

Lecture 4: Histograms

September 21, 2026

Course Administration 1 of 2

- 1 Tutorial 3 quiz

Course Administration 1 of 2

- ① Tutorial 3 quiz
- ② Will return Tutorial 2 quiz at end of class
- ③ Update for next week
 - The United Way needs help with maps
 - I have volunteered us
 - They are coming Sept. 28 – Lecture 5
 - They will lay out goals
 - We replace quiz 5 with questions for them that you'll turn in before class
 - If you have strong objections to this, let me know

Course Administration, 2 of 2

- ① Policy brief proposal comments posted – alert me if you don't see them
- ② Reminder: Fully composed chart due next week **Sept. 28**
 - if there is something you want to do, but can't figure out how
 - write it in words accompanying the graph
 - I want to be sure you know what to do
 - we can work on how to do it
 - look at the grading sheet for complete graph elements

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- ③ Anything else lingering?

General Policy Brief Proposal Feedback

Good work and interesting topics.

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Successful proposals

- have a point to make and a story to tell
- clearly set out the ≥ 2 data sources you're using
- explain how you're planning on aggregating data
- give a sense of having some thoughts about the graphics you'd like to do or the points you'd like to make
- for this class, aggregation does not mean merging together – it means going from one unit of observation to another

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In the best final work, graphics drive narrative

Looking Forward to the Final Product

- Final product needs 8 to 10 graphics
- Graphics with some basic descriptives often set the stage
- May be helpful to think about summary statistics before correlations
- With new data, good practice for you to match published summary stats
- As relevant, consider adding in decennial census/acs data to add demographics
 - Use nhgis.org for geographic census data
- Come see me about data sources

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- Expect to have problems
- Next deadline: Lecture 5, one fully composed chart

Next Week's Good Bad and Ugly

Find a histogram. Post by Wednesday noon. Post the link on the google sheet.

Finder	Commenter
Stephanie	Logan
Tanya	Avril

Harini on Logan's Graph

The Jobs Moving Toward Greater Promise and Peril

The 10 industries in which the "strong-impact scenario" differs most from the original projection, both positively and negatively.

Epidemiologists	+25.3%
Medical scientists, except epidemiologists	+23.2%
Web developers and digital interface designers	+10.5%
Biochemists and biophysicists	+10.0%
Network and computer systems administrators	+9.8%
Computer network architects	+9.7%
Information security analysts	+9.0%
Microbiologists	+8.6%
Biological technicians	+5.6%
Database administrators and architects	+5.4%

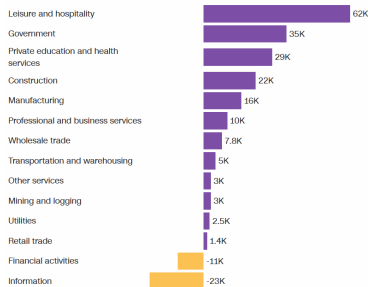
Hosts and hostesses, restaurant, lounge and coffee shop	-24.2%
Bartenders	-18.6%
Reservation and transportation ticket agents and travel clerks	-16.7%
Hotel, motel and resort desk clerks	-16.2%
Waiters and waitresses	-16.0%
Receptionists and information clerks	-13.5%
Cashiers	-13.5%
Flight attendants	-11.7%
Subway and streetcar operators	-11.5%
Bus drivers, transit and intercity	-10.9%

Kolko, Jed, "The Jobs the Pandemic May Devastate," *New York Times* Feb. 22, 2021. [\[link\]](#)

Veronica on Chloe's Graph

US jobs report by industry

Among the 14 top-level industry sectors, 12 trended up and 2 saw declines. The top industries adding jobs were leisure and hospitality, government and private education and health services.



Alicia Wallace, “The US economy added 162,000 jobs in August, more than double expectations,” CNN September 4, 2026. [link](#).

How is AI Helpful in Coding?

Using AI Helpfully

- Which AI(s) are you using?
- What problems has it solved for you?
- What problems did it not solve, or solved wrong?
- What do you think it should be able to do for you but has not?

