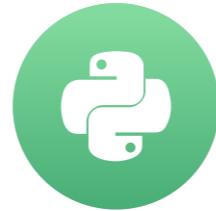


# Highlighting data

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON



Nick Strayer

Instructor

# About me



The New York Times

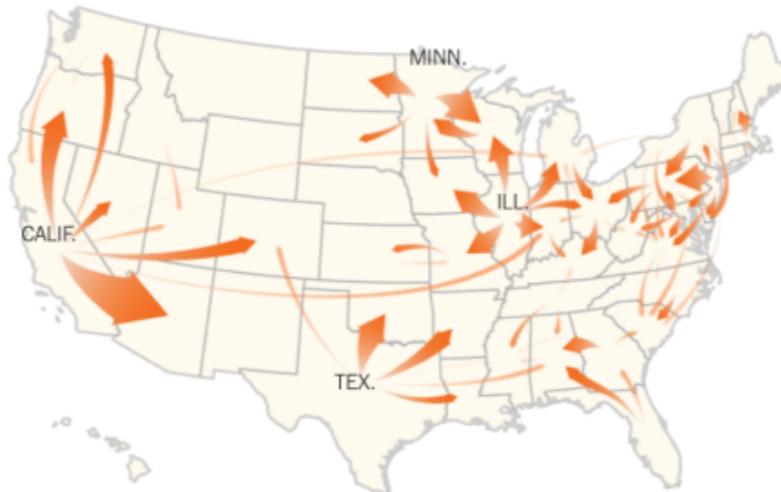
## The Great Out-of-State Migration: Where Students Go

By NICK STRAYER AUG. 26, 2016

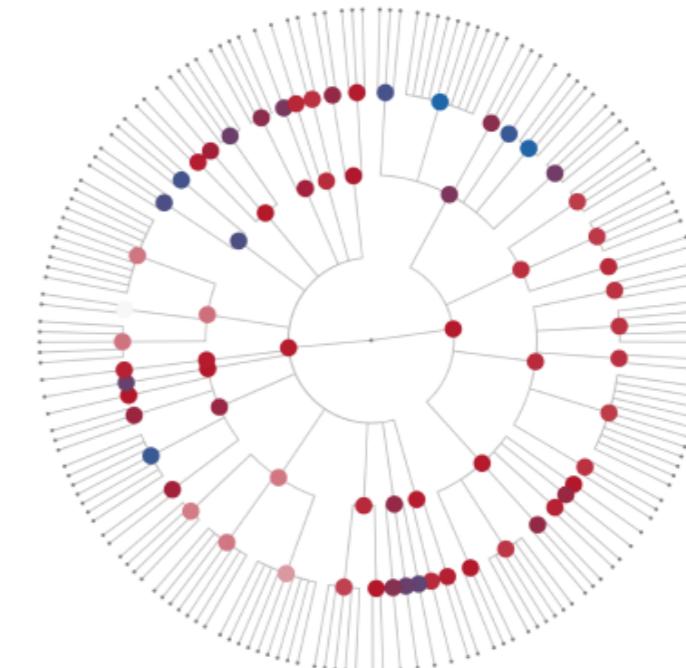
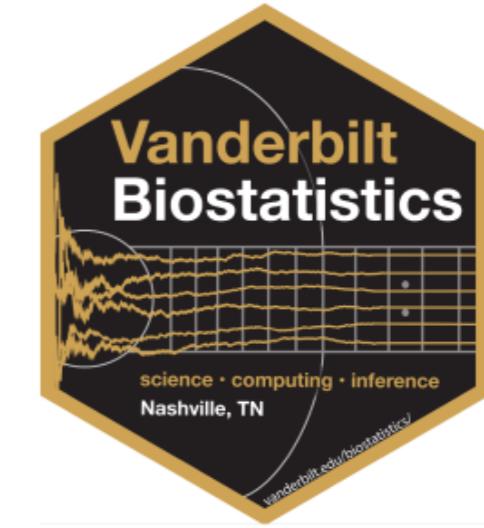
Public colleges and universities have historically served their own state residents, but the number of out-of-state freshmen attending them has nearly doubled since 1986, according to Department of Education data. [RELATED ARTICLE](#)

### Exodus of Public University Students

Arrows are in proportion to number of freshmen leaving their home state to attend public universities in other states.\*

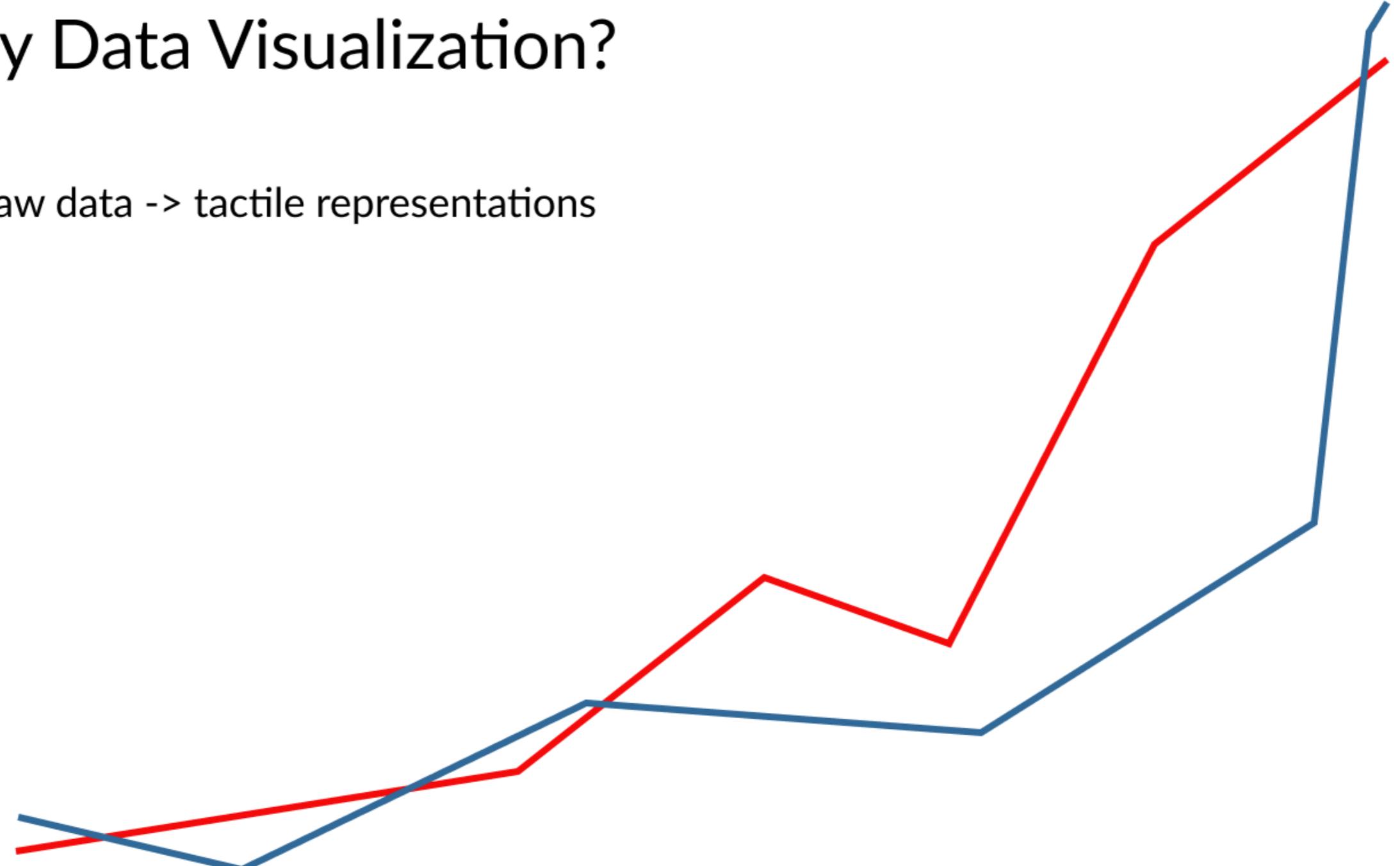


Source: U.S. Department of Education, 2014 data. \*Note: Arrows show only movements of 500 or more students.



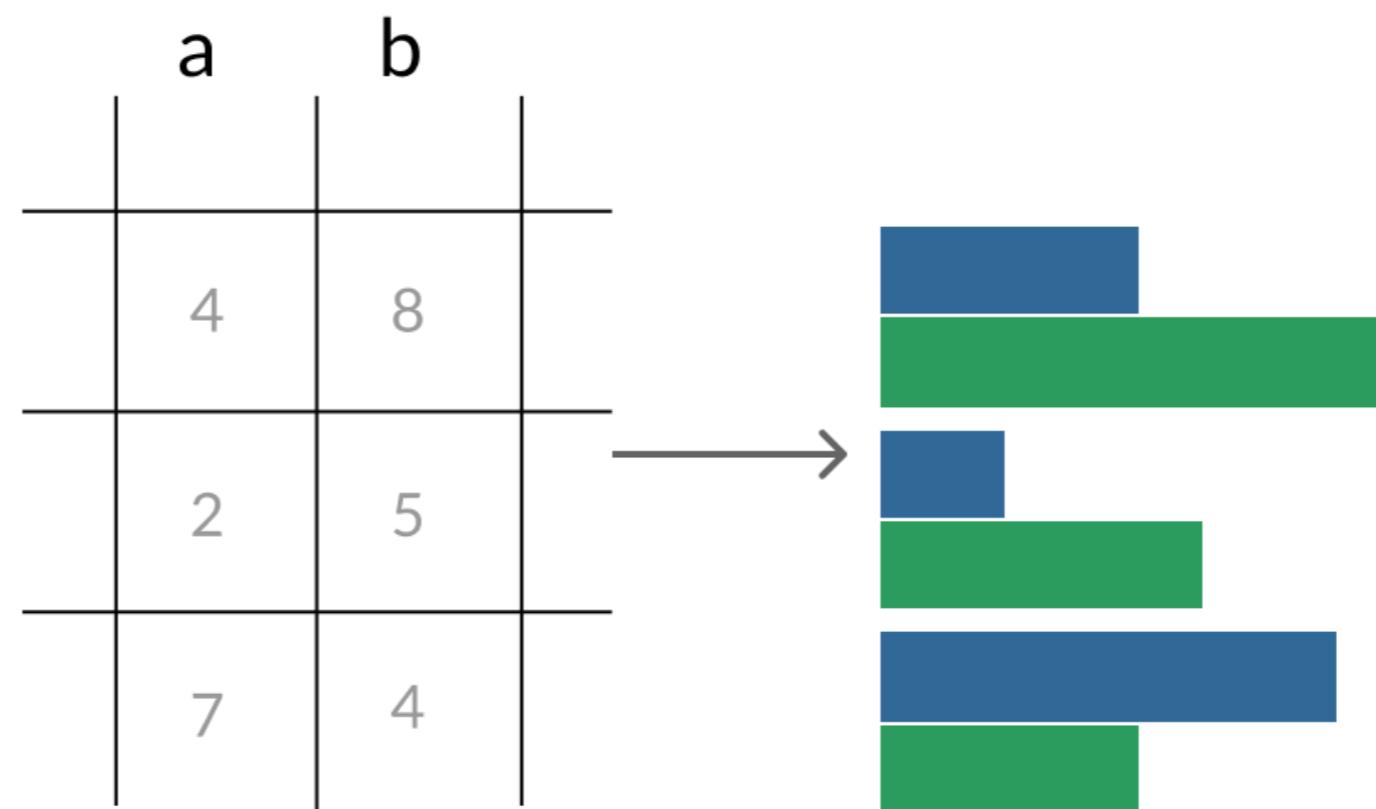
# Why Data Visualization?

