GR5702
Exploratory Data Analysis and Visualization

Prof. Joyce Robbins

March 9, 2017

Community Contribution idea

Columbia Statistics Club
Python Group Study Syllabus Spring 2017
Sundays, March 26?, April 2, 9, 16, 23
2pm - 4pm, Mathematics Room 520

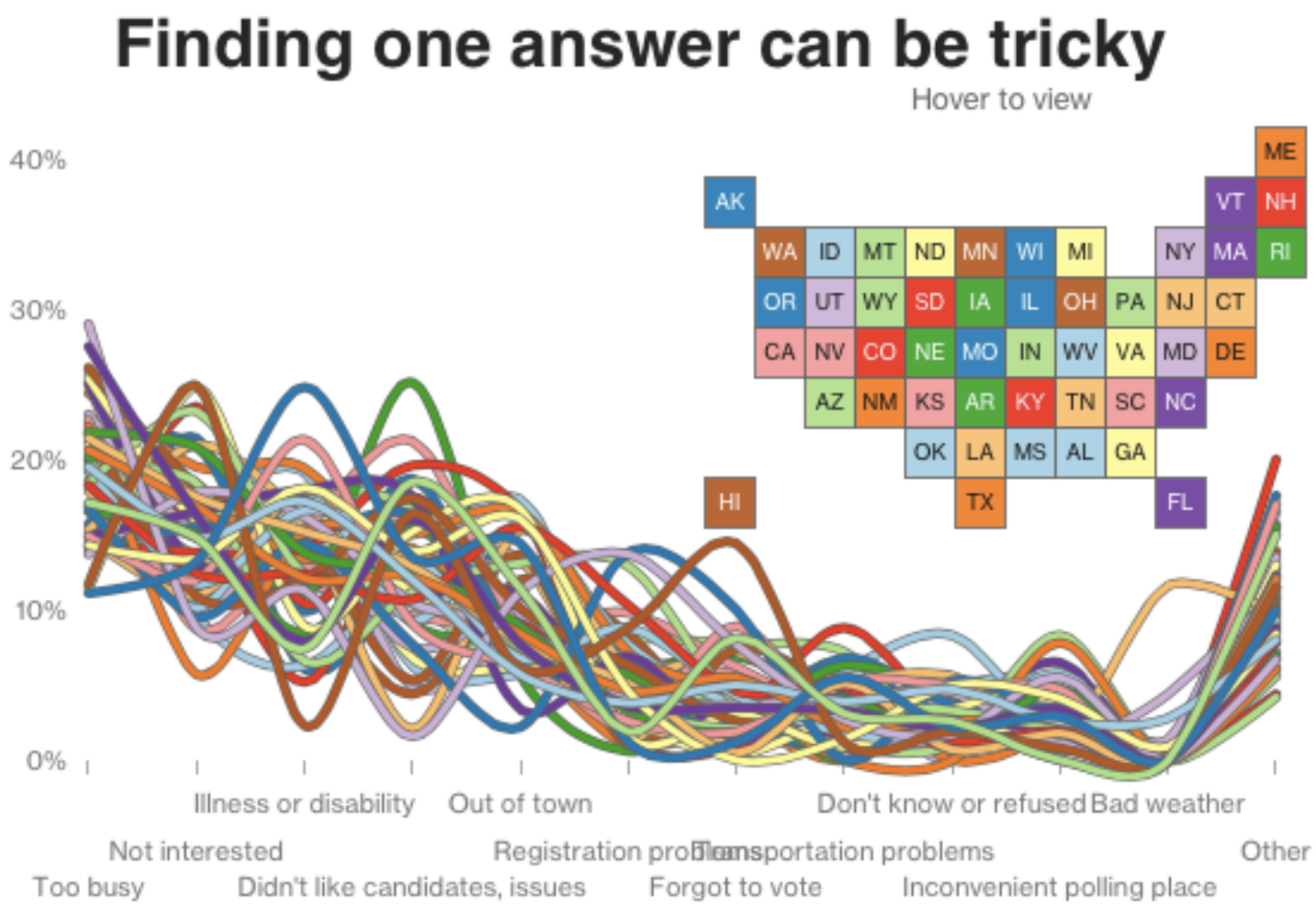
Python Data Science Handbook, by Jake VanderPlas

more info: CSSPythonSyllabus.pdf
contact: Xuehan Liu (xl2615)

