# Approach to Deal With Overdraw

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CS 360/560 Data Visualization

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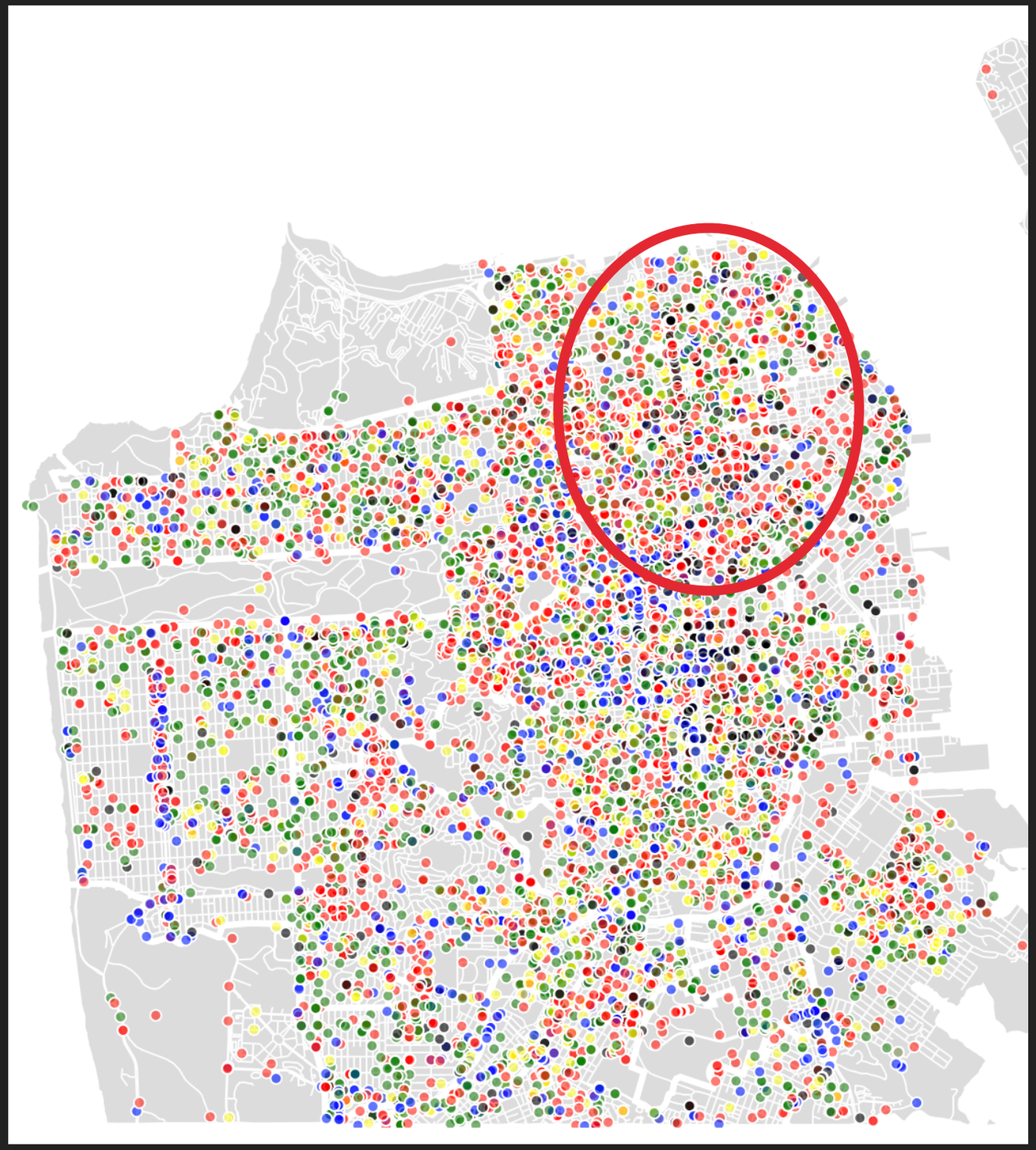
# Agenda

1. What Is Overdraw
2. Motivation
3. The Paper For This Topic
4. Background Of The Paper
5. Approach
6. User Study
7. Performance
8. Conclusion