- Raw data -> tactile representations



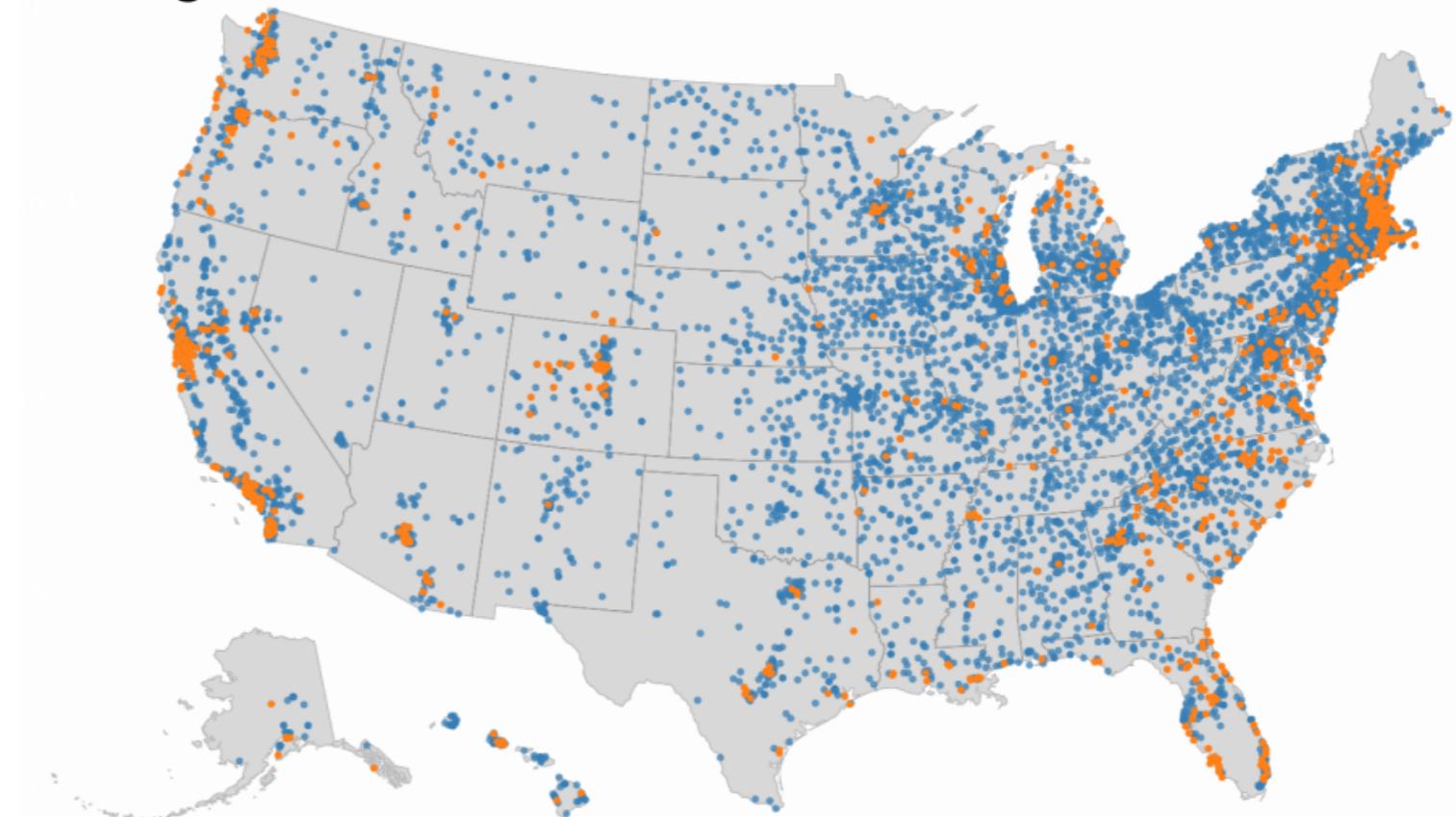
# Why Data Visualization?

- Raw data -> tactile representations
- *Sometimes* purely cosmetic



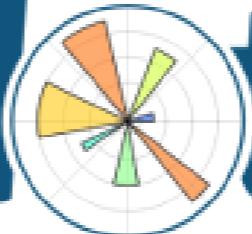
# Why Data Visualization?

- Raw data -> tactile representations
- *Sometimes* purely cosmetic
- *Sometimes* essential to understanding data



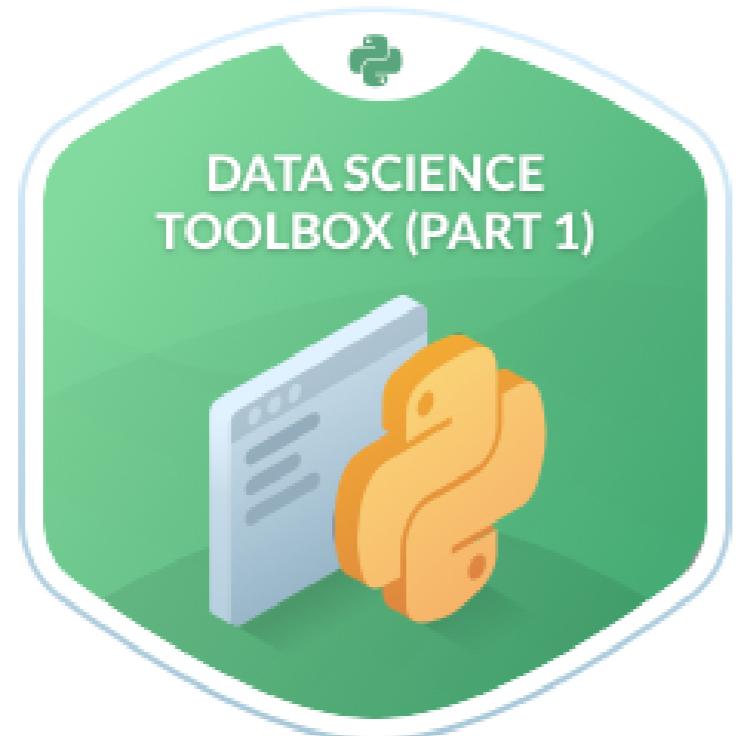


python



matplotlib

The word "matplotlib" in blue, with a small circular logo containing a multi-colored sunburst chart positioned between the "o" and the "t".