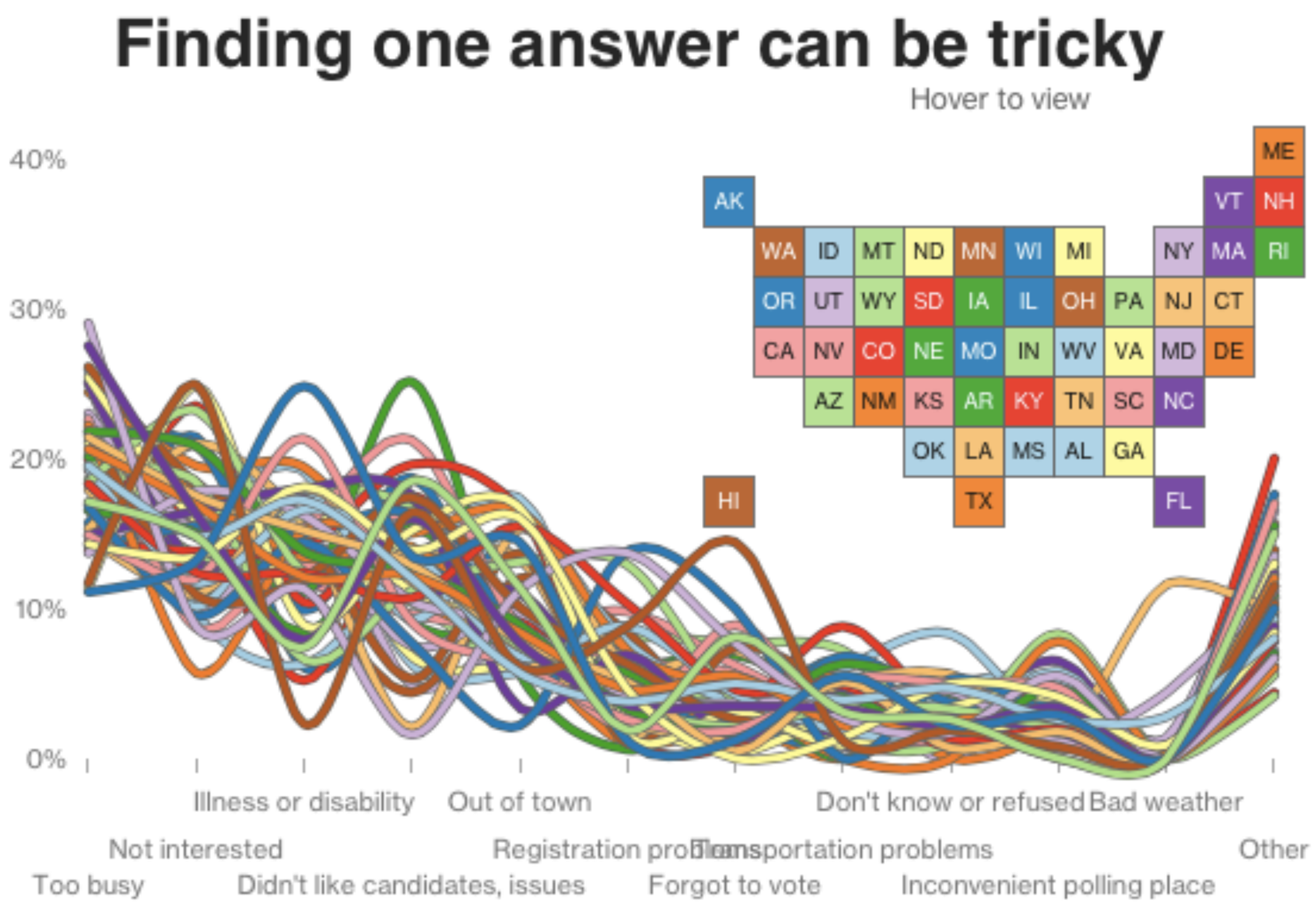
Second half of course

shift of focus to:

- projects
- presentation
- interactivity
- more options / tools, less detail (take or leave)



https://www.bloomberg.com/politics/graphics/2016-non-voters/

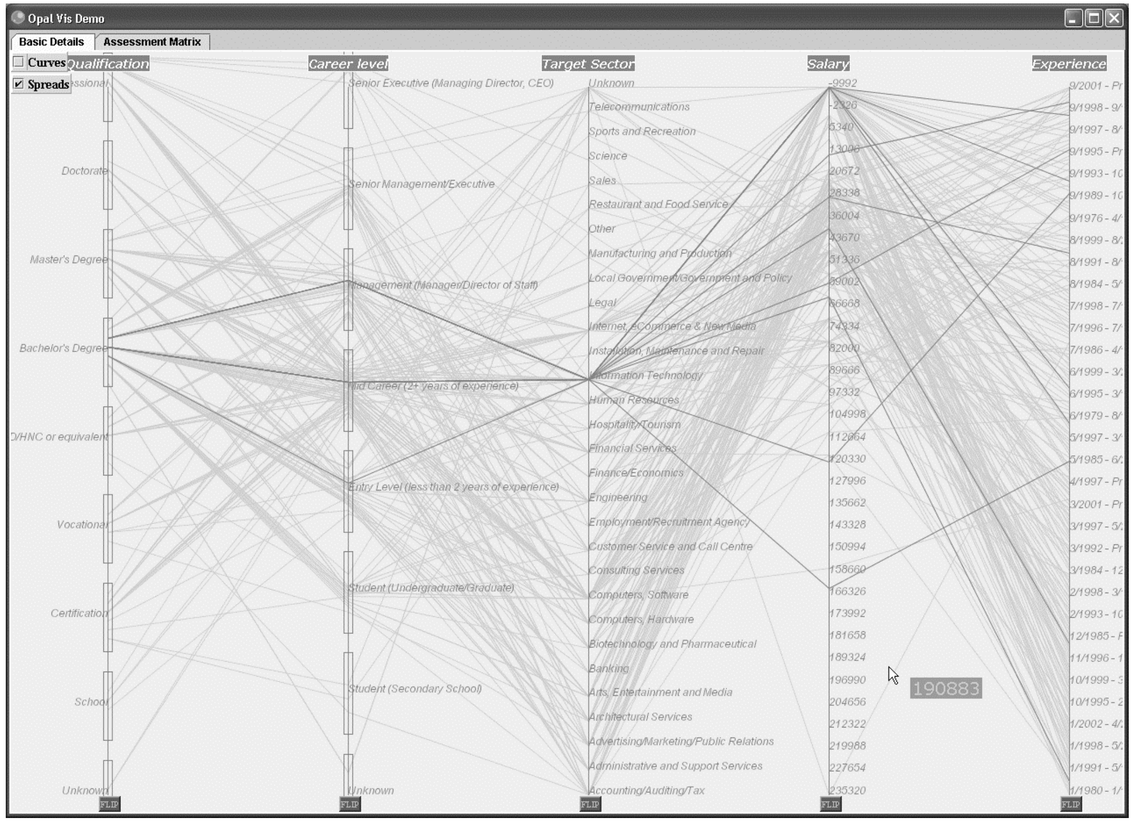


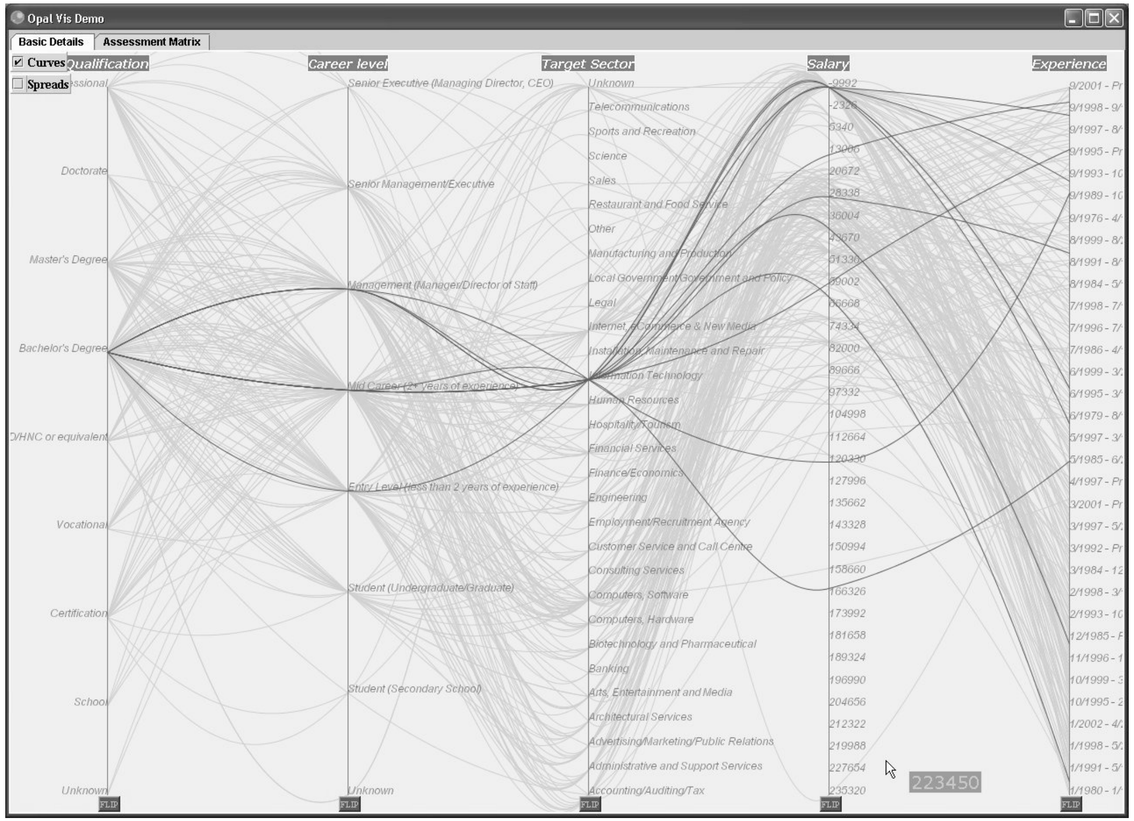
map or table?