Histograms

Thinking About Histograms

- ① What is a histogram and why use one?
- ② Most basic histogram
- ③ Histogram history
- ④ Histogram variations

1. What are histograms and why should you use them?

Histograms Show the Distribution of **One** Variable

What are non-graphical ways of describing the distribution of a continuous variable?

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Two ways to think about distributions.

Ex.: Number of commuters by jurisdiction in DMV.

① levels

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- ① levels
 - number of commuters by jurisdiction

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 - number of commuters by jurisdiction
- ② shares

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Ex.: Number of commuters by jurisdiction in DMV.

① levels

- number of commuters by jurisdiction

② shares

- share of commuters by jurisdiction

When Do You Want to Show a Histogram?

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- Or show relative prevalence

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 - How many people at each part of the income distribution?
 - How much of an outlier is Caitlin Clark?
 - How much variation is there in prices for airline tickets?
 - My work: distribution of condo prices vs other residential prices

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But beware! Histograms are harder to explain than bars.

2. Most Basic Histogram

Notionally, to Create a Histogram

- Take a variable
- Make bins by value
- Count the number of observations in each bin
- Plot bars with that number

Notionally, to Create a Histogram

Imaginary Income Data

Person	Income
A	4
B	11
C	12
D	3
E	0

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Binned Dataset

Bin	No.
0	1
1-5	2
6-10	0
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Graph this one!

Key Features of Histograms

- Looks like a bar chart
- But! unlike a bar chart, histogram bars touch, to indicate continuity
- Give me more examples of when a histogram would be useful

3. Histogram History

The Histogram Inventor

Karl Pearson (1857-1936) as a young man



The Histogram Inventor

Karl Pearson (1857-1936) as a young man



A big thinker

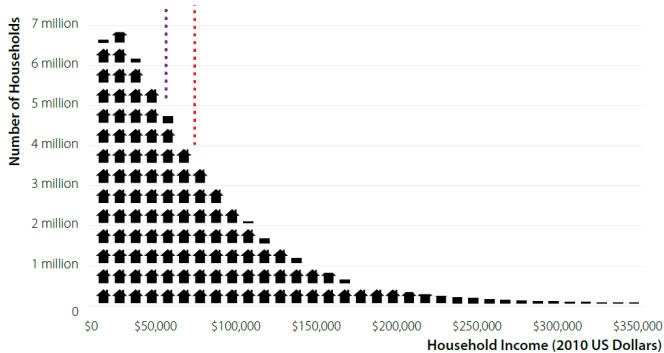
- father of mathematical statistics
- publishes first histogram, 1895
- fervent eugenicist
- early suffragist
- turned down knighthood due to socialist beliefs

4. Histogram Variations

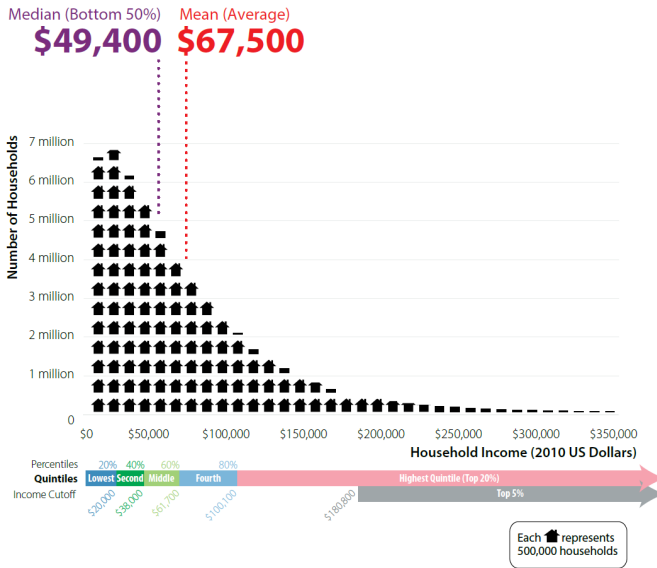
Histogram Variations

- ① The classic: touching bars
- ② The modified classic: bars with colors by category
- ③ Make bars into lines: frequency polygon
- ④ Smooth further: density distribution