Google Sheets



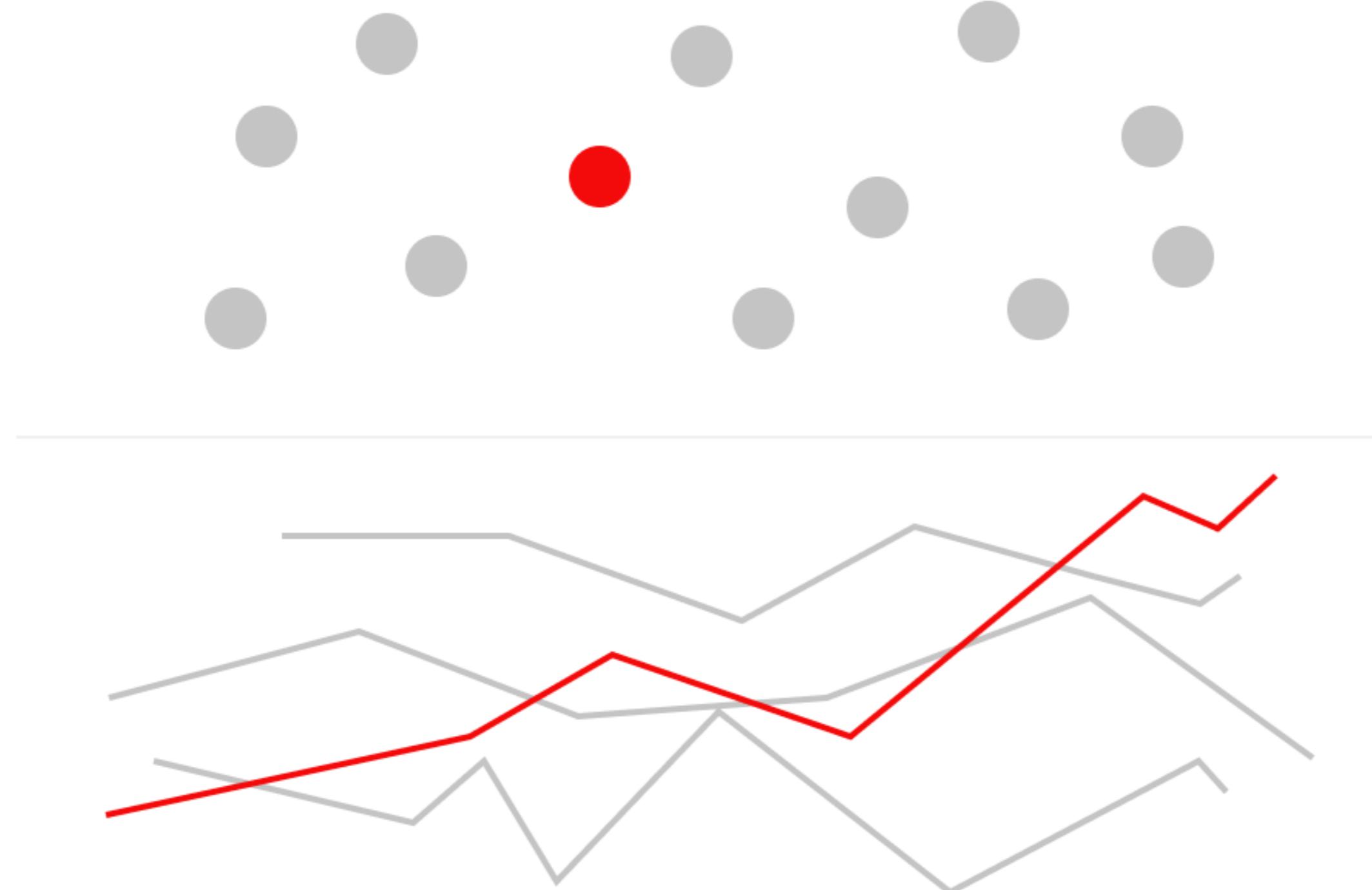
++ + a b | e a u°

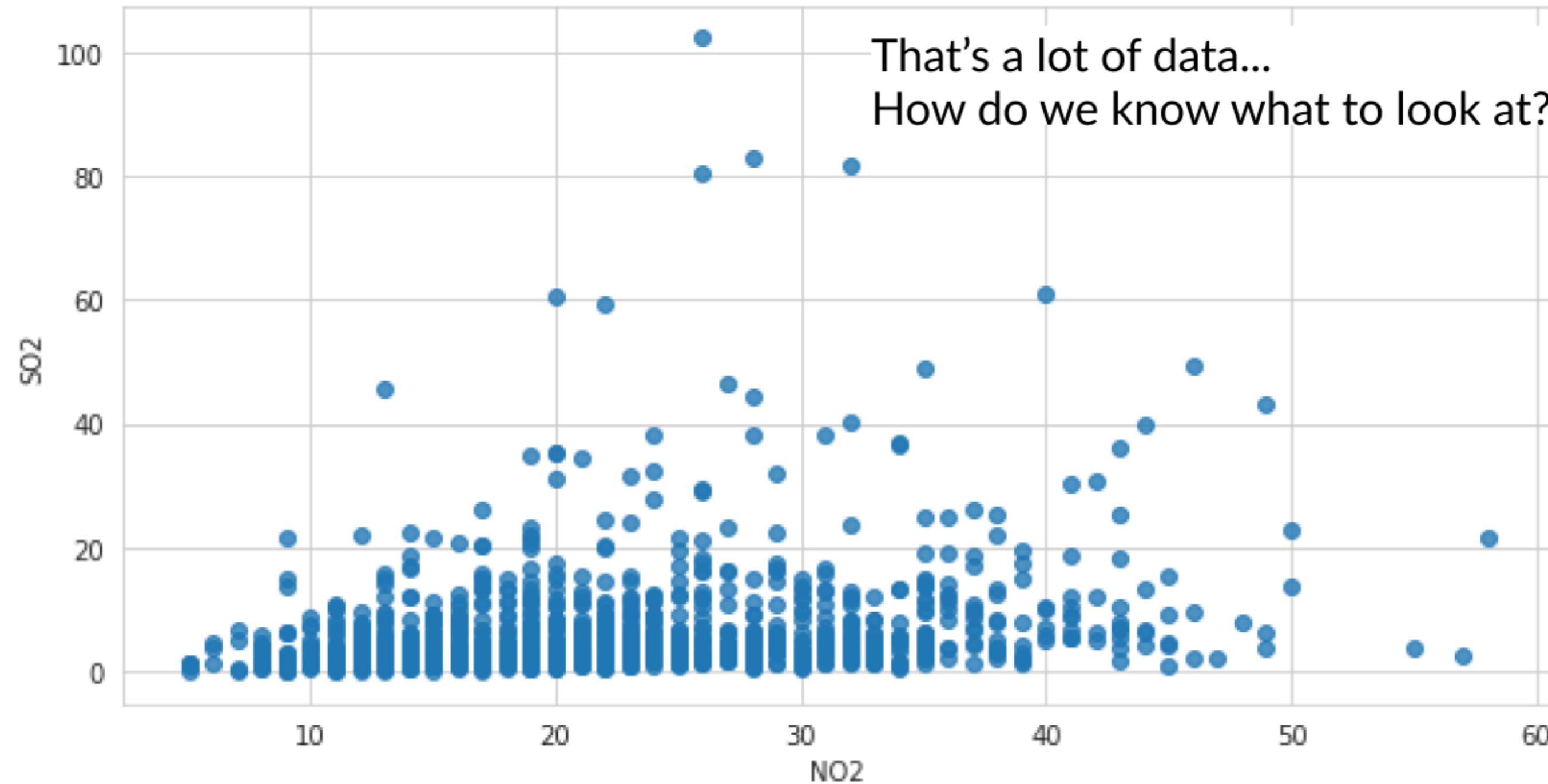
```
pollution.head()
```

```
      city  year  month  day    CO    NO2     O3    SO2
0  Cincinnati  2012       1    1  0.245  20.0  0.030   4.20
1  Cincinnati  2012       1    2  0.185   9.0  0.025   6.35
2  Cincinnati  2012       1    3  0.335  31.0  0.025   4.25
3  Cincinnati  2012       1    4  0.305  25.0  0.016  17.15
4  Cincinnati  2012       1    5  0.345  21.0  0.016  11.05
```

```
pollution.city.unique()
```

```
[ 'Boston',      'Cincinnati',      'Denver',          'Des Moines',
  'Fairbanks',   'Houston',        'Indianapolis',   'Long Beach',
  'New York',    'Salt Lake City',  'Vandenberg Air Force Base' ]
```

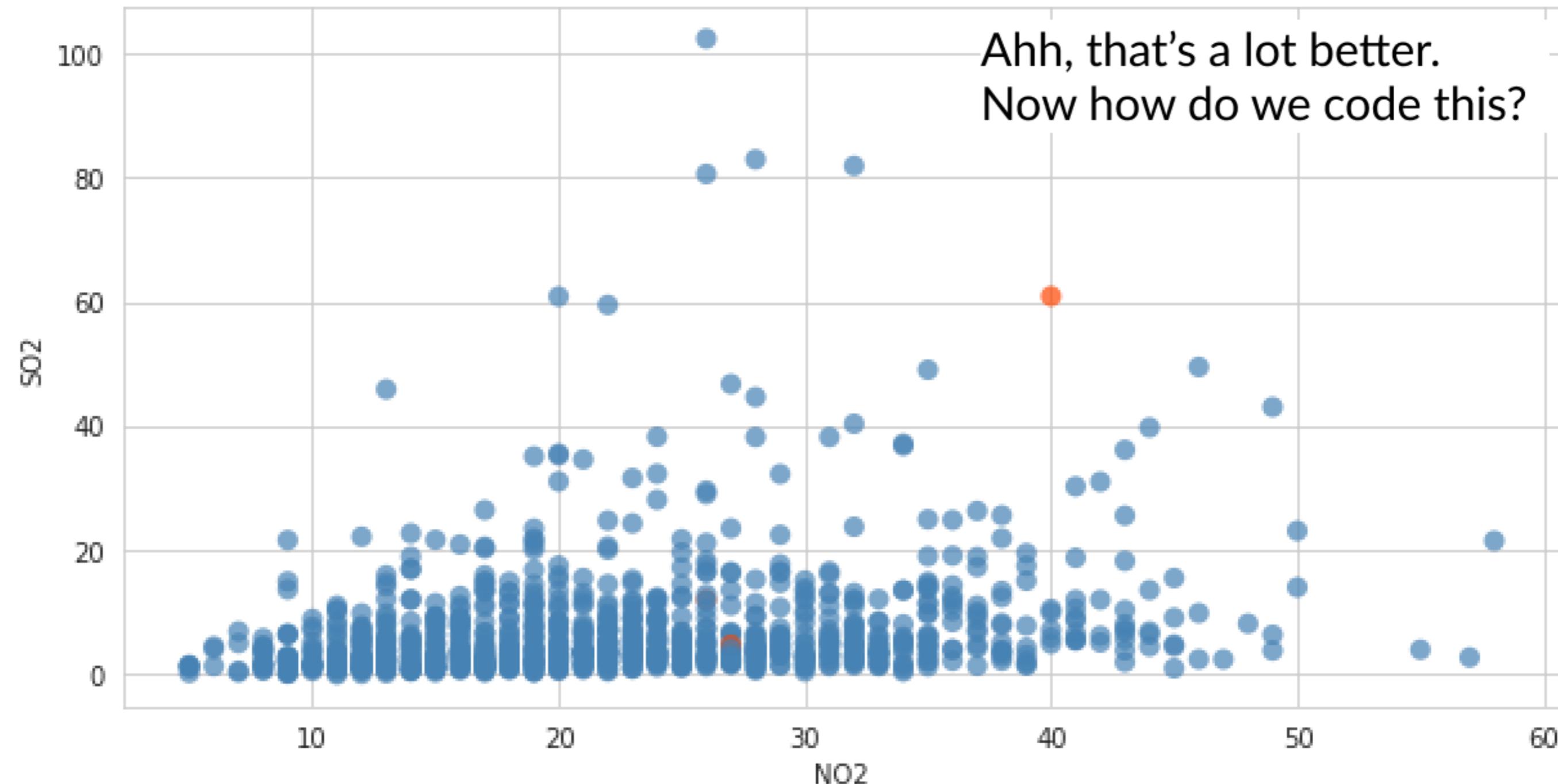




```
cinci_pollution = pollution[pollution.city == 'Cincinnati']

# Make an array of colors based upon if a row is a given day
cinci_colors = [ 'orangered' if day == 38 else 'steelblue'
                 for day in cinci_pollution.day]

# Plot with additional scatter plot argument facecolors
p = sns.regplot(x='NO2',
                  y='SO2',
                  data = cinci_pollution,
                  fit_reg=False,
                  scatter_kws={'facecolors': cinci_colors, 'alpha': 0.7})
```

