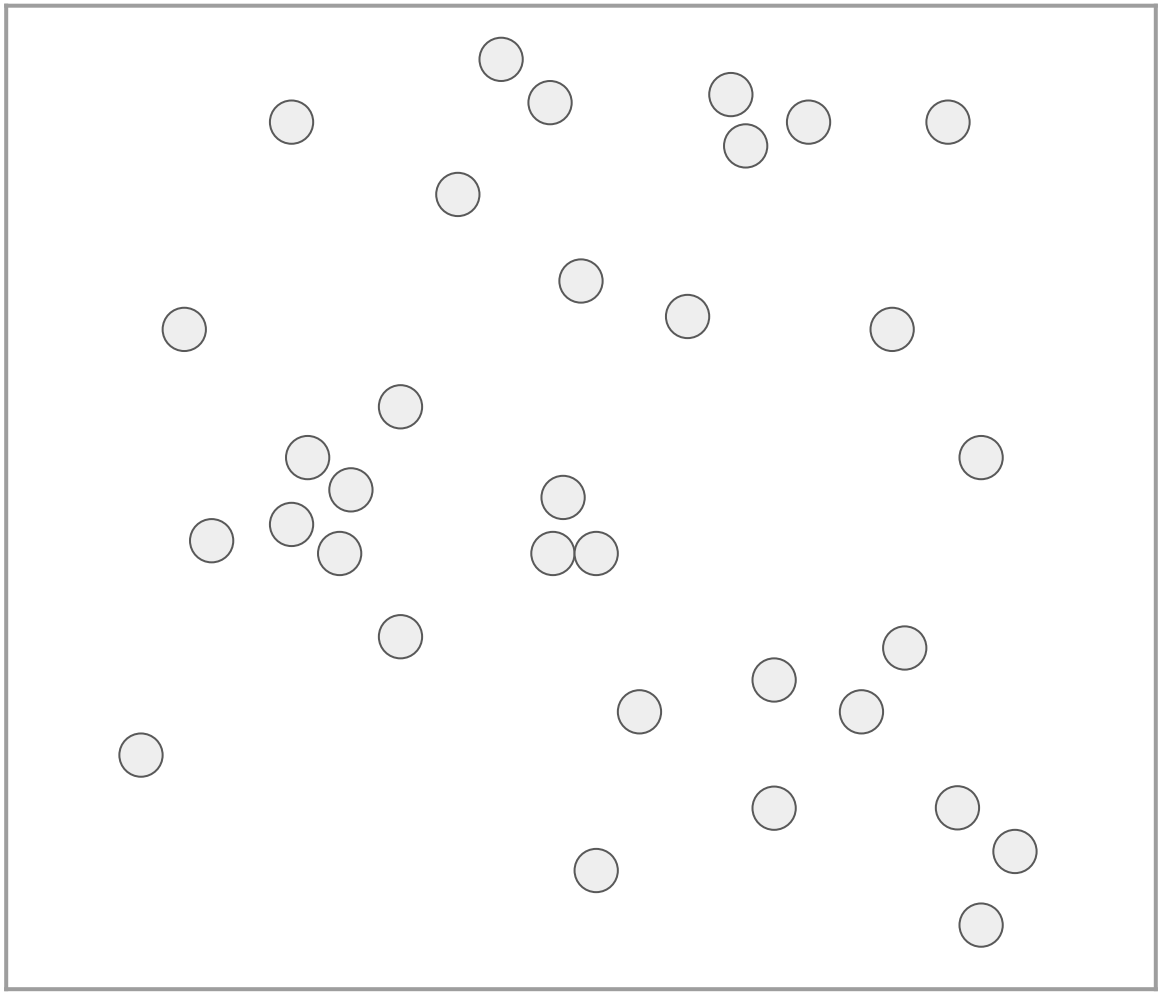

0.2
0.0
1.0

Uniform-width bins:

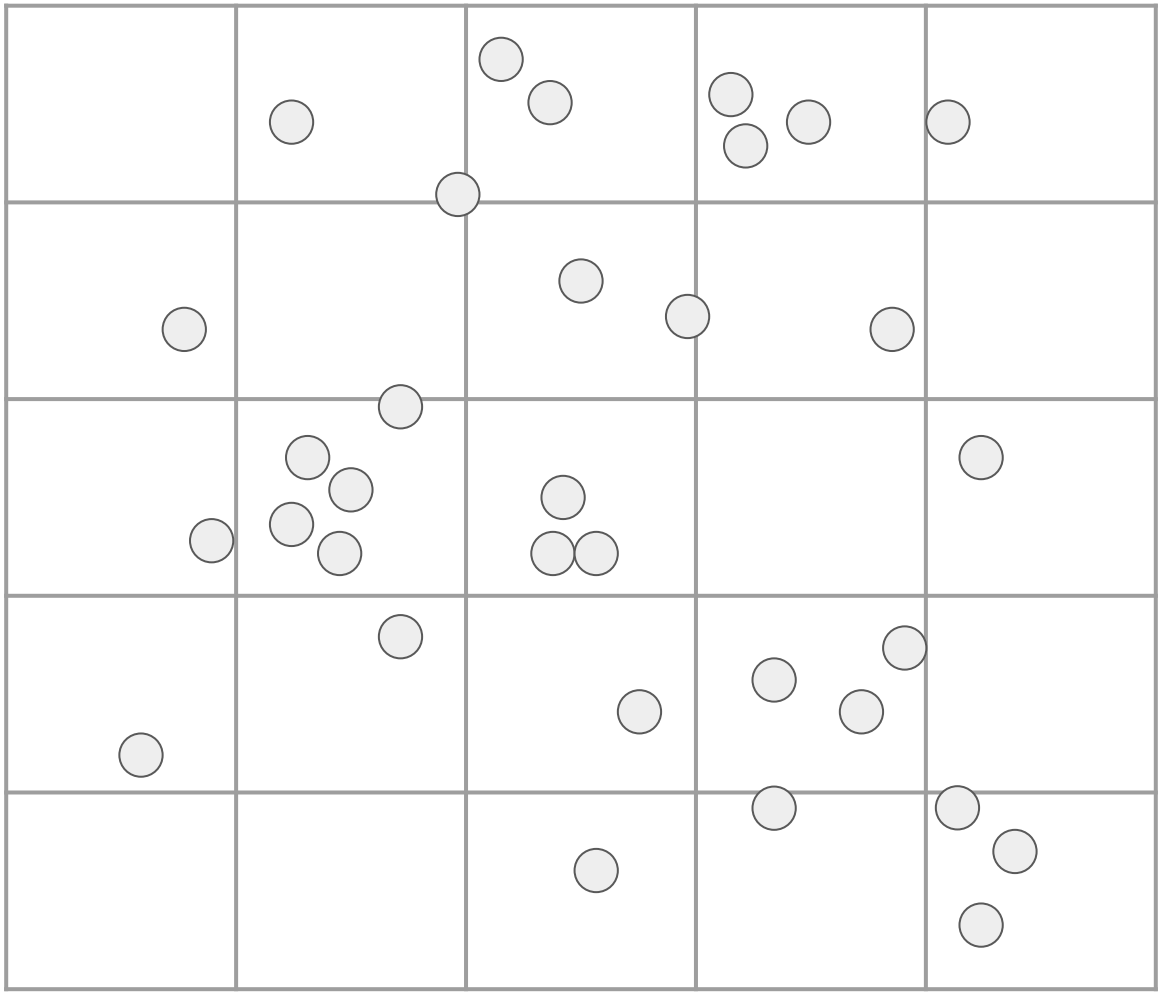
```
bin_id = floor( (value - left_edge) / bin_width )
```

Variable-width bins require searching.