# Overdraw

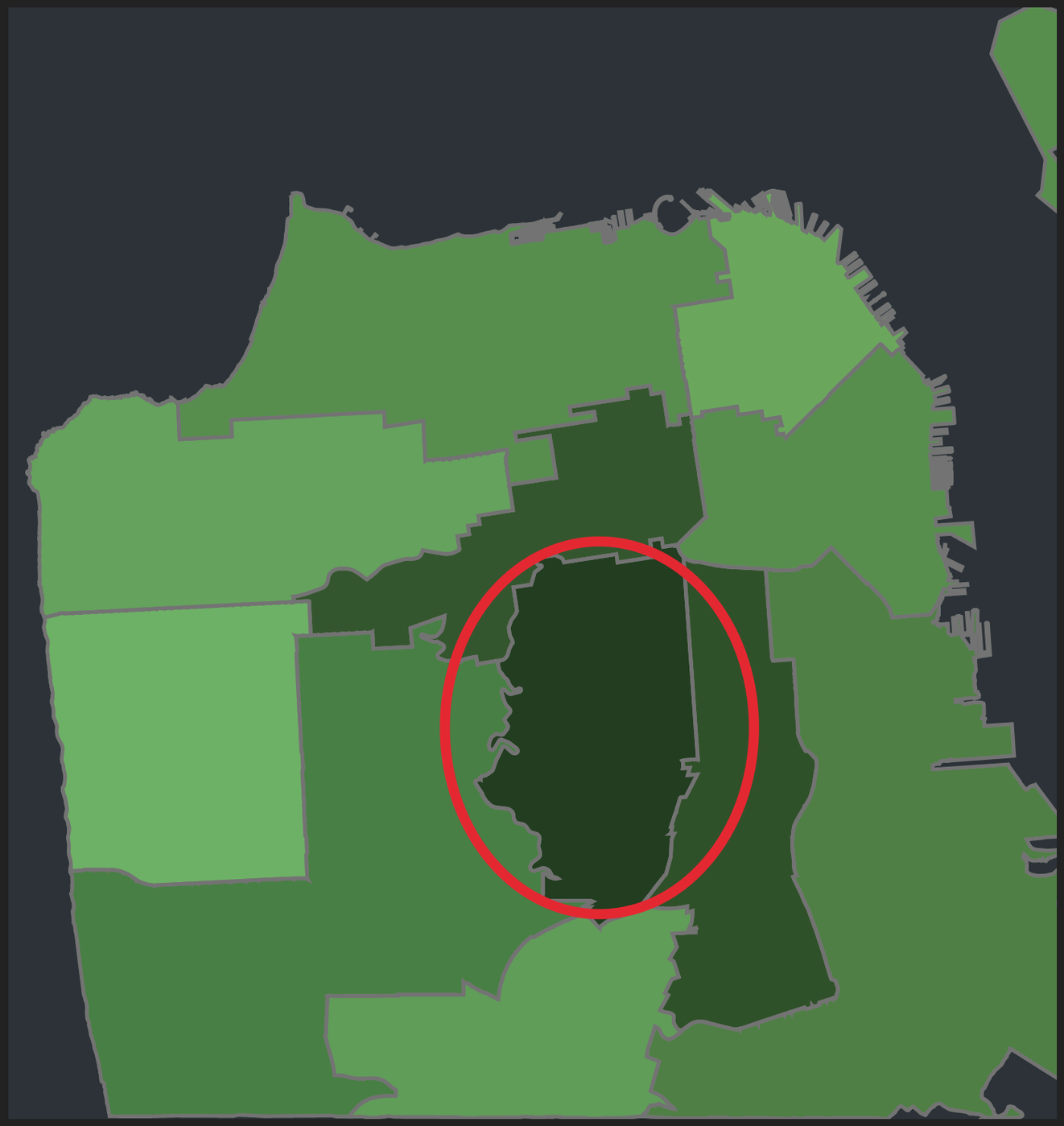
- Overlapping points
- Overplotting
- Example



San Francisco Tree Maintenance by Emmit Parubrub
http://usf-cs360-spring2019.github.io/homework3-eparubrub/

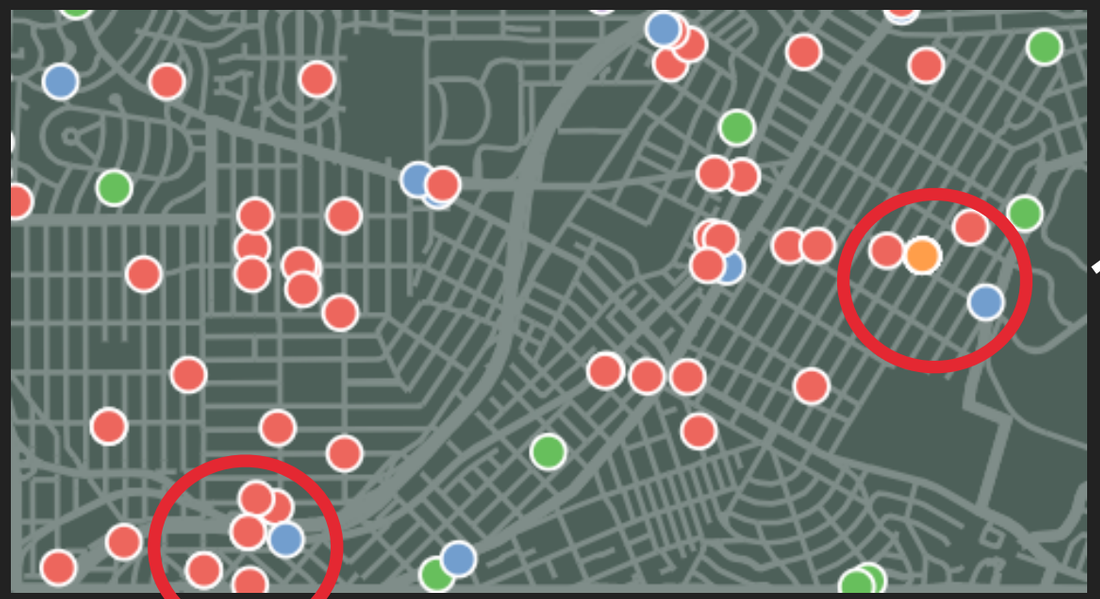
# Overdraw

- Overlapping points
- Overplotting
- Example



San Francisco Tree Maintenance by Chien-Yu (Brian) Sung
https://ohbriansung.github.io/data_visualization_hw3/