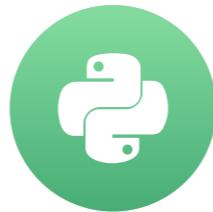


# Let's make some highlights!

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

# Comparing groups

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

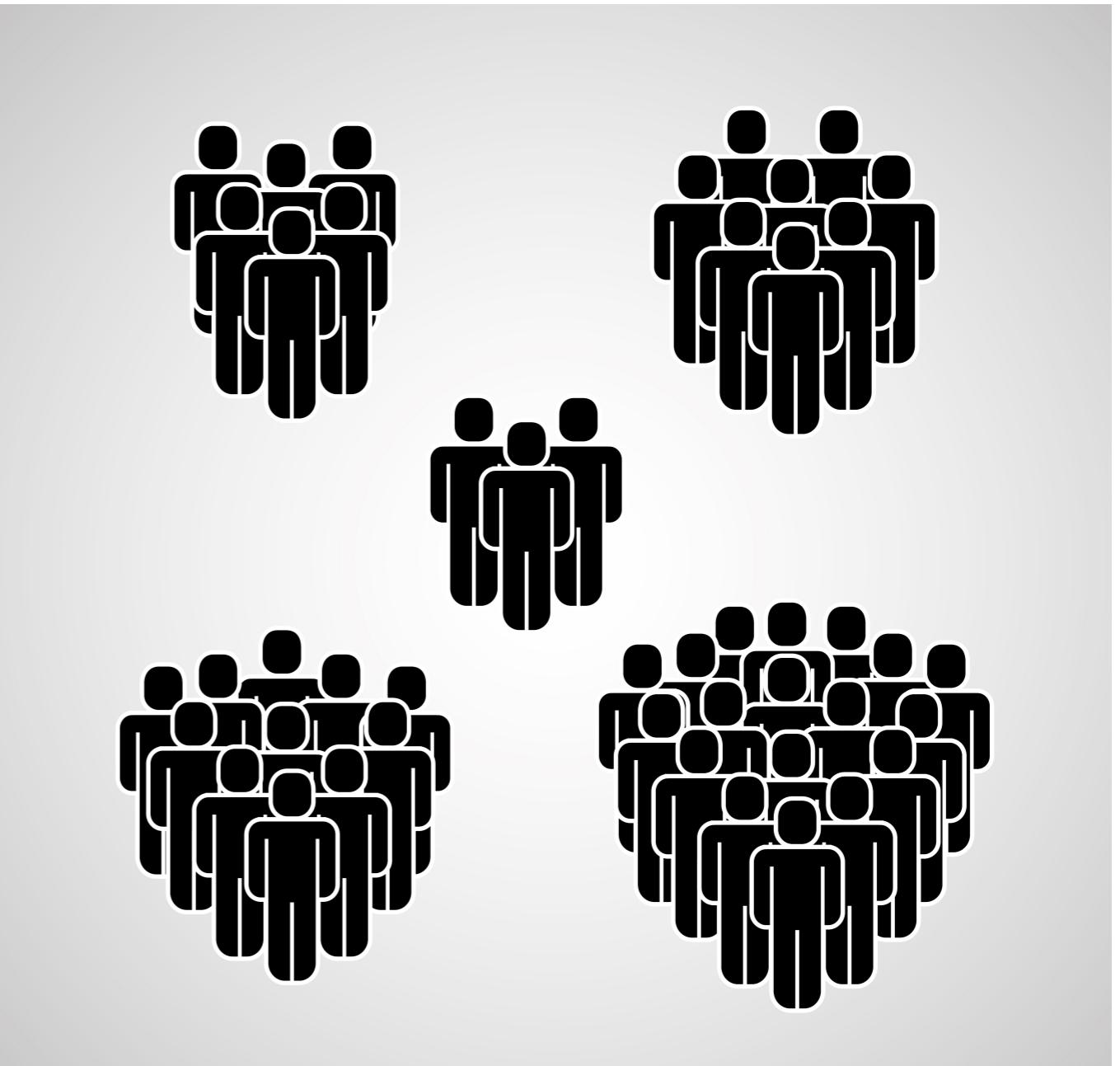


Nick Strayer

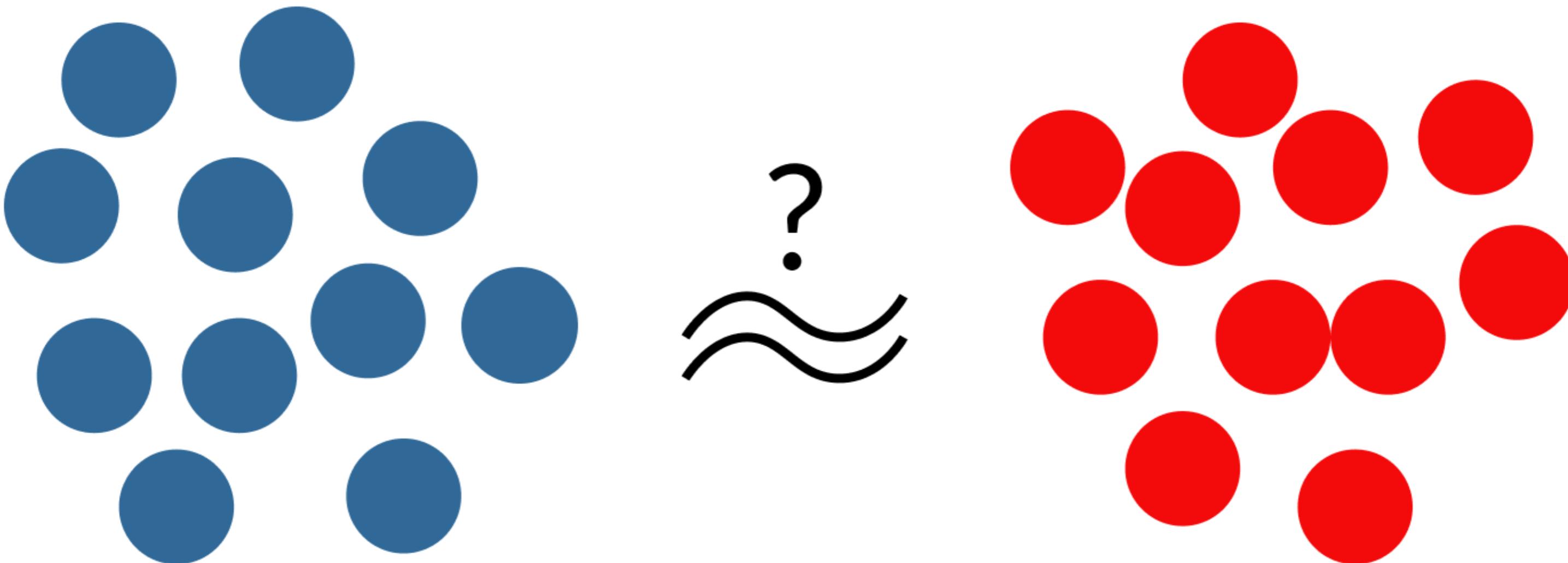
Instructor

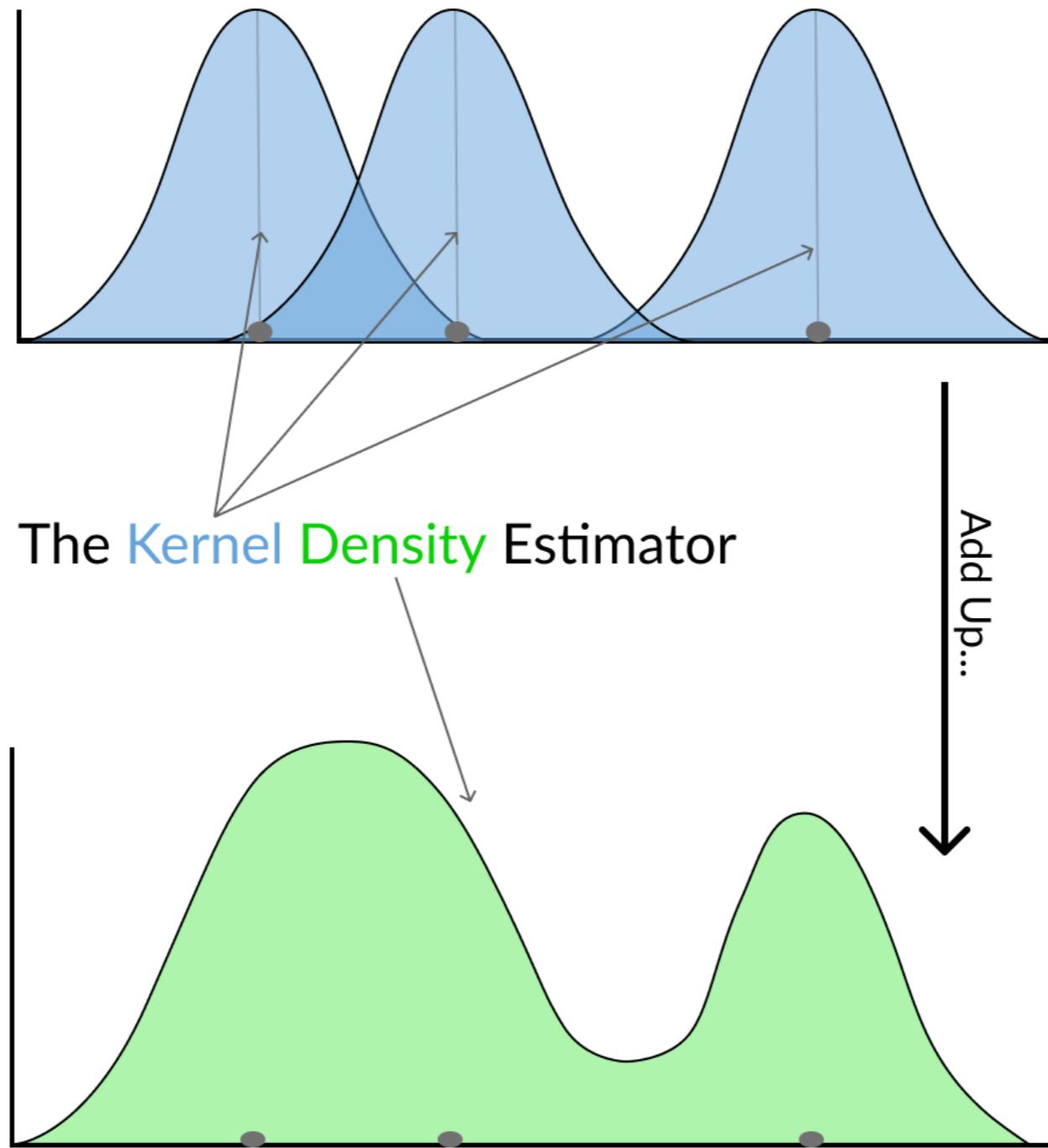
# What does this mean?