What type of graph?

https://www.bloomberg.com/politics/graphics/2016-non-voters/

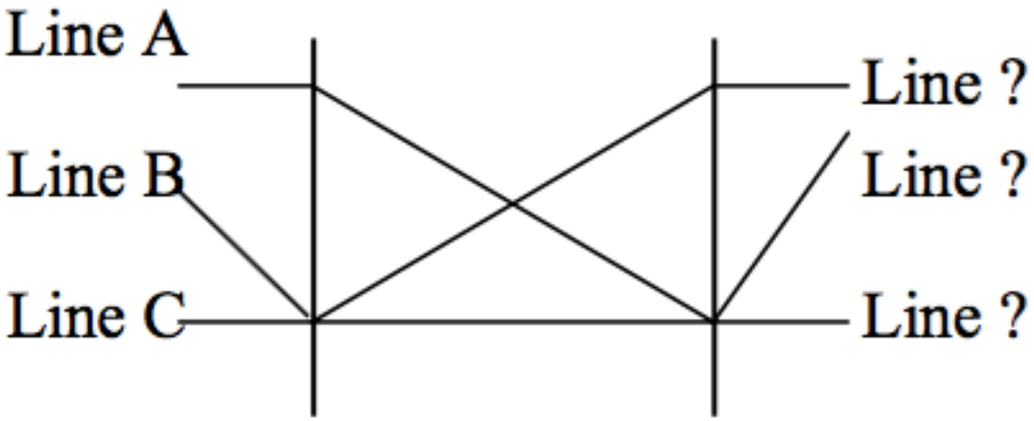
Parallel Coordinate Curves

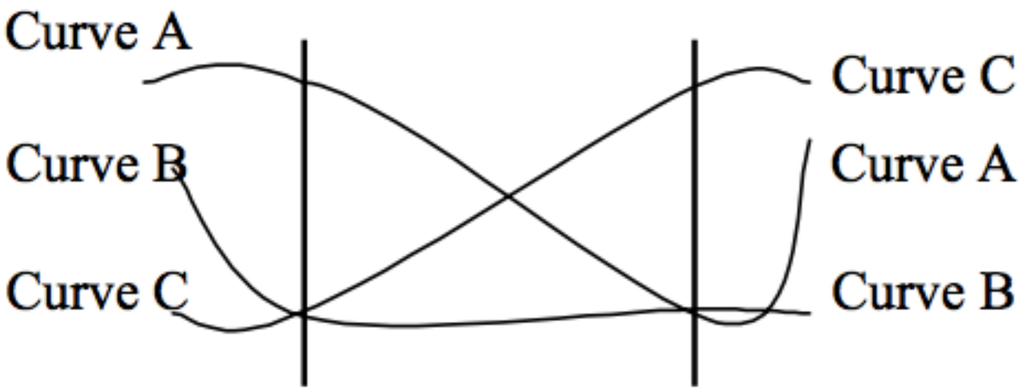




Graham and Kennedy, "Using Curves to Enhance Parallel Coordinate Visualisations"