# How Many Data Points In Each Circle?

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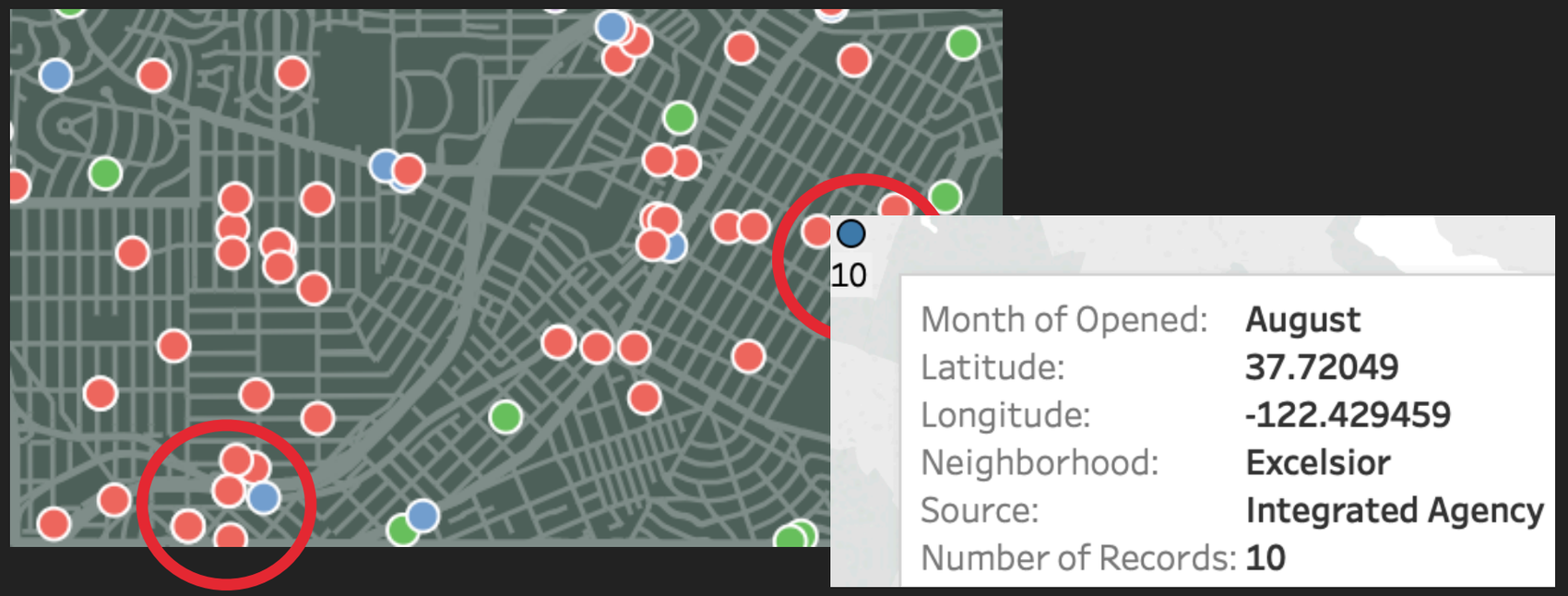
# How Many Data Points In Each Circle?

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# Motivations

- Scatterplot and scatterplot matrices are commonly used (Although the examples I showed were not scatterplot)
- Similar problem happened in our previous homework
- To reduce lying factors in your visualizations

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https://ohbriansung.github.io/data_visualization_hw3/