- Values generally higher?
- Distribution of values wider? Narrower?
- Crucial for representing your data

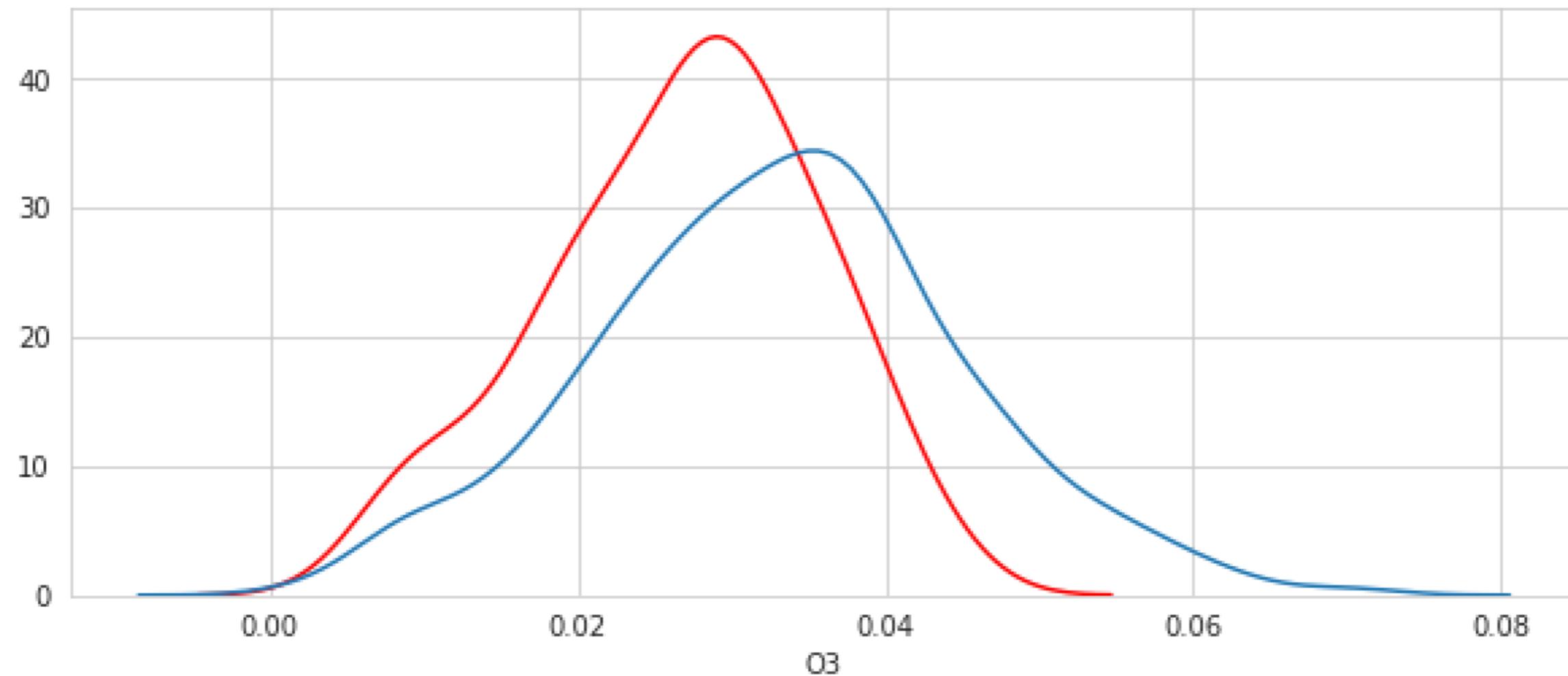


# Comparing a couple classes

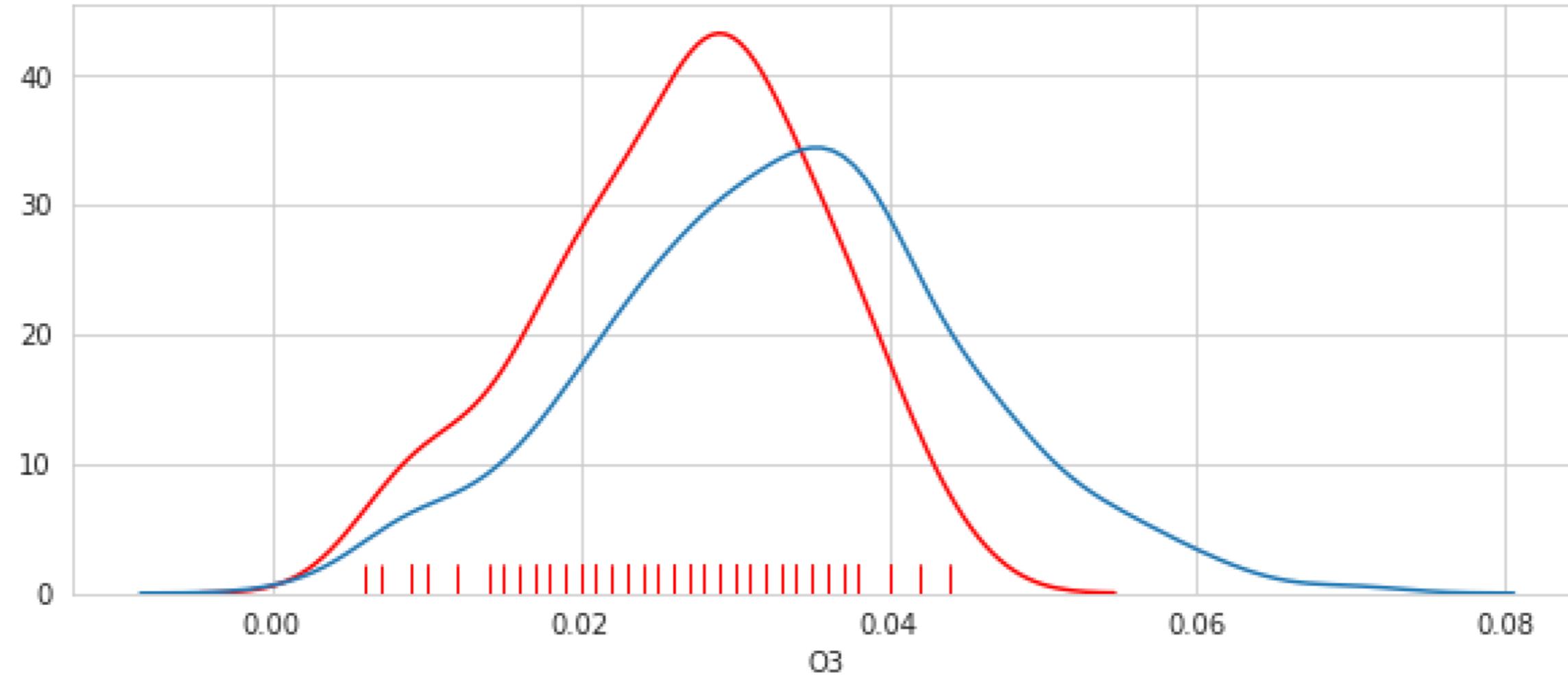




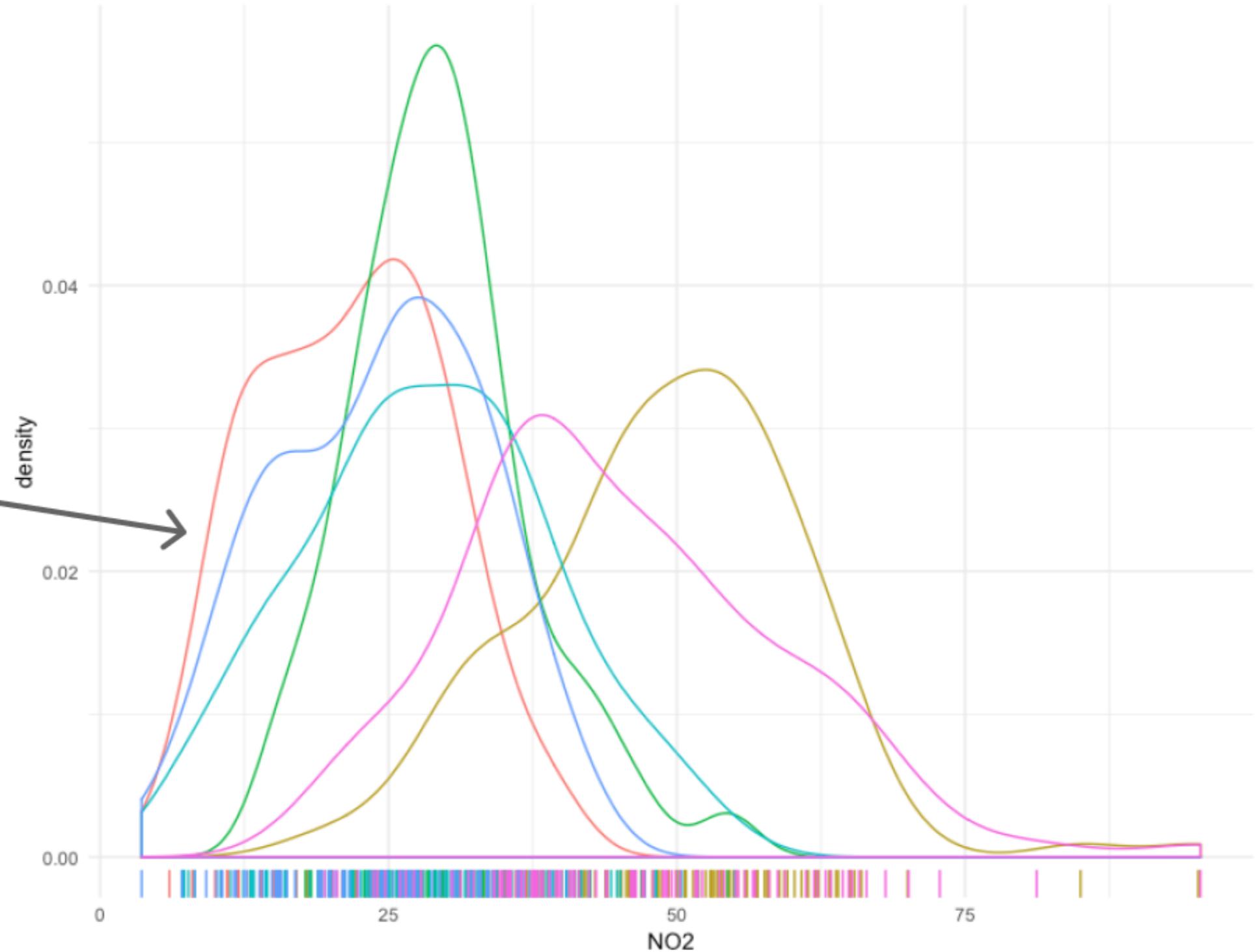
```
pollution_nov = pollution[pollution.month == 10]
sns.distplot(pollution_nov[pollution_nov.city == 'Denver'].03, hist=False,
             color = 'red')
sns.distplot(pollution_nov[pollution_nov.city != 'Denver'].03, hist=False)
```