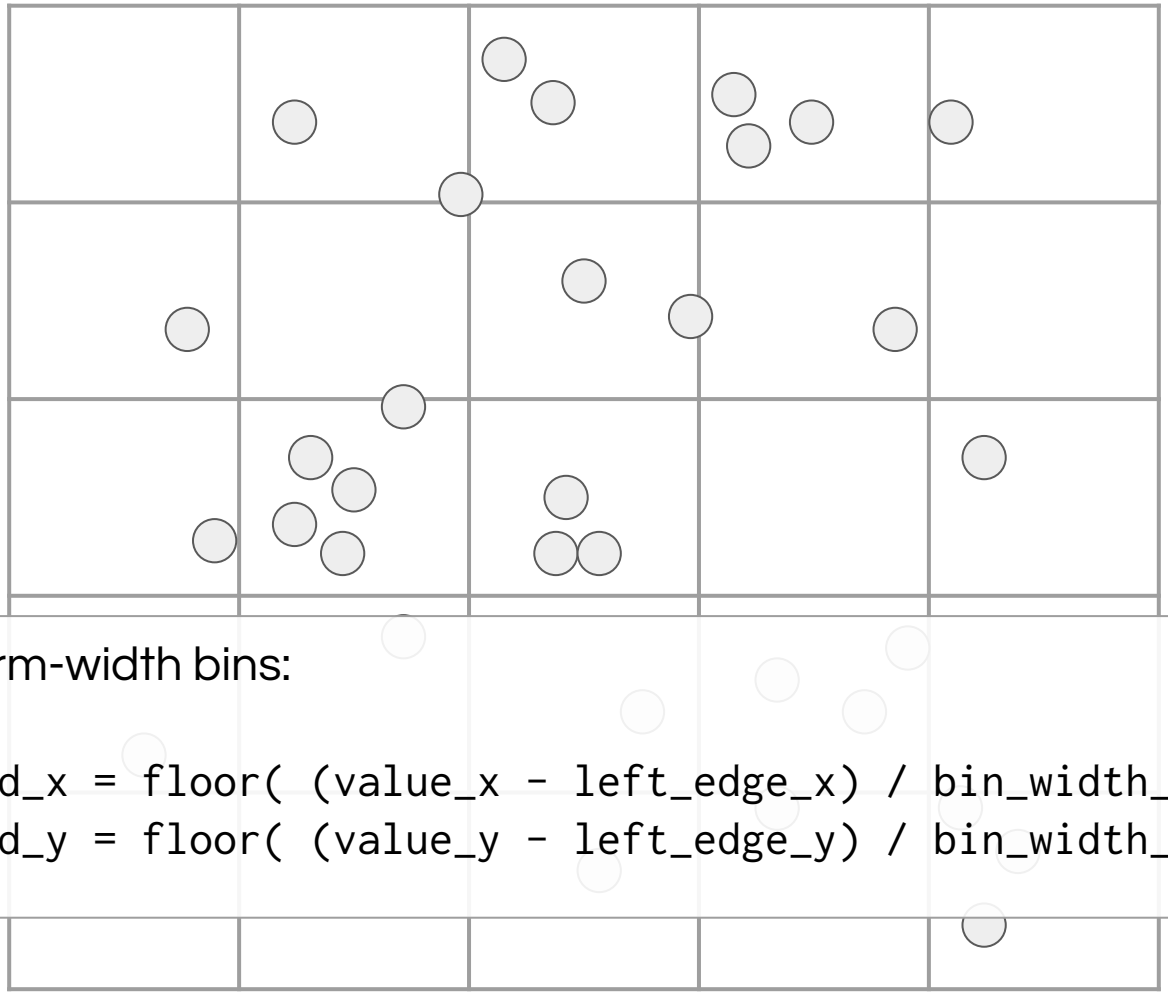
Binning and histograms



Binning and histograms



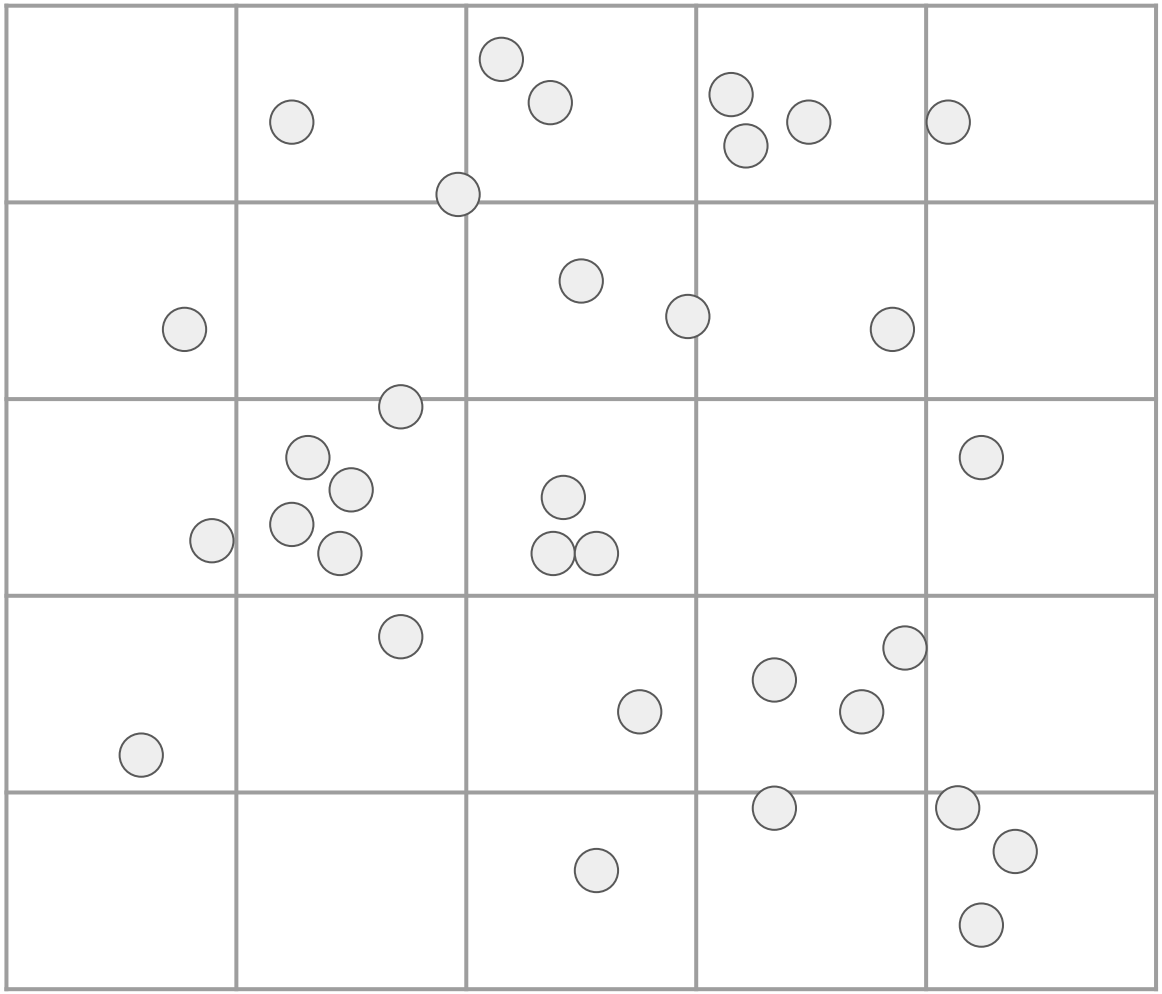
Binning and histograms



Uniform-width bins:

```
bin_id_x = floor( (value_x - left_edge_x) / bin_width_x )
bin_id_y = floor( (value_y - left_edge_y) / bin_width_y )
```

Binning and histograms



- Counts

  sum(1)
- Sum

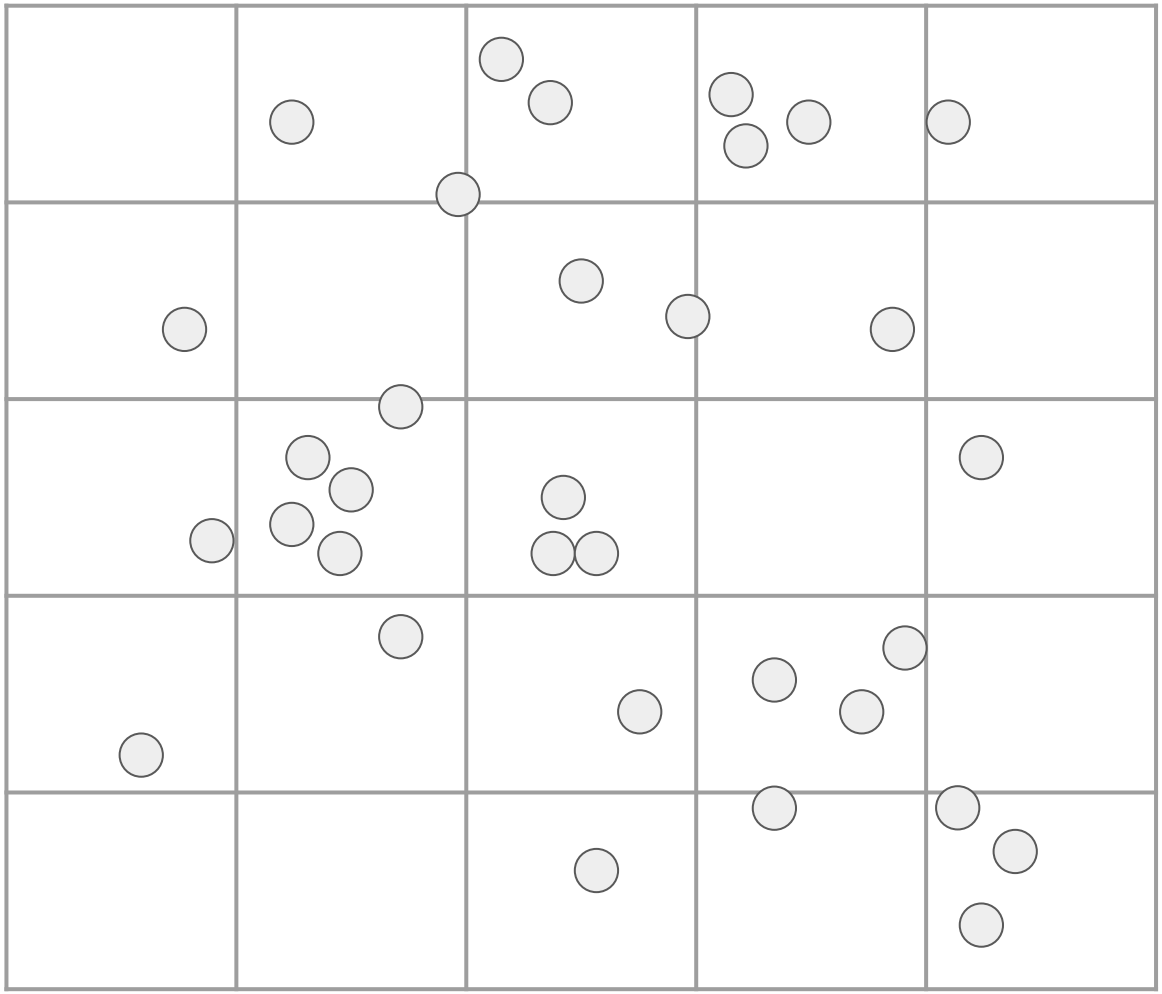
  sum(v_i)
- Average

  sum(v_i)/sum(1)
- Weighted Average

  sum(v_i * w_i) / sum(w_i)

Counts

`sum(1)`

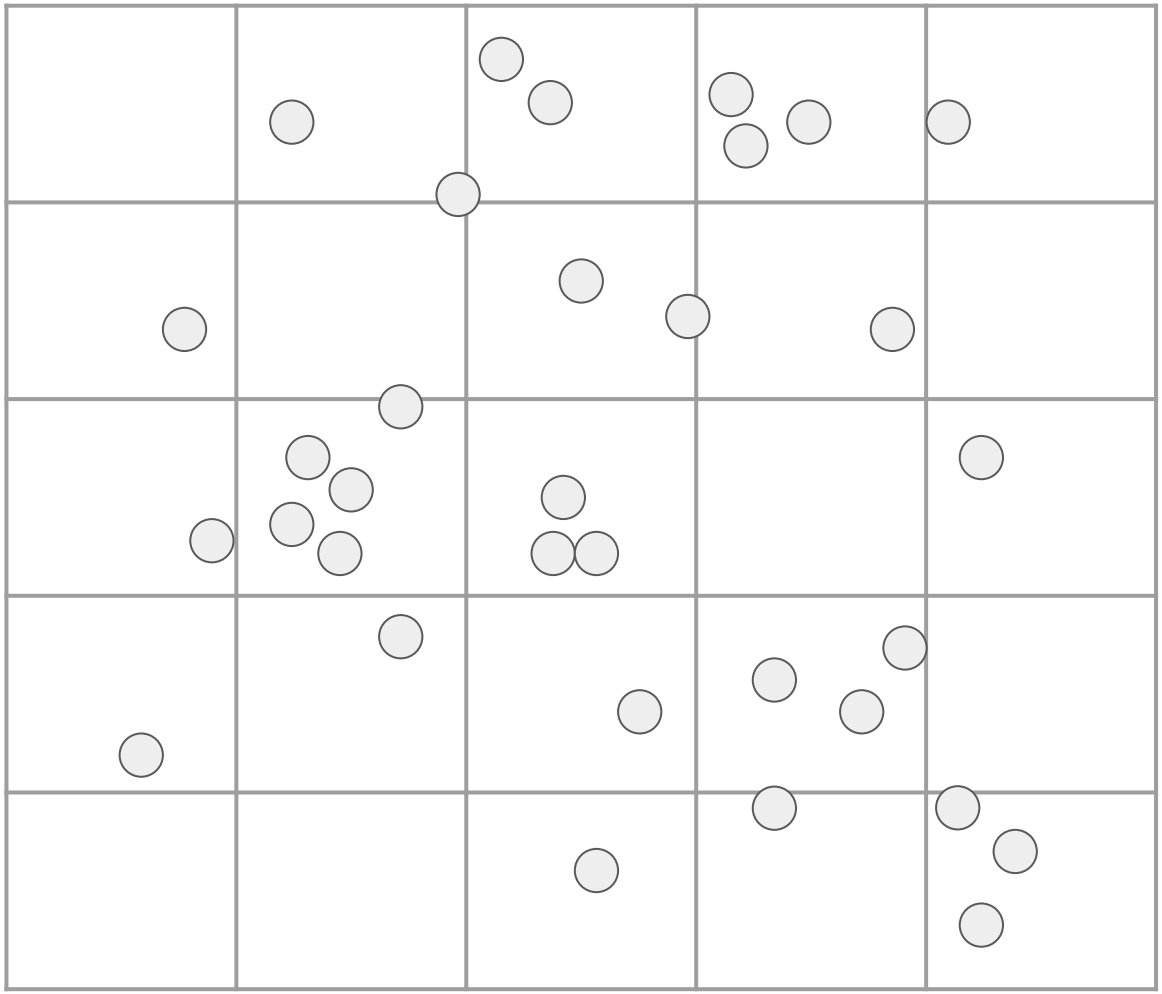


Useful for describing distribution of samples.

- “Number of times the weather station recorded the weather that day”
- “How many times was a UFO seen in the area?”
- “How many voting precincts in this state?”

Sum

$$\texttt{sum}(v_i)$$

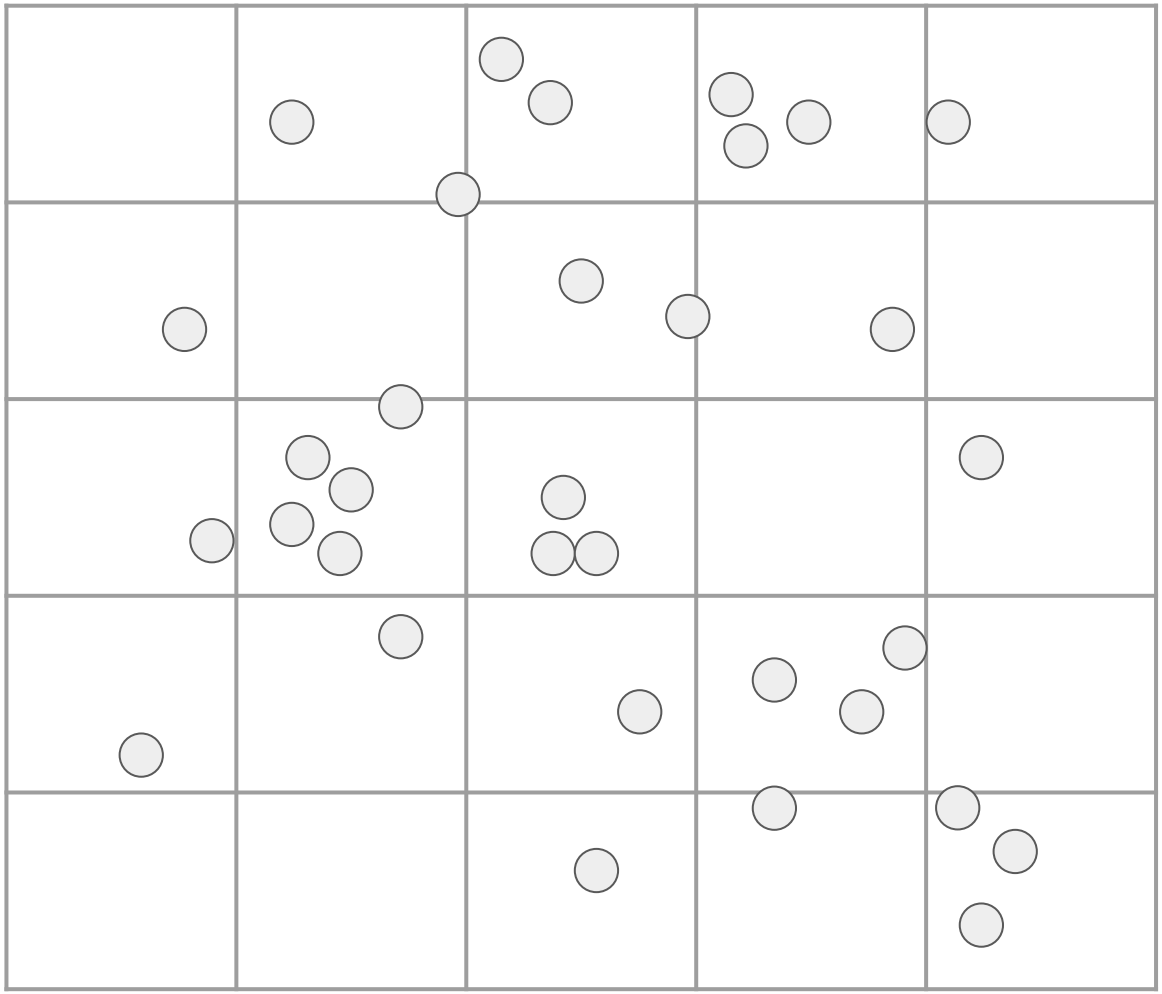


Useful for describing total quantity measured.

- “Inches of rain.”
- “Total time of recorded UFO sitings in the area.”
- “How many votes were cast?”

Average

$$\texttt{sum(v\_i)/sum(1)}$$

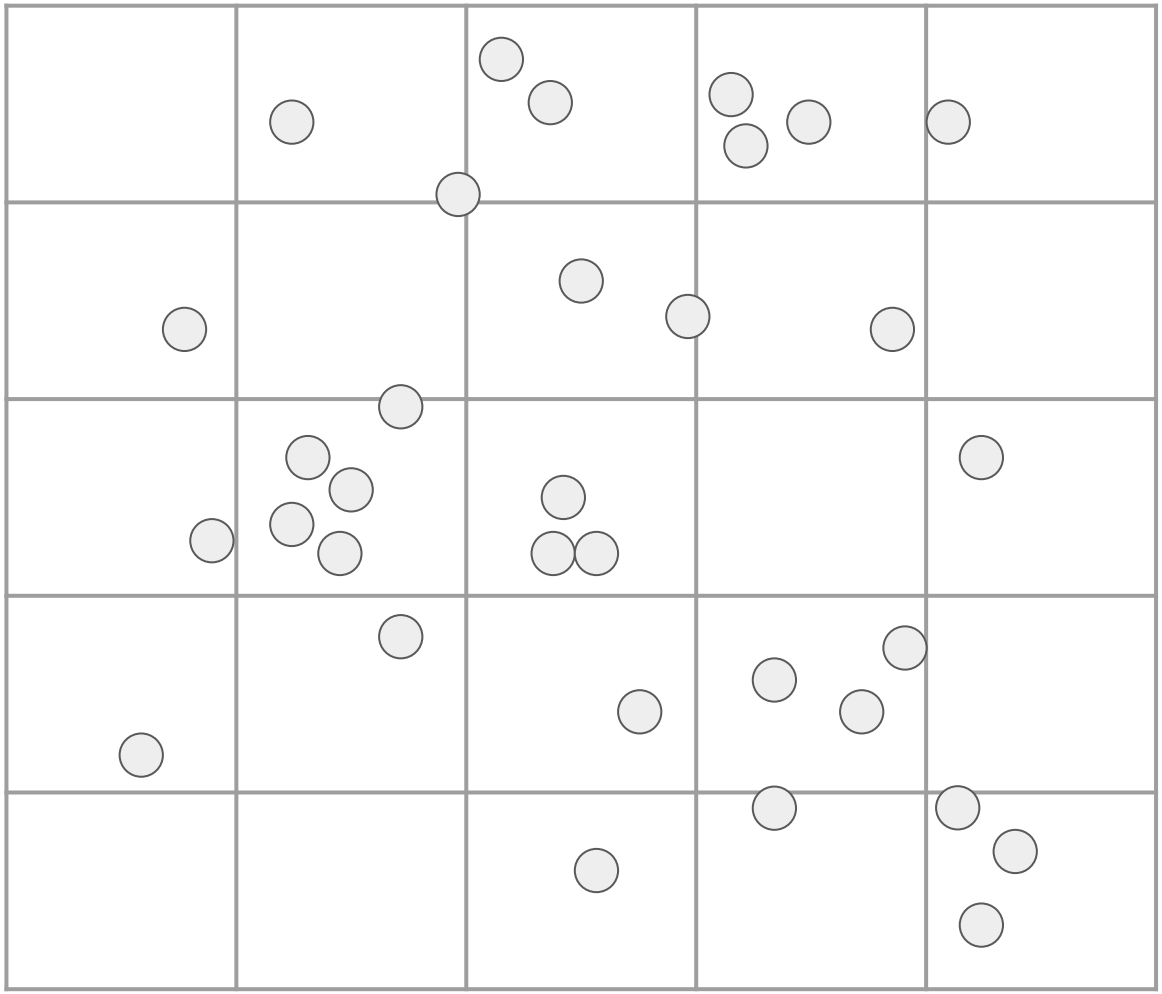


Useful for describing average or mean quantity.

- “Average rainfall in the area.”
- “Average time of UFO sighting.”
- “Who was the average candidate?”

Weighted Average

`sum(v_i*w_i)/sum(w_i)`



Useful for describing mean, but not strict arithmetic mean.

- “Average rainfall, weighted by how humid it was that day.”
- “What was the most commonly seen UFO type, as a function of the time it was seen?”
- “What’s the mean age of a voter, as a function of the total years of experience in the election?”

https://lis590.ncsa.illinois.edu/