# Using Animation to Alleviate Overdraw in Multiclass Scatterplot Matrices (SPLOMs)


- Authors:
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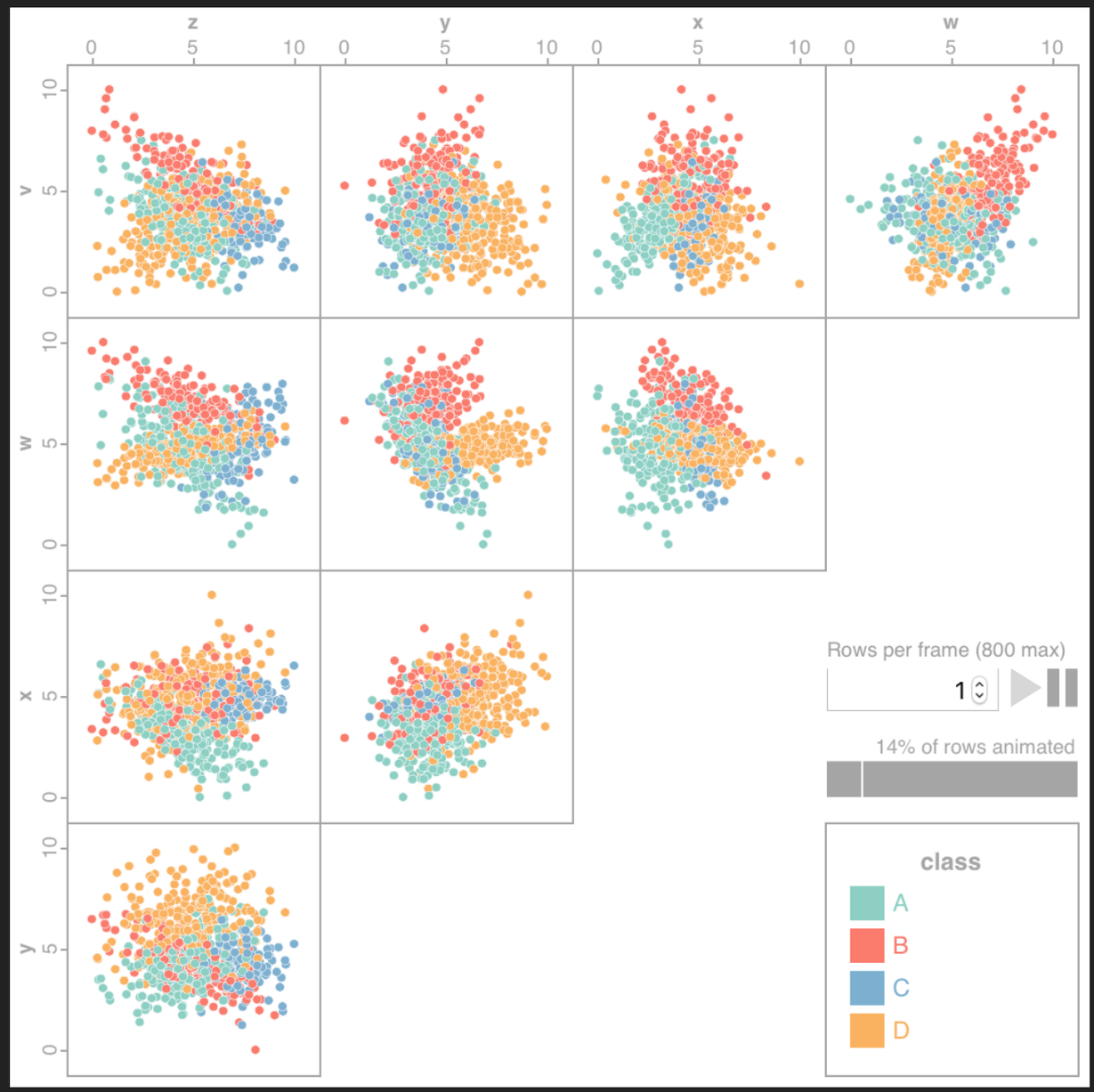
  Eric D Ragan, Texas A&M University
  Lane Harrison, Worcester Polytechnic Institute


- Paper: https://dl.acm.org/citation.cfm?doid=3173574.3173991
- Website: http://vgl.cs.usfca.edu/animated-sploms/
- License: http://vgl.cs.usfca.edu/animated-sploms/LICENSE

# Multiclass Scatterplot Matrices (SPLOMs)

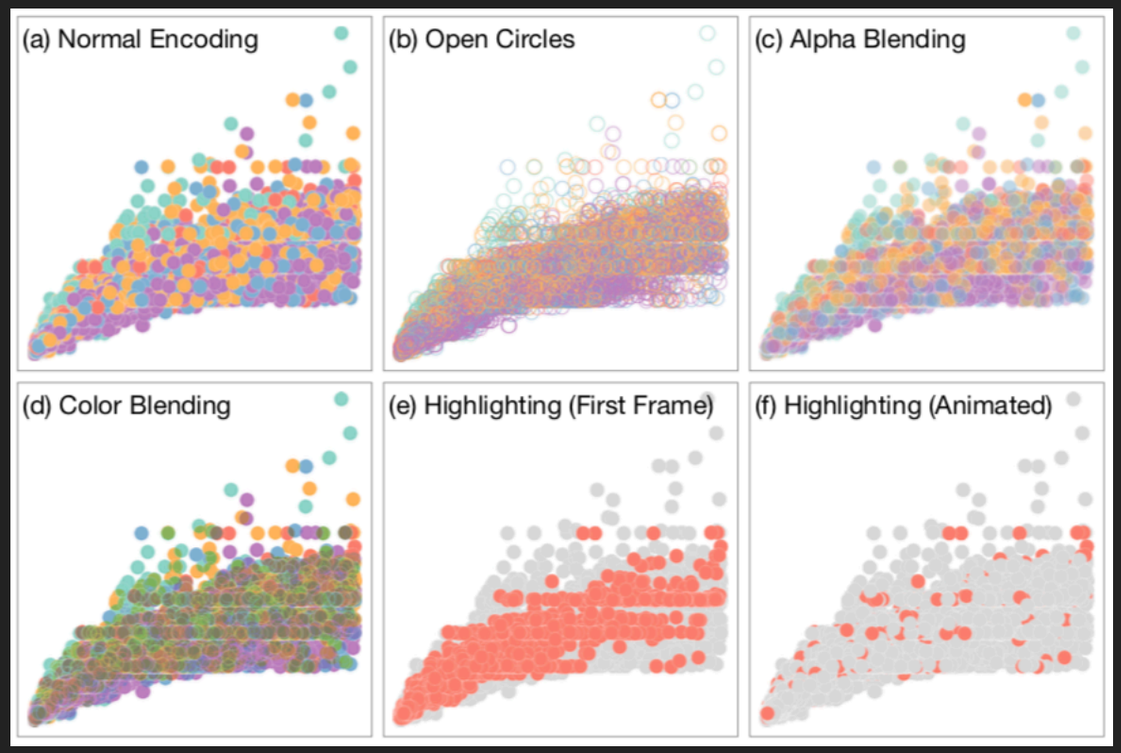
- Grid of scatterplots
- Encoding with variables on column and row
- Horizontal, Vertical positions
- Color based on some kind of class or category




http://vgl.cs.usfca.edu/animated-sploms/

# Why Multiclass SPLOMs?

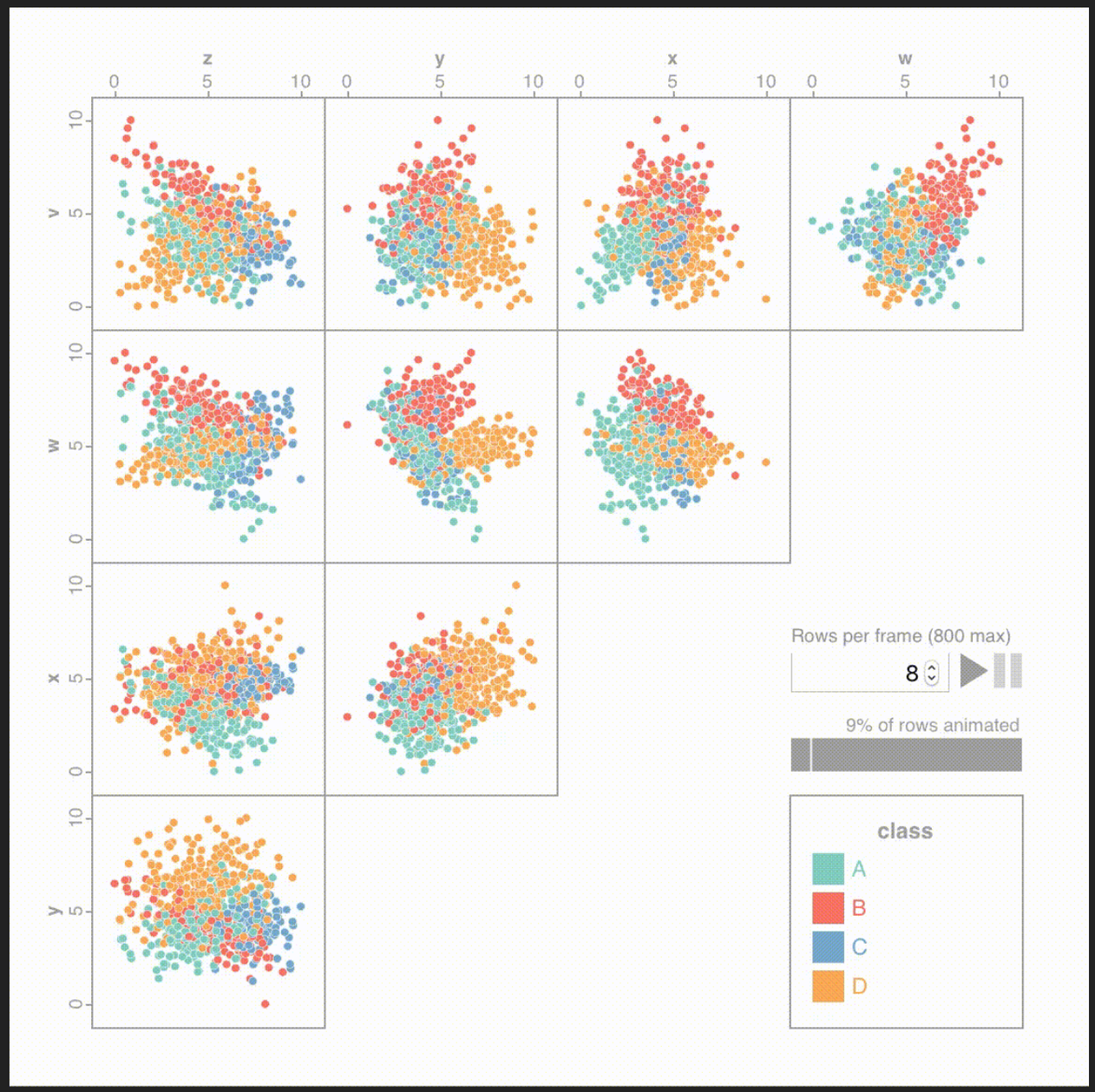
- Overdraw for moderate to large datasets
- Scatterplots have been actively researched
- Multiclass SPLOMs be the hardest and least studied for overdraw
- Common plotting techniques not working