1. The Classic: Mulbrandon's Income Histogram

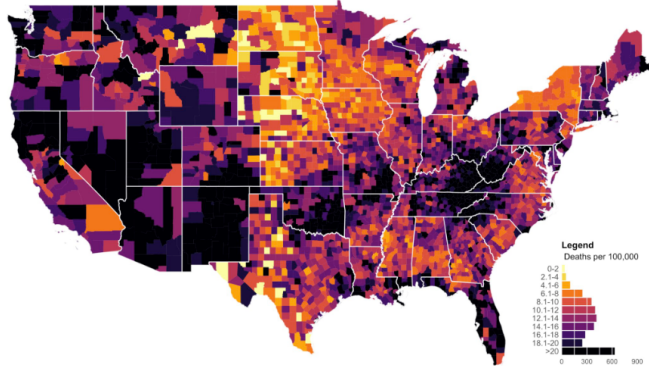


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As a Map Legend

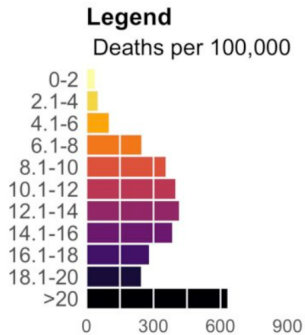
Drug poisoning deaths (2014)



Source: <https://blogs.odc.gov/nchs-data-visualization/drug-poisoning-mortality/>

From <https://mathewkiang.com/2017/01/16/using-histogram-legend-choropleths/>

Legend, Now Visible



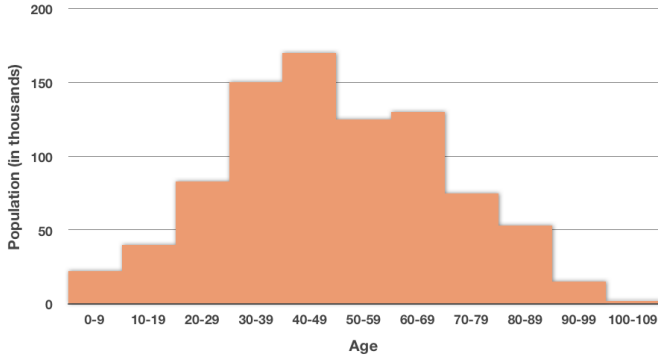
With code on how to do this! From [Matthew Kiang's website](#)

2. The Modified Classic: Colored in Bars

Missing a good example – you'll do this in the tutorial

3. Make Bars into Lines: Frequency Polygon

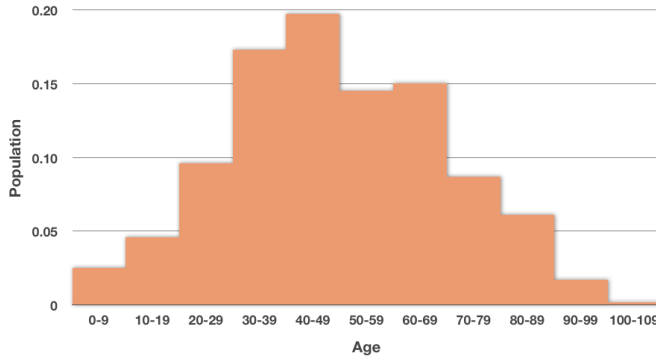
Basic Histogram: Age Distribution



Thank you [Krista King math](#)

3. Make Bars into Lines: Frequency Polygon

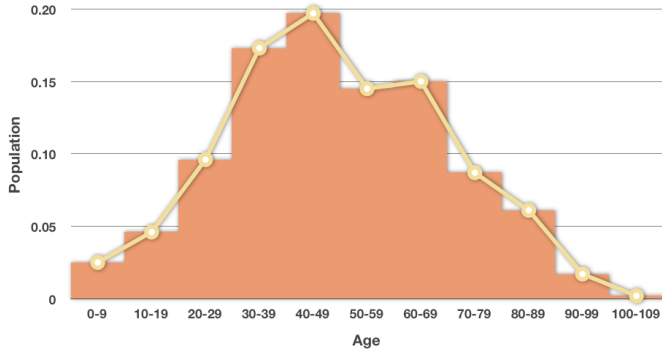
Basic Histogram: Age Distribution – The Same?



Thank you [Krista King math](#)

3. Make Bars into Lines: Frequency Polygon

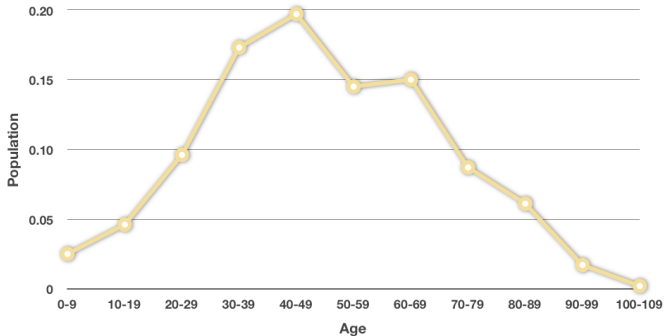
Basic Histogram: Add Points and Lines



Thank you [Krista King math](#)

3. Make Bars into Lines: Frequency Polygon

And Now a Frequency Polygon!

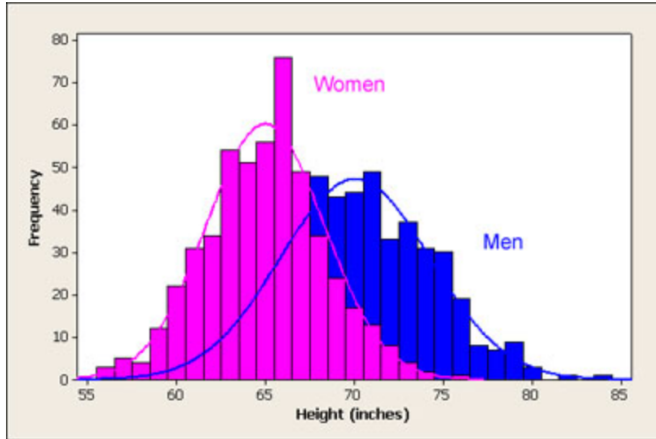


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4. Density Curves: Smoothed Histograms

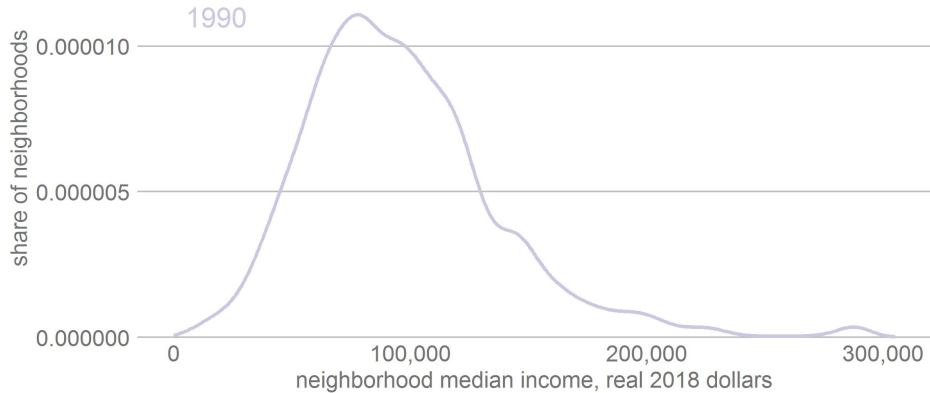
- Imagine many very thin bars
- This yields a curve
- Sometimes it is more helpful to draw the curve