Parallel Coordinate Curves





Graham and Kennedy, "Using Curves to Enhance Parallel Coordinate Visualisations"

Final Project GENERAL INFORMATION

GOAL

The goal of this project is to perform an exploratory data analysis / create visualizations of a data set of your choosing, in order to gain preliminary insights on questions of interest to you.

TEAMS

You may work alone or in teams of up to 4 people. Grading will be by team; more is expected of larger teams. Information will be provided on CourseWorks on how to sign up as a team.

Final Project GENERAL INFORMATION

DATA

Choose a data set that is not on the beaten track, that is, one that is not included in R (or similar), nor used in Kaggle (or similar) competitions, nor relatively well-known through some other forum. You will begin working with the dataset in Homework #4, to be assigned soon, due Tues, March 28.

ANALYSIS

You have a lot of freedom to choose what to do, as long as you restrict yourselves to *exploratory* techniques (rather than modeling / prediction approaches). In addition, your analysis must be clearly *documented* and *reproducible* (more on that below).

Final Project GENERAL INFORMATION

FEEDBACK

At any point, you may ask the TAs--Ian (iak2119) and Bridget (blr2147)--or me (jtr13) for advice. Our primary role in this regard will be to provide general guidance on your choice of dataset / topic / direction. As always, you are encouraged to post specific questions to Piazza, particularly coding questions and issues. You may also volunteer to discuss your project with the class in order to get feedback--if you'd like to do this, email me to schedule a date.

Final Project GENERAL INFORMATION

PEER REVIEW

A portion of your grade is based on the feedback you give to other groups. After the due date, you will be assigned projects to review, which you need complete by **Thursday, April 20, 11:59pm**. More specific details on what you need to do will be provided at that time. Your grade is *not* directly based on the feedback you receive. It will be determined by the instructor and TAs.

Final Project GENERAL INFORMATION

REPORT FORMAT

Your project should be submitted to CourseWorks as a **nb.html** or **.ipynb** file, with graphs / output rendered. Any material that cannot be included in the notebook format, such as certain interactive visualizations, should be clearly referenced, ideally by providing a link in your notebook to an online visualization. You will lose points if we have trouble reading your file, need to ask you to resubmit with graphs visible, if links are broken, or if we have other difficulties accessing your materials due to factors that are in your control.

Final Project REPORT OUTLINE

Your report should include the following sections, with subtitles ("Introduction", etc.) as indicated:

1. Introduction
In this section, explain why you chose this topic, and the questions you are interested in studying. Include a brief description of how you found the data, and clear instructions on where the reader can find the data.

2. Team
List team members and a description of how each contributed to the project.

Final Project REPORT OUTLINE

3. Analysis of Data Quality
Provide a detailed, well-organized description of data quality, including textual description, graphs, and code.

4. Executive Summary
Provide a short **nontechnical** summary of the most revealing findings of your analysis with no more than 3 static graphs or one interactive graph (or link), written for a nontechnical audience. The length should be approximately 2 pages (if we were using pages...) Do not show code, and take extra care to clean up your graphs, ensuring that best practices for presentation are followed.

Final Project REPORT OUTLINE

5. Main Analysis
Provide a detailed, well-organized description of your findings, including textual description, graphs, and code. Your focus should be on both the results and the process. Include, as reasonable and relevant, approaches that didn't work, challenges, the data cleaning process, etc.

6. Conclusion
Discuss limitations and future directions, lessons learned.

Final Project REPORT OUTLINE

A note on style:

You are encouraged to be as intellectually honest as possible. That means pointing out flaws in your work, detailing obstacles, disagreements, decision points, etc. -- the kinds of "behind-the-scene" things that are important but often left out of reports. You may use the first person ("I"/"We") or specific team members' names, as relevant.