https://dl.acm.org/citation.cfm?doid=3173574.3173991

# Approach

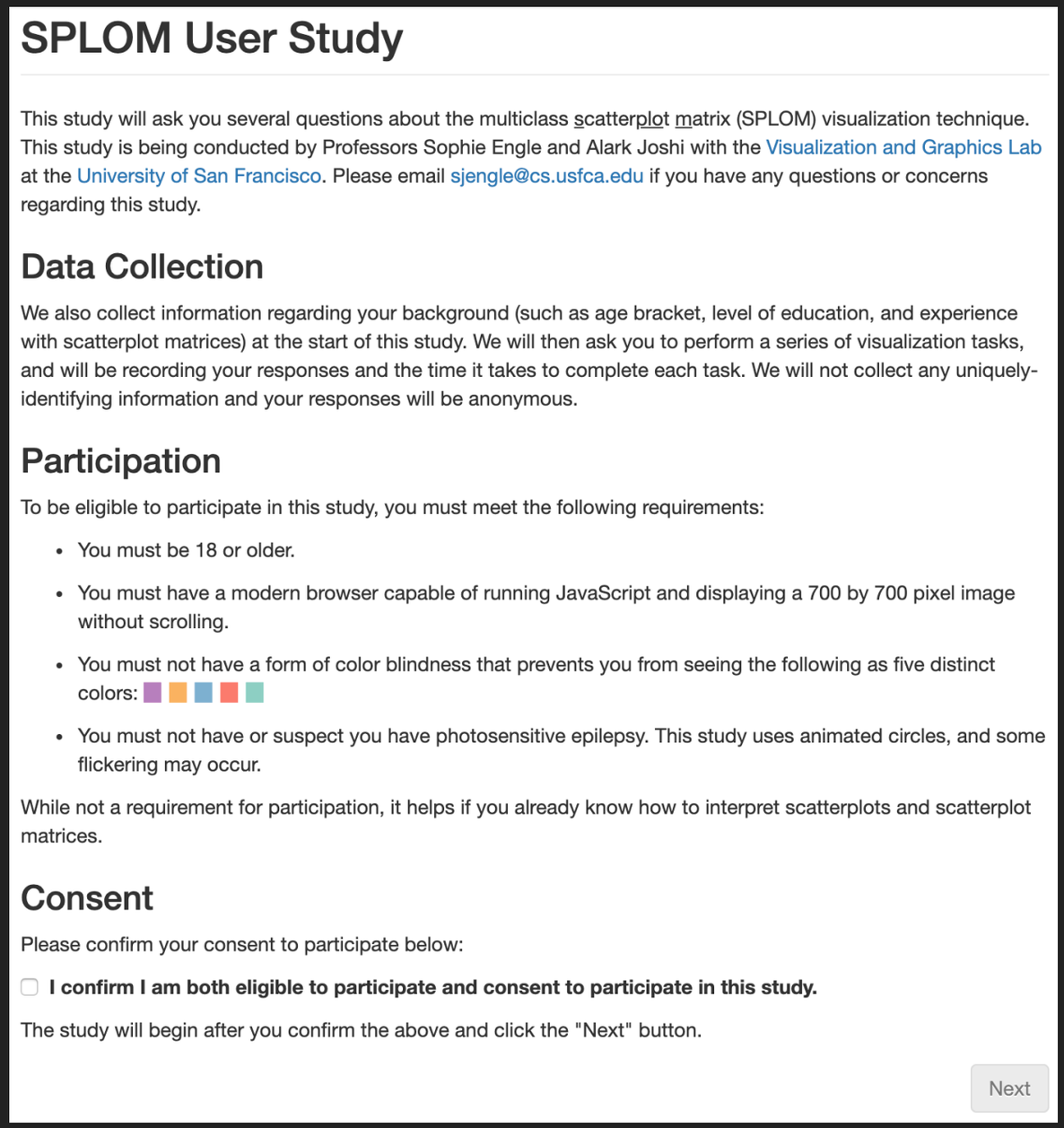
- Continuously redraws points
- New ones above old ones
- Not observing data overtime
- Dense region: many points and few/many classes (colors)
- Interactivity: highlighting class




http://vgl.cs.usfca.edu/animated-sploms/

# User Study

- Does the animation distract users?
- 69 participants (33% female)
- Students from Data Vis class
- 78% were 18-24 years old
- Most somewhat comfortable with techniques
- Demo: Experimentr framework



## SPLOM User Study

This study will ask you several questions about the multiclass scatterplot matrix (SPLOM) visualization technique. This study is being conducted by Professors Sophie Engle and Alark Joshi with the Visualization and Graphics Lab at the University of San Francisco. Please email sjengle@cs.usfca.edu if you have any questions or concerns regarding this study.

### Data Collection

We also collect information regarding your background (such as age bracket, level of education, and experience with scatterplot matrices) at the start of this study. We will then ask you to perform a series of visualization tasks, and will be recording your responses and the time it takes to complete each task. We will not collect any uniquely-identifying information and your responses will be anonymous.

### Participation

To be eligible to participate in this study, you must meet the following requirements:

- You must be 18 or older.
- You must have a modern browser capable of running JavaScript and displaying a 700 by 700 pixel image without scrolling.
- You must not have a form of color blindness that prevents you from seeing the following as five distinct colors:
- You must not have or suspect you have photosensitive epilepsy. This study uses animated circles, and some flickering may occur.

While not a requirement for participation, it helps if you already know how to interpret scatterplots and scatterplot matrices.