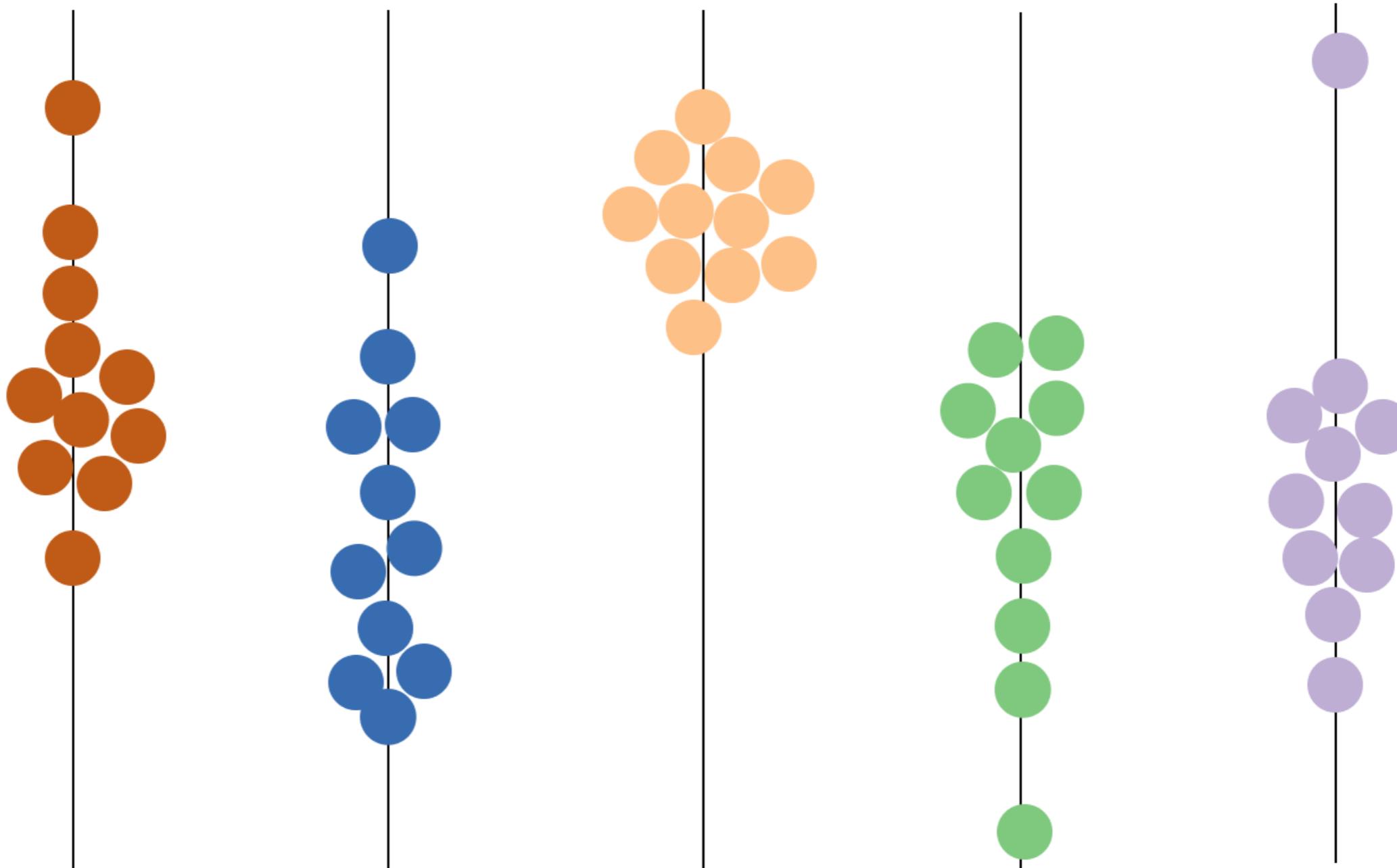
```
# Enable rugplot
sns.distplot(pollution_nov[pollution_nov.city == 'Denver'].03,
              hist=False, color='red', rug=True )
sns.distplot(pollution_nov[pollution_nov.city != 'Denver'].03, hist=False)
```



Hard to keep track of lines

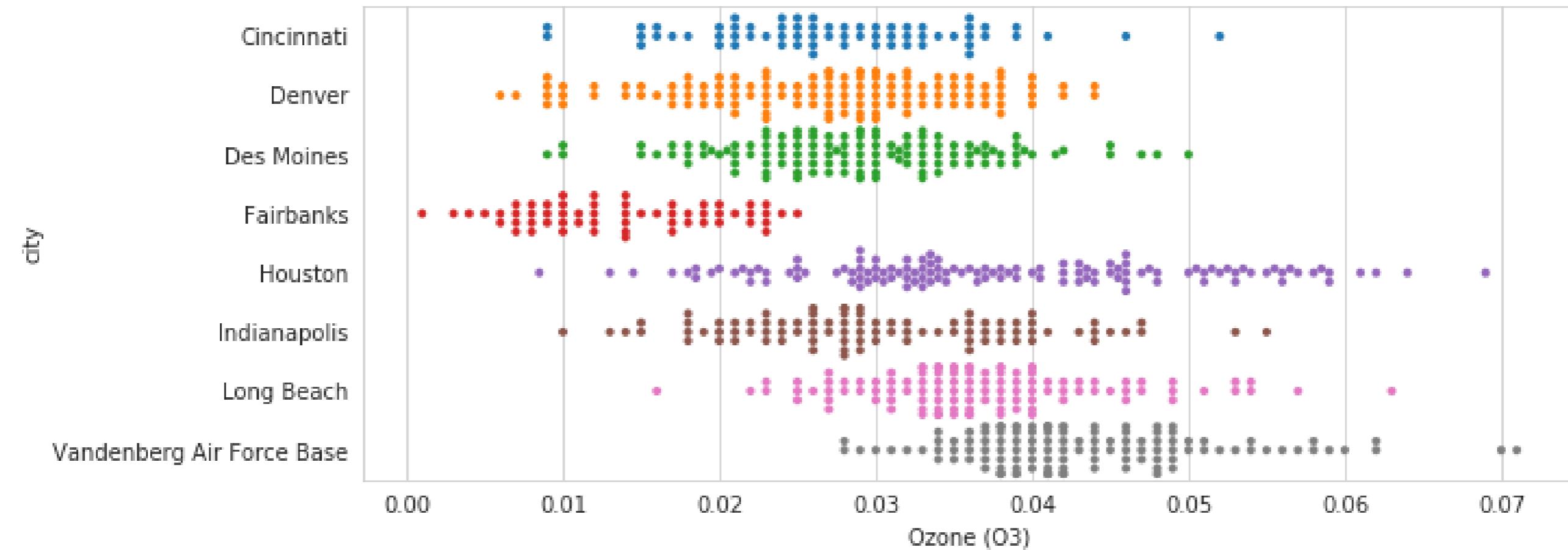


# The beeswarm plot



```
pollution_nov = pollution[pollution.month == 10]
```

```
sns.swarmplot(y="city", x="O3", data=pollution_nov, size=4)  
plt.xlabel("Ozone (O3)")
```