Height: Note the Curves

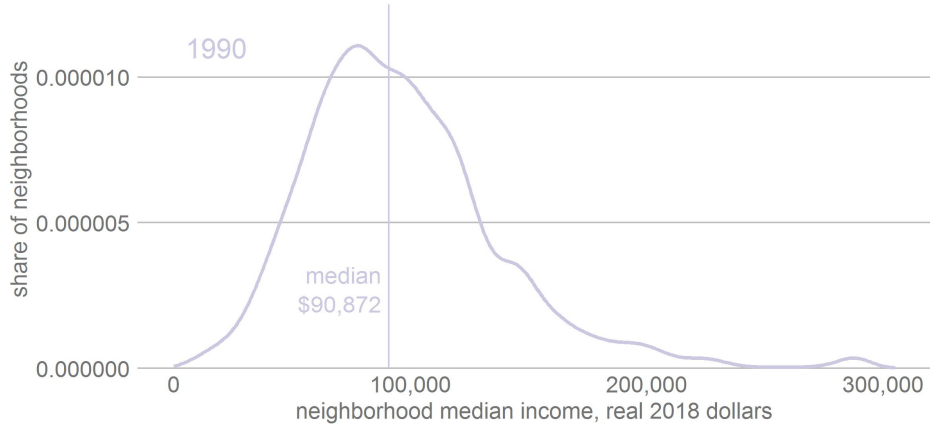


What can you learn about men's versus women's height?

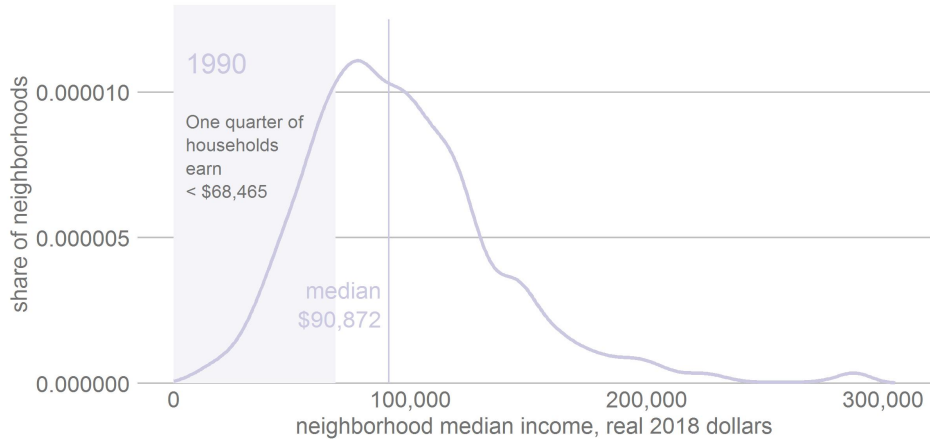
INCOME Incomes Have Grown, But the Middle Class Has Hollowed Out



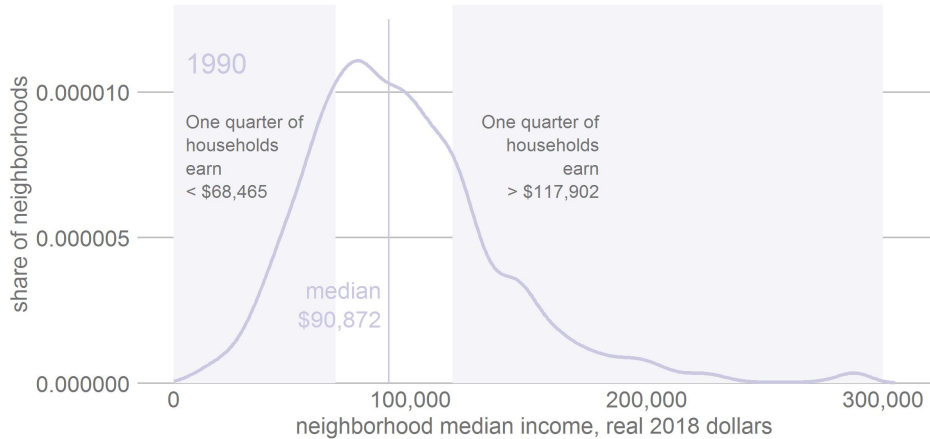
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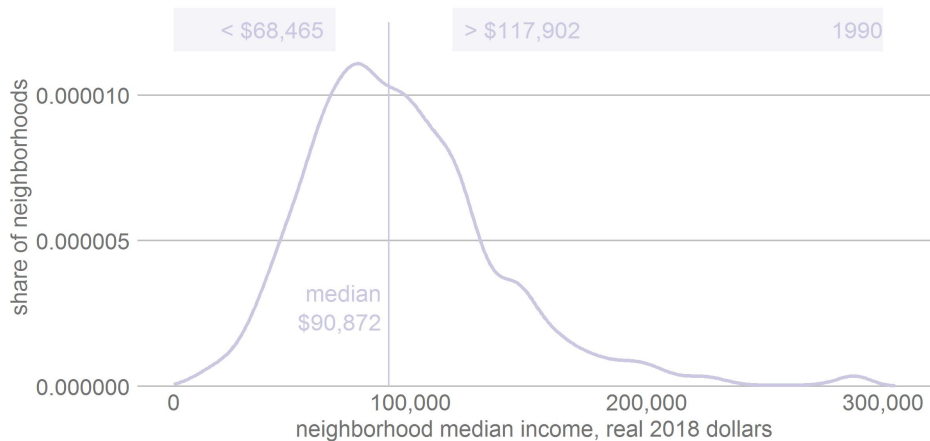
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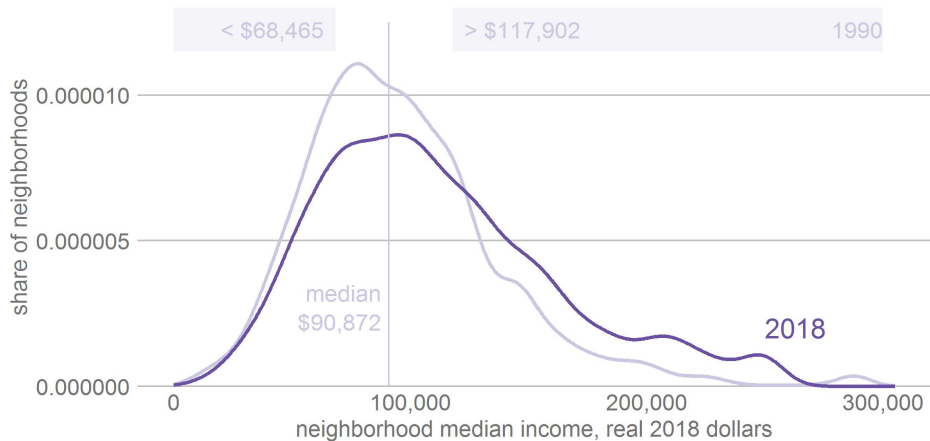
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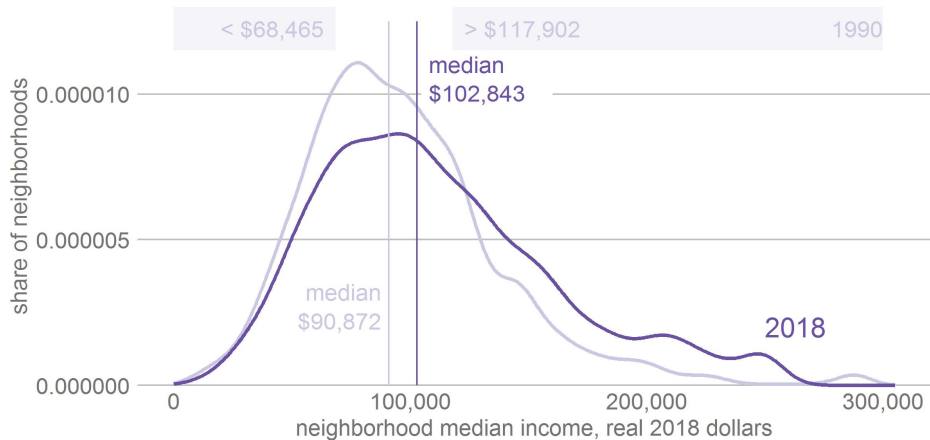
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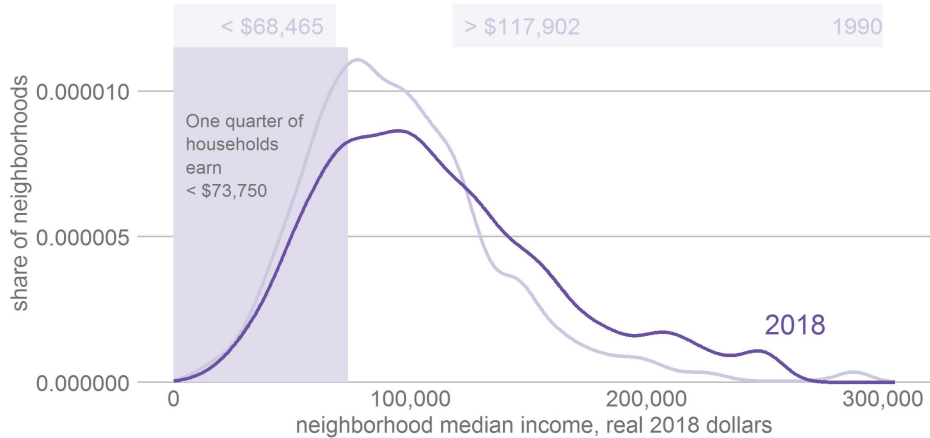
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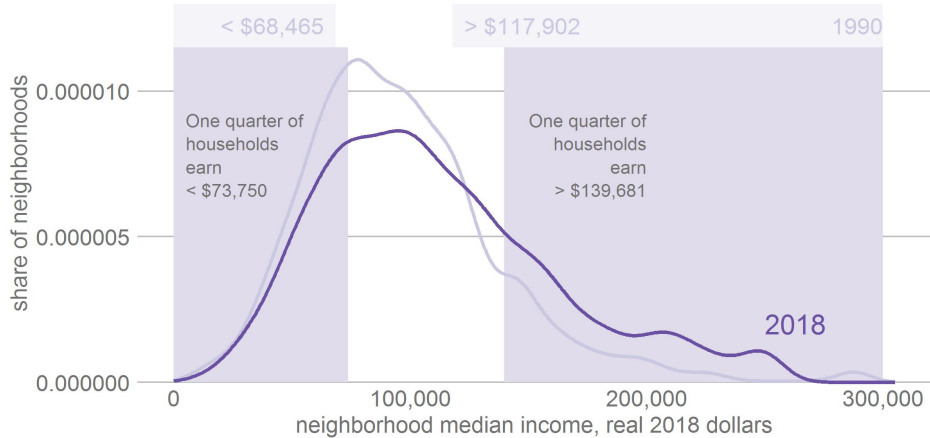
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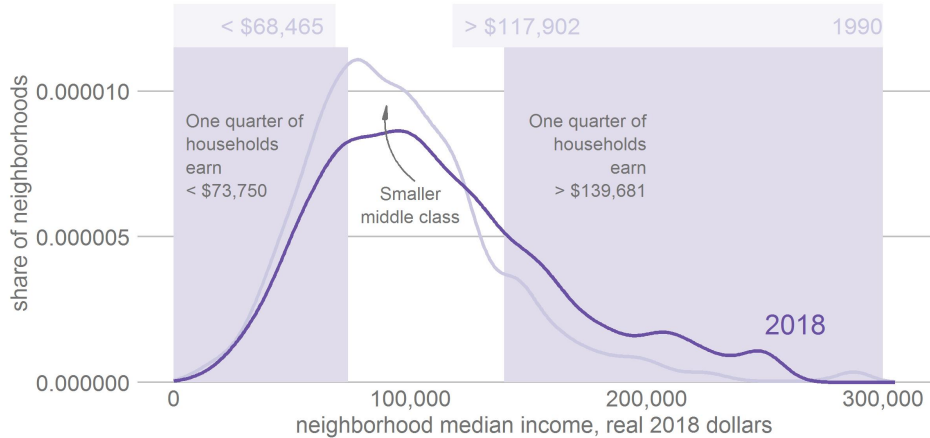
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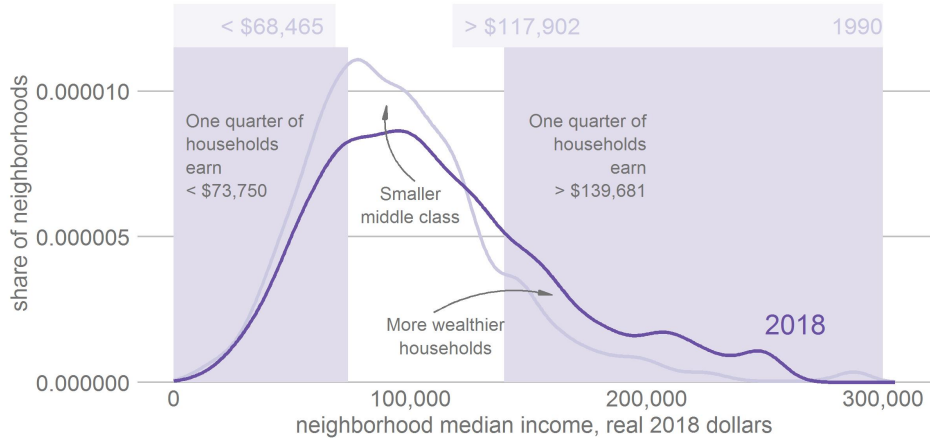
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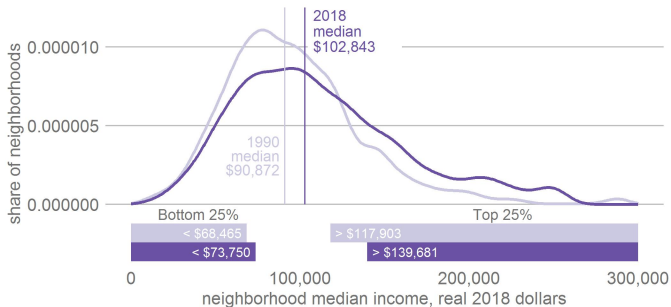
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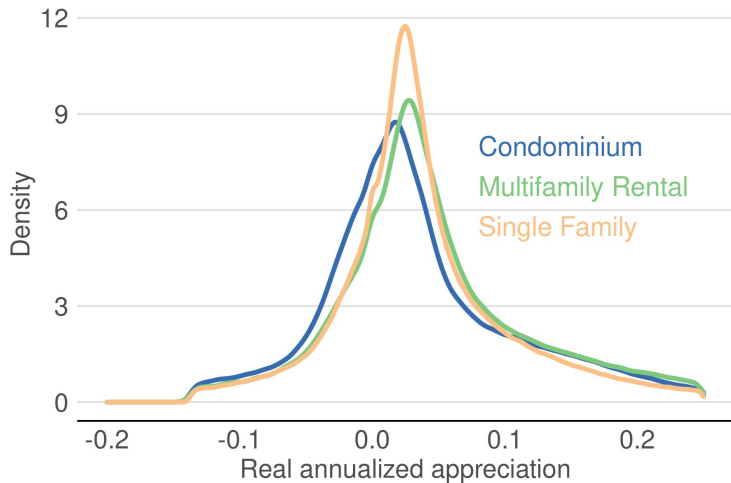


Income Distribution in the DC Metro Area Over Time



- print version
- was never satisfied with y axis
- light purple probably too light
- goal was to show 25th and 75th percentiles
- and change therein

Comparison of Price Appreciation at Distribution Tails



Goal: compare
distribution of price
appreciation by type

R Histograms

Next Class: Maps

- Visitors from United Way, then Tutorial 4 quiz
- Turn in fully composed chart assignment via link in assignment
- Read Manson, *Mapping and Society*, Chapter 7