### Consent

Please confirm your consent to participate below:

☐ **I confirm I am both eligible to participate and consent to participate in this study.**

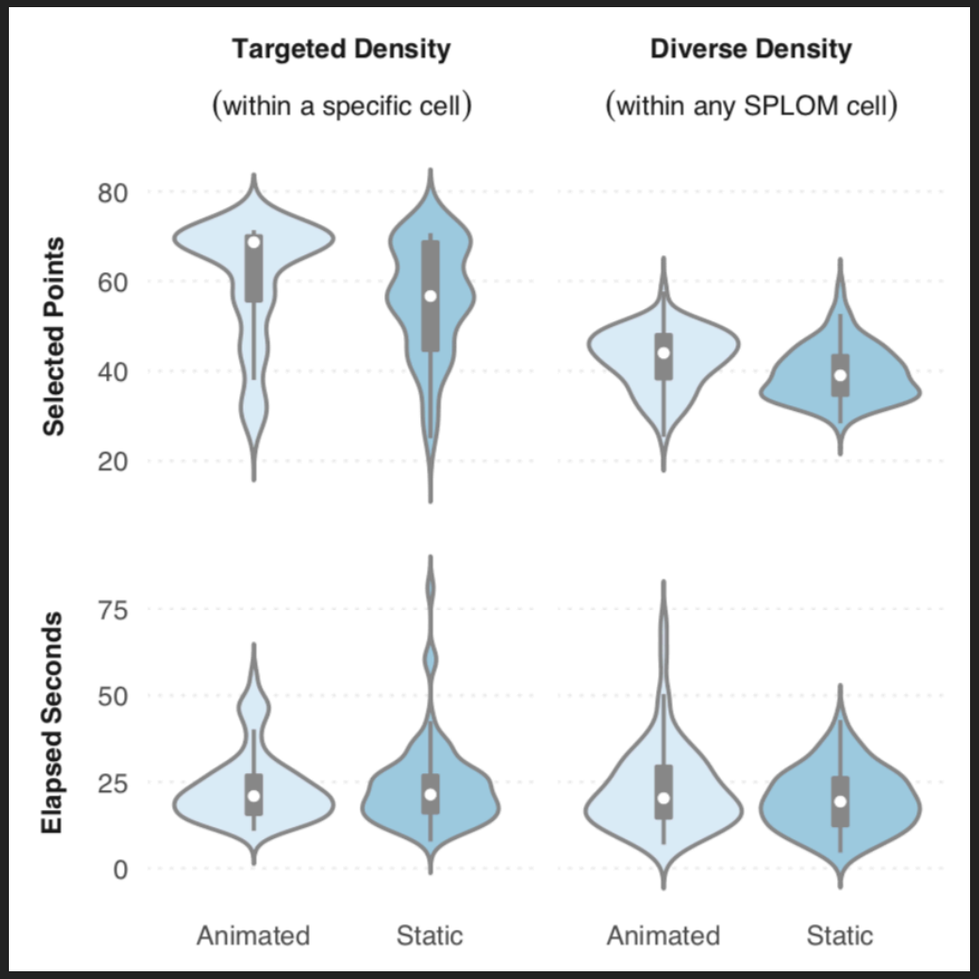
The study will begin after you confirm the above and click the "Next" button.

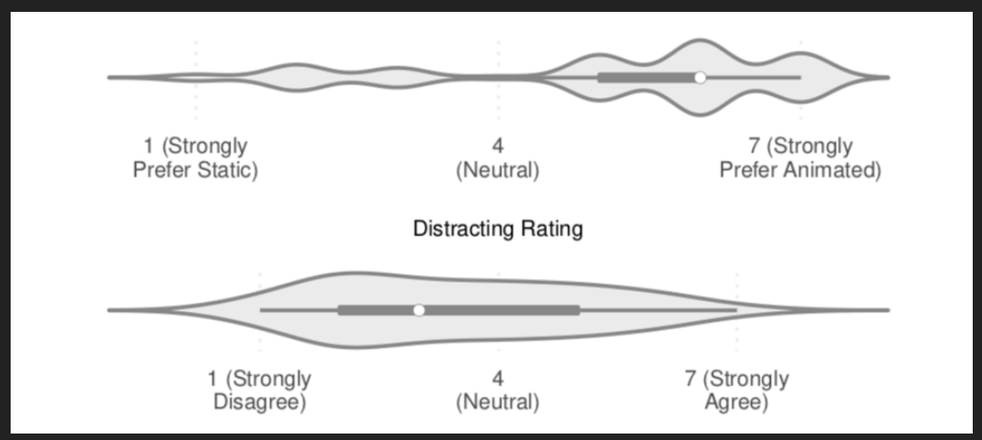
Next

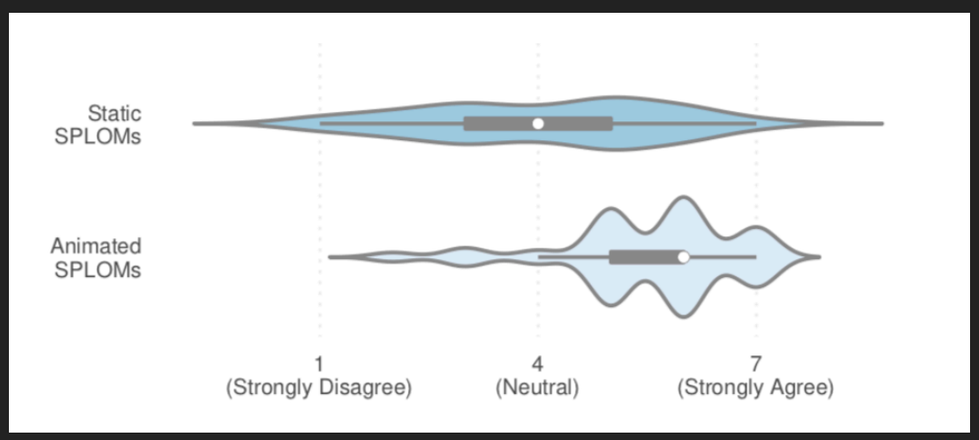
https://drive.google.com/file/d/1aukoi-Ypi9oMh4nRmc-Ox5gPV1SXyuhV/view

# Performance

- Animated outperformed static
- 77% preferred animated SPLOMs
- 30% found animation distracting
- 30% performed worse with animation
- Speed adjustment

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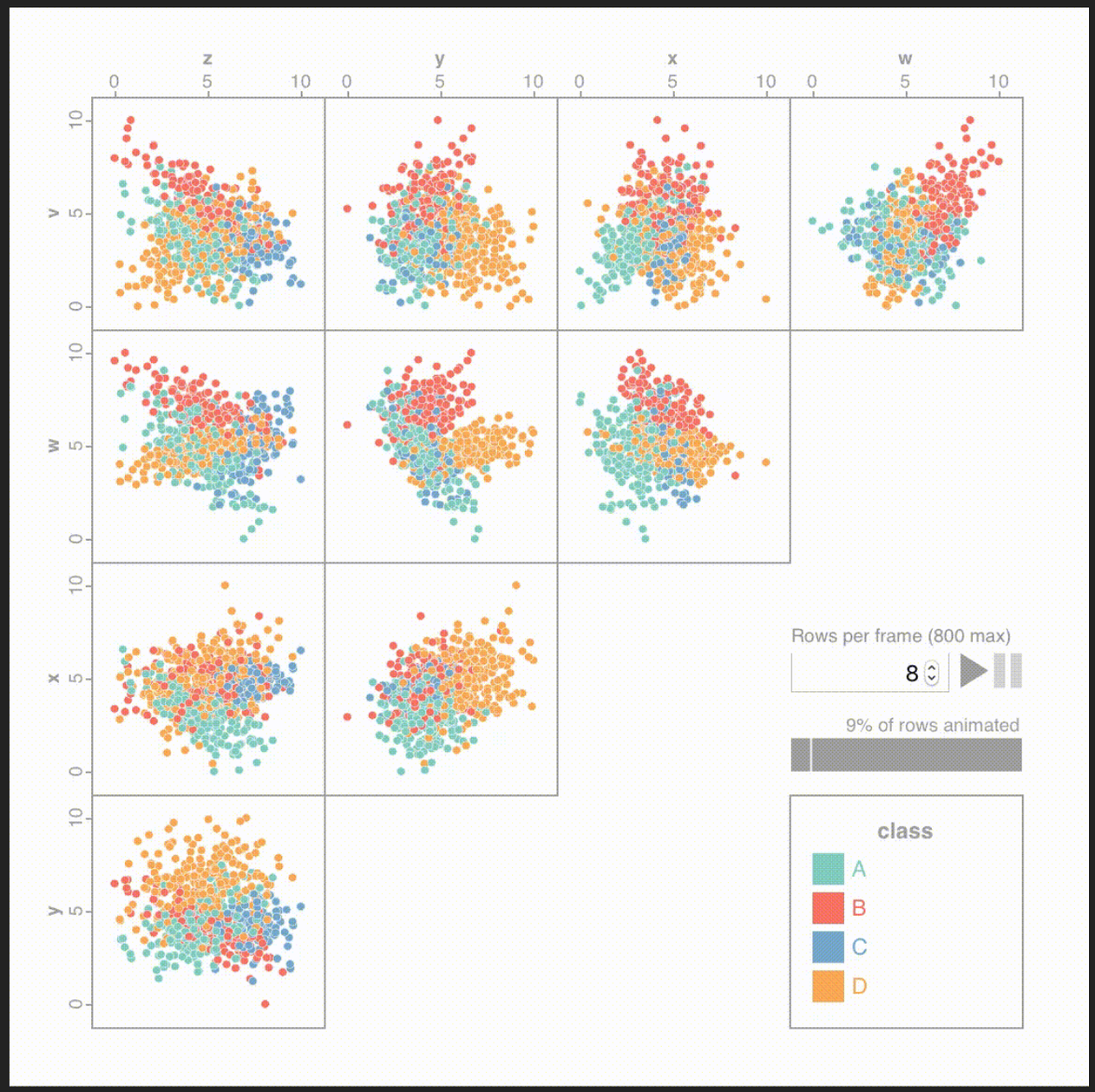
# Conclusion

- Preferred animated techniques
- Need time to observe
- Understanding the data
- Use this approach to alleviate overdraw




http://vgl.cs.usfca.edu/animated-sploms/

# Thank you very much!
# Any question?

# Resources

- Paper website: http://vgl.cs.usfca.edu/animated-sploms/
- Experimentr: https://github.com/usfvgl/splom-studies
- Sophie's website: https://sjengle.cs.usfca.edu/research.html
- My website for this presentation: https://ohbriansung.github.io/