# Let's compare!

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

# Annotations

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

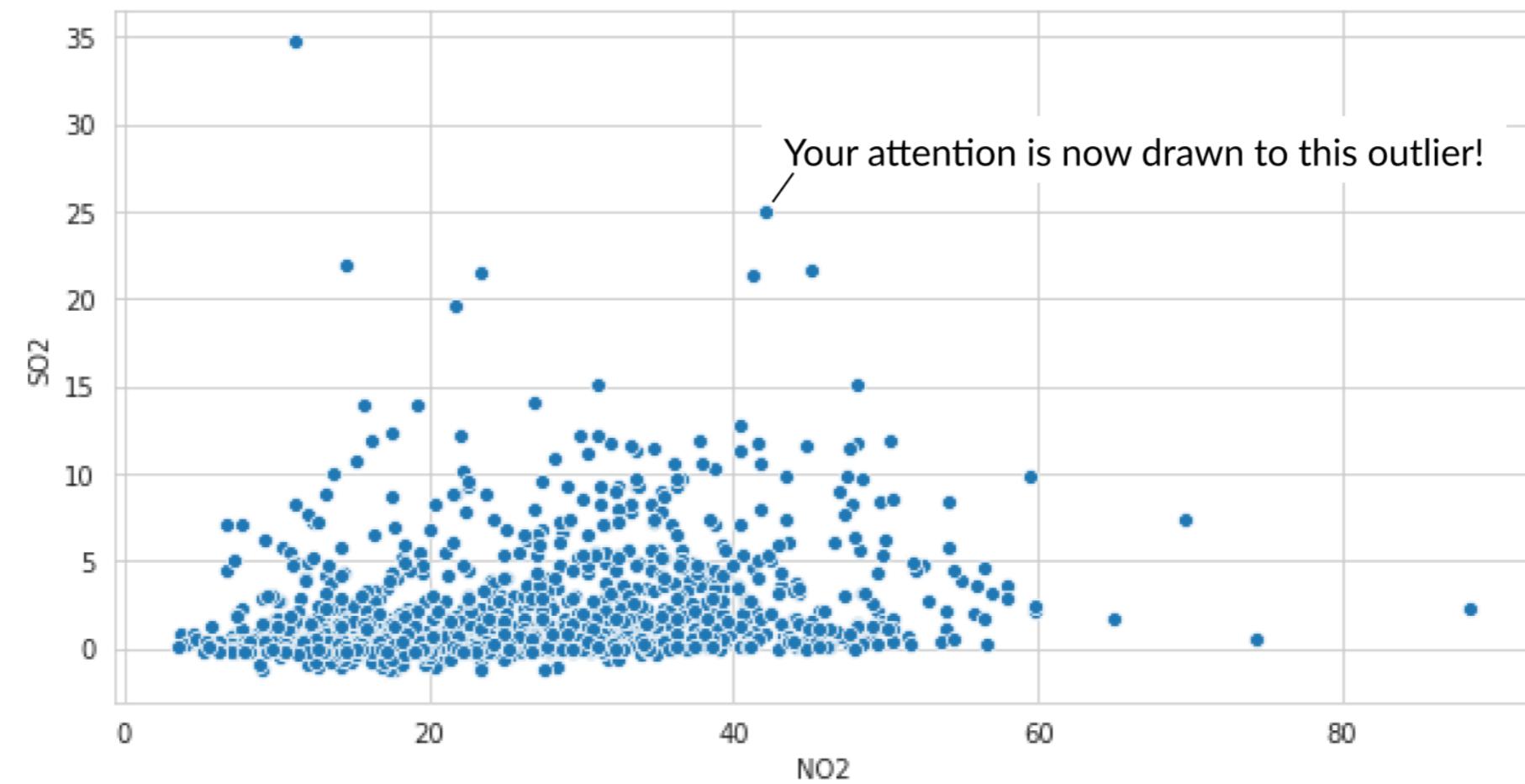


Nick Strayer

Instructor

# What annotations add

- Compact and efficient communication
- Opportunity to supply deeper insight to data



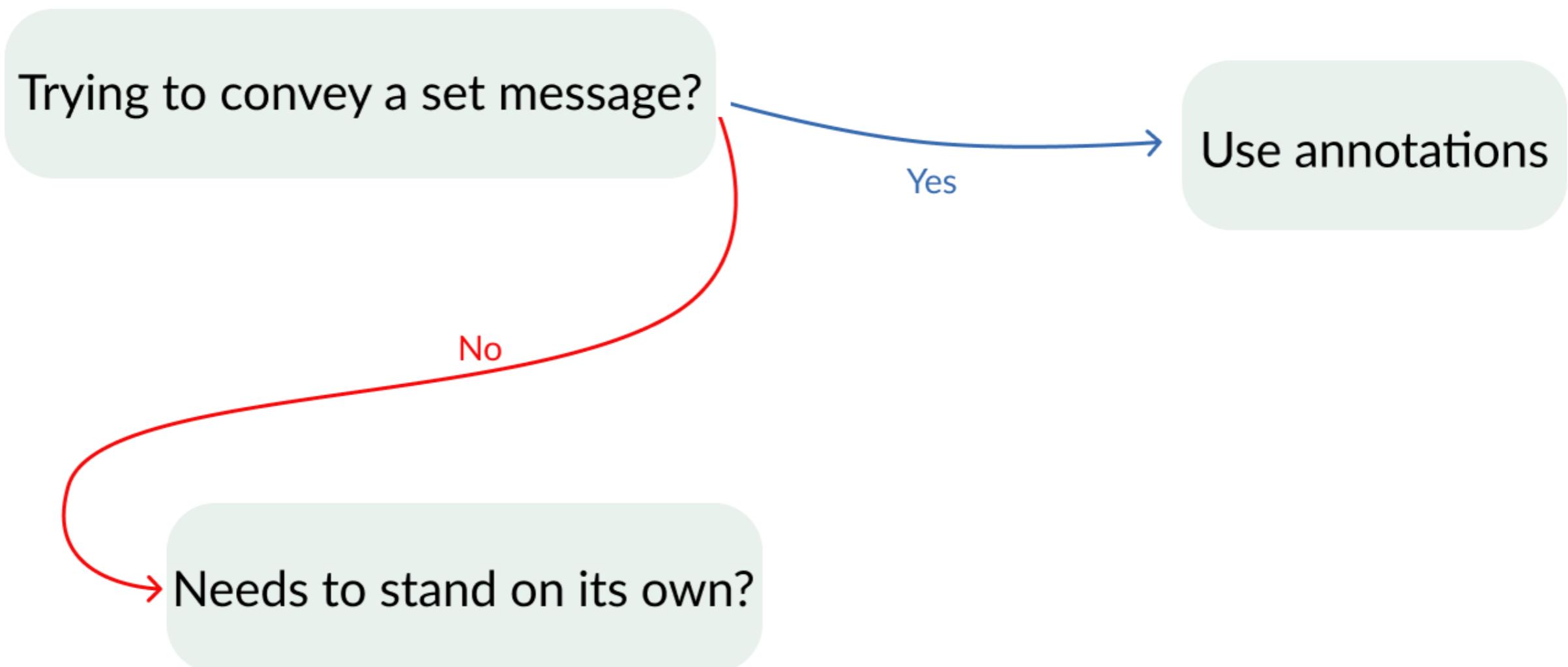
# When to use annotations

Trying to convey a set message?