Final Project

GRADING RUBRIC

	Topic	Pts
Report Sections	Introduction (including choice of data set, questions), Team description	10
	Analysis of Data Quality	10
	Executive Summary (focus on quality of presentation choices / techniques)	20
	Main Analysis (focus on quality of EDA choices / techniques)	35
	Conclusion	5
General	Reproducibility, sources cited	10
	Technical flawlessness	10
	TOTAL	**100**

Final Project GRADING RUBRIC

Lateness: 10 points will be deducted per day

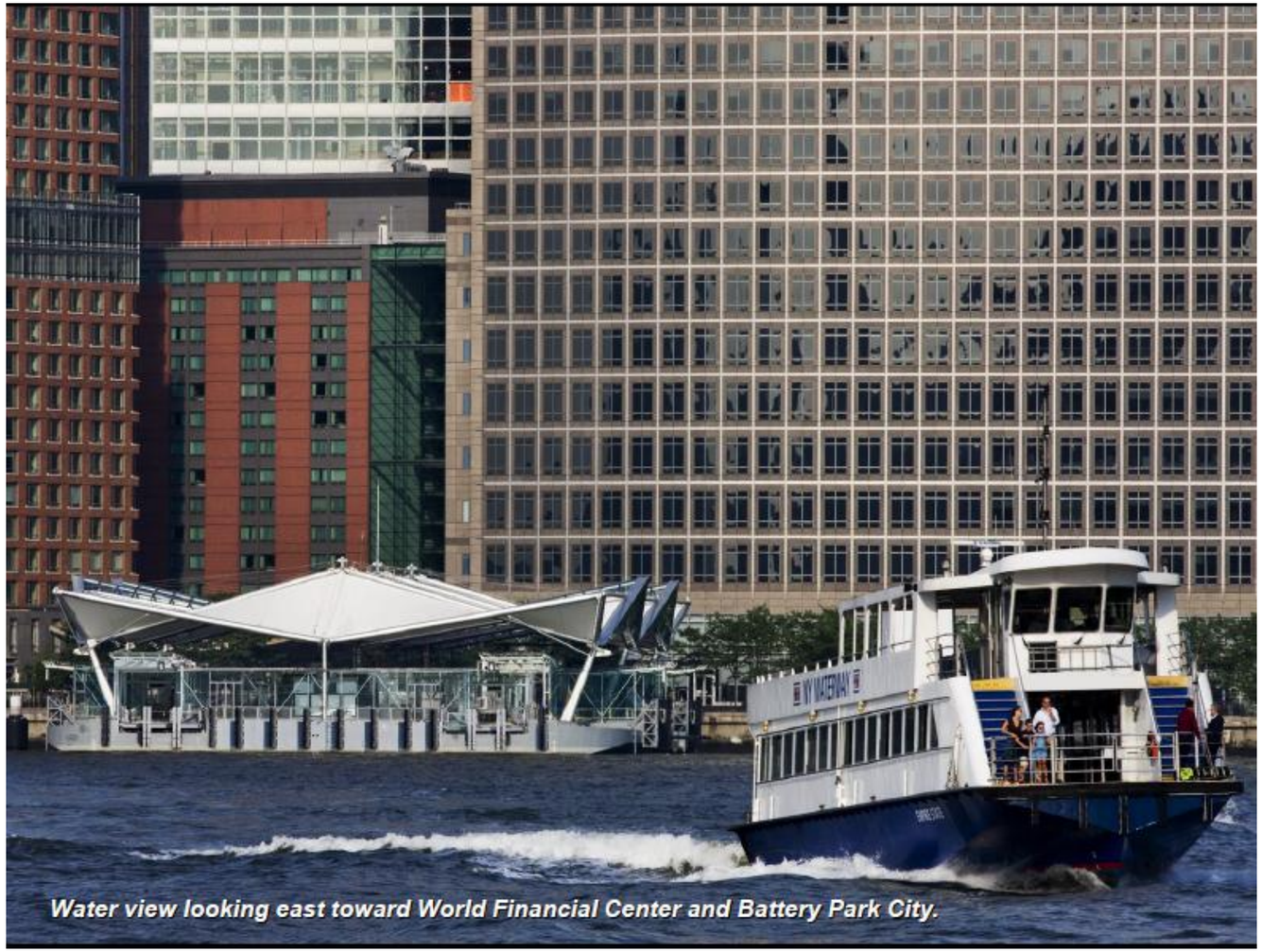
Plagiarism of any kind will not be tolerated and will result in a grade of 0 for the project.
(of course)

Guest Lecturer: Todd Schneider

March 21 (first class after break)

http://toddwschneider.com

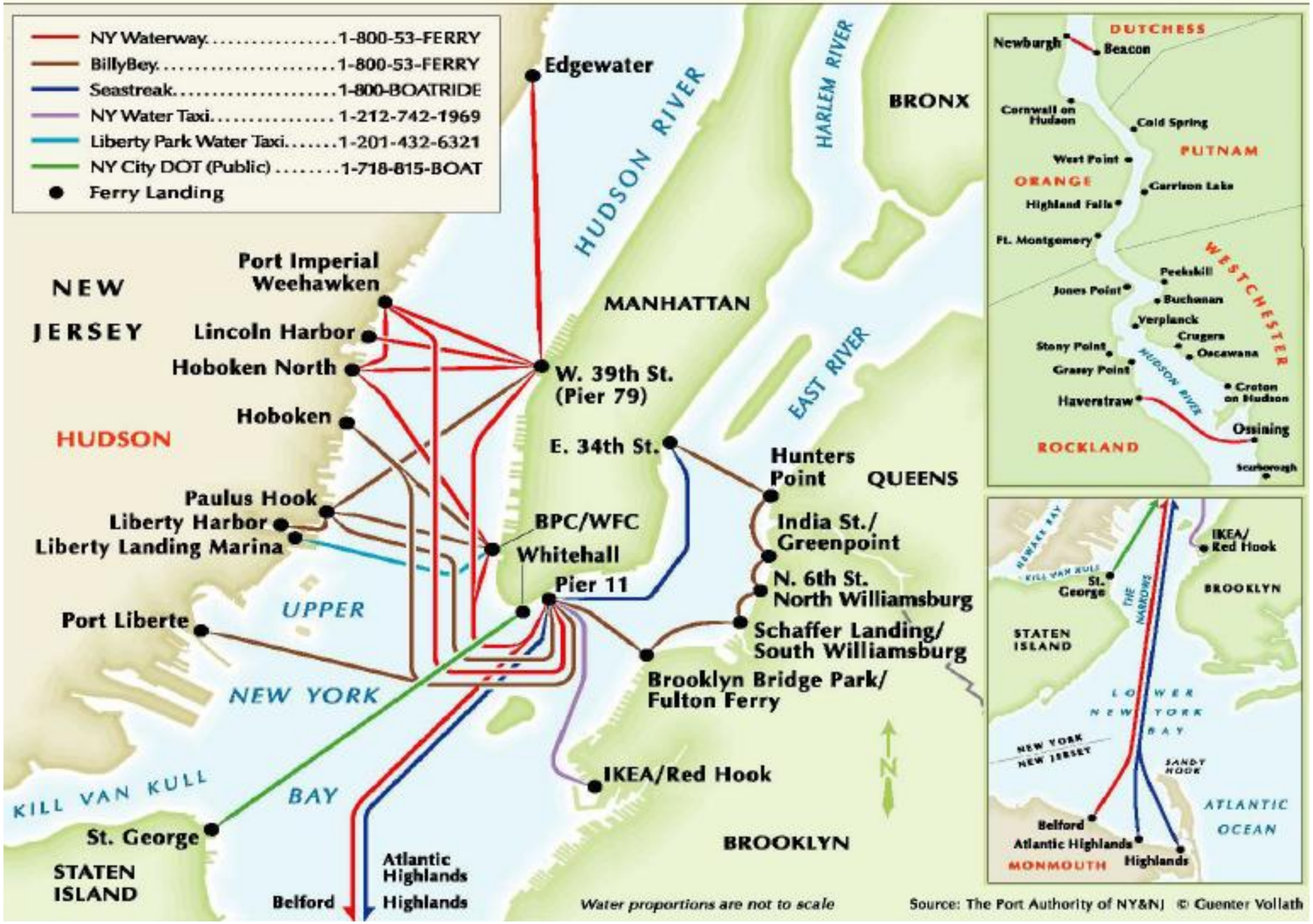
Is ferry ridership across the Hudson growing or shrinking?