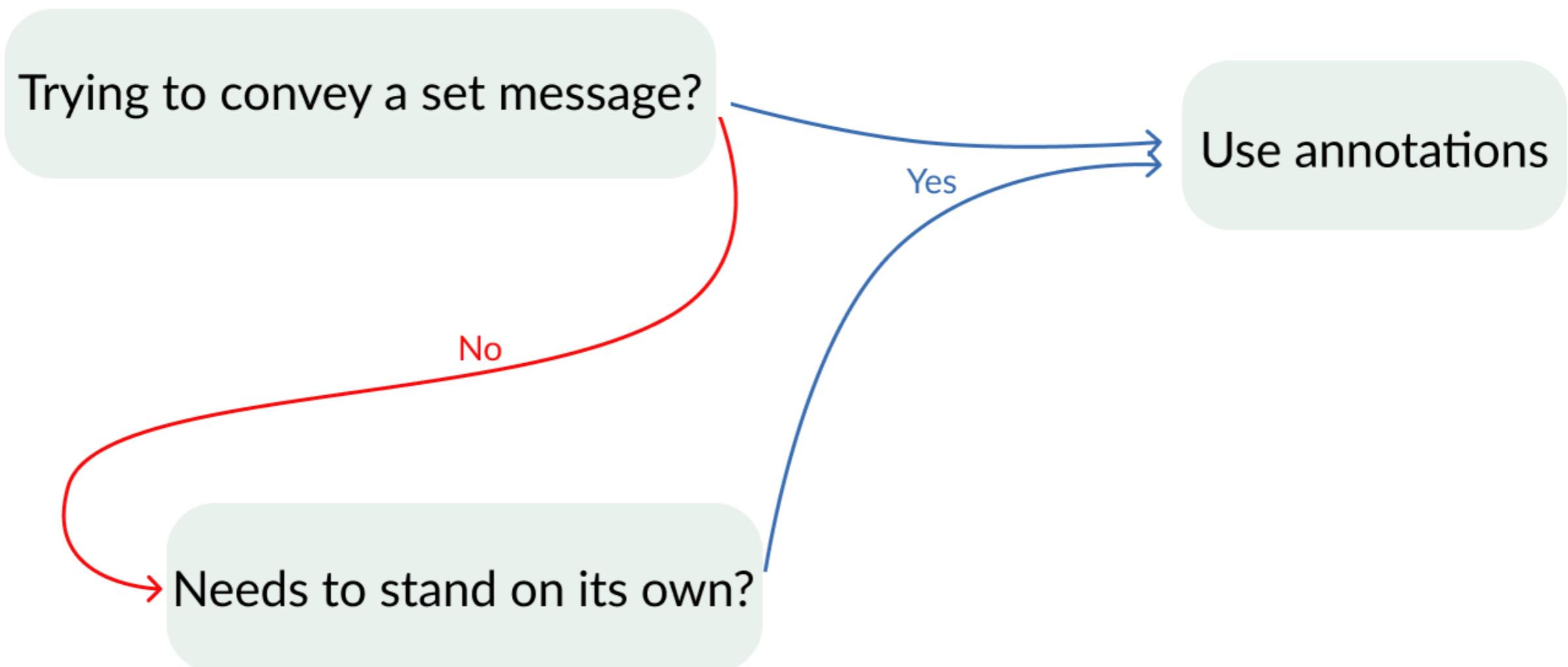
Yes

Use annotations

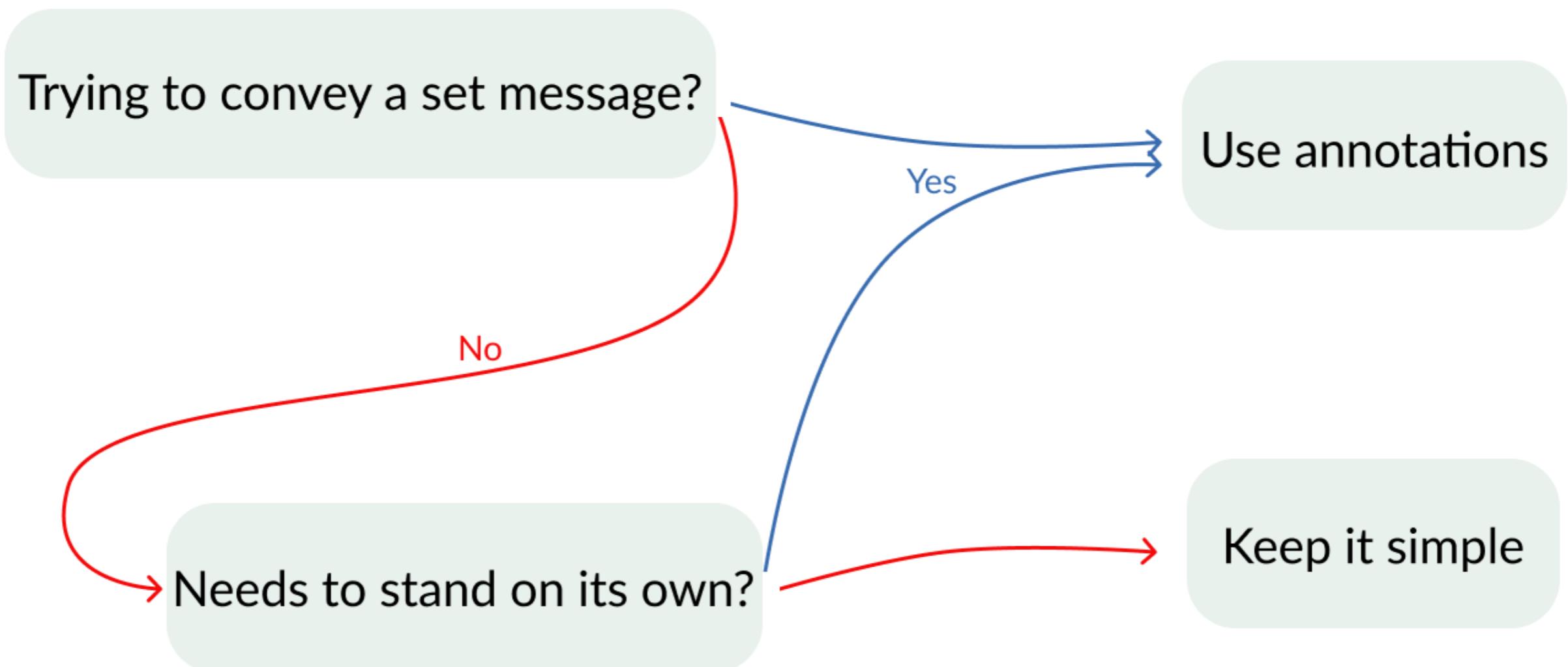
# When to use annotations



# When to use annotations

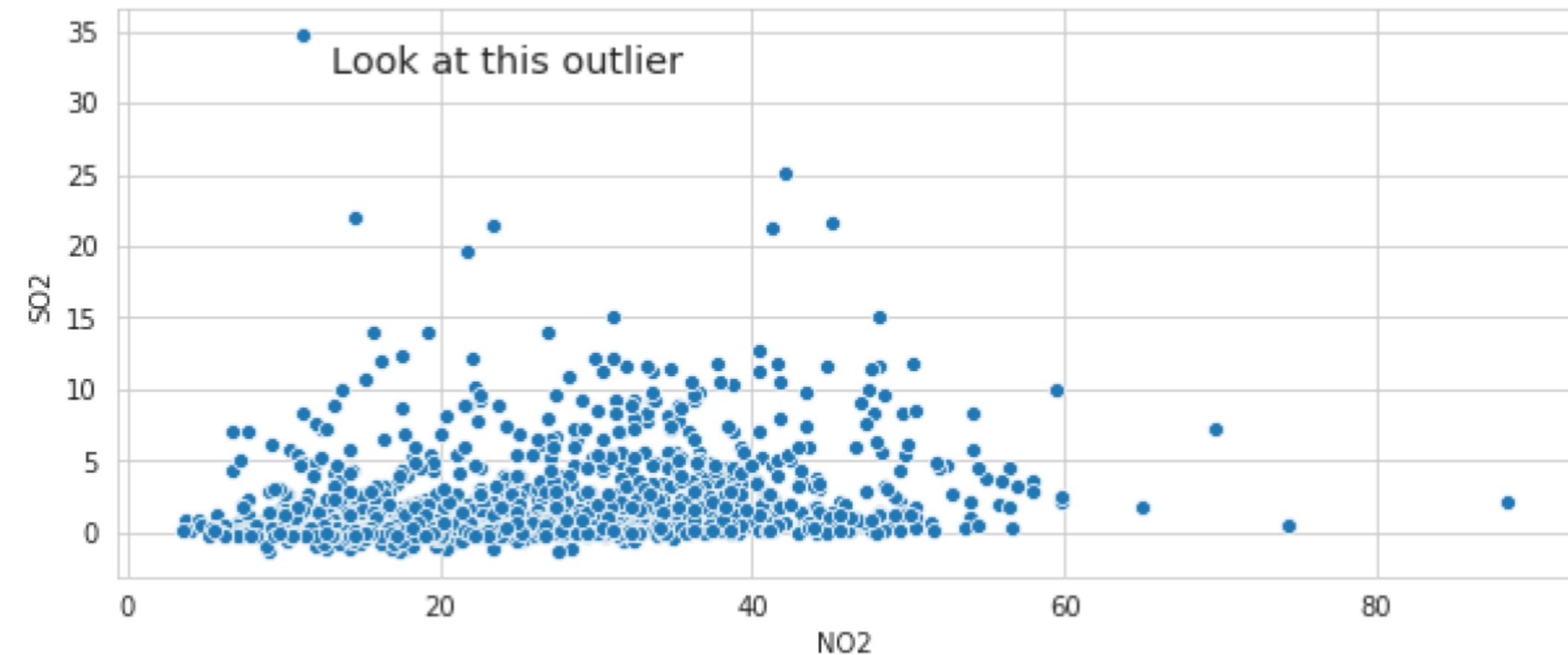


# When to use annotations



```
sns.scatterplot(x='NO2', y='SO2', data = houston_pollution)

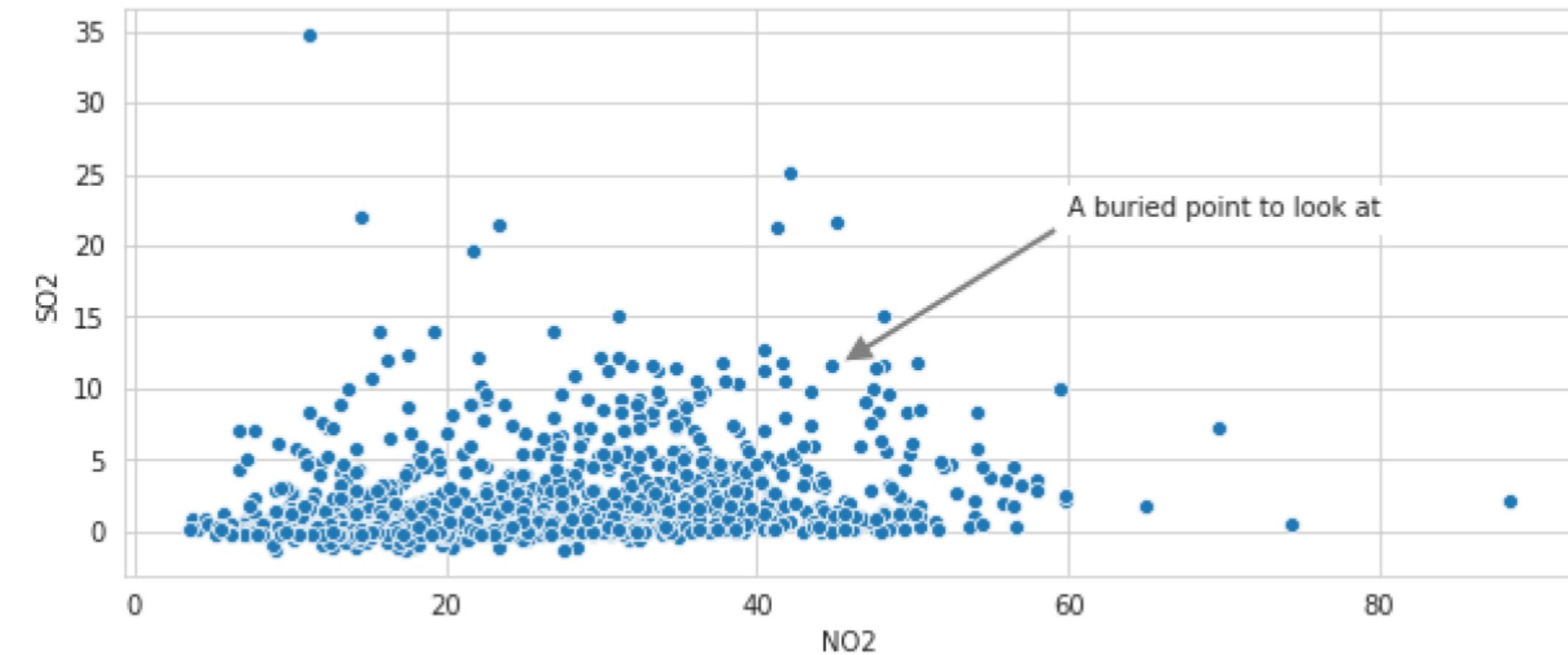
# X and Y location of outlier and text
plt.text(13,33,'Look at this outlier',
        # Text properties for alignment and size.
        fontdict = {'ha': 'left', 'size': 'x-large'})
```



```
sns.scatterplot(x='NO2', y='SO2', data = houston_pollution)

# Arrow start and annotation location
plt.annotate('A buried point to look at', xy=(45.5,11.8), xytext=(60,22),

# Arrow configuration and background box
arrowprops={'facecolor':'grey', 'width': 3}, backgroundcolor = 'white' )
```



# Let's annotate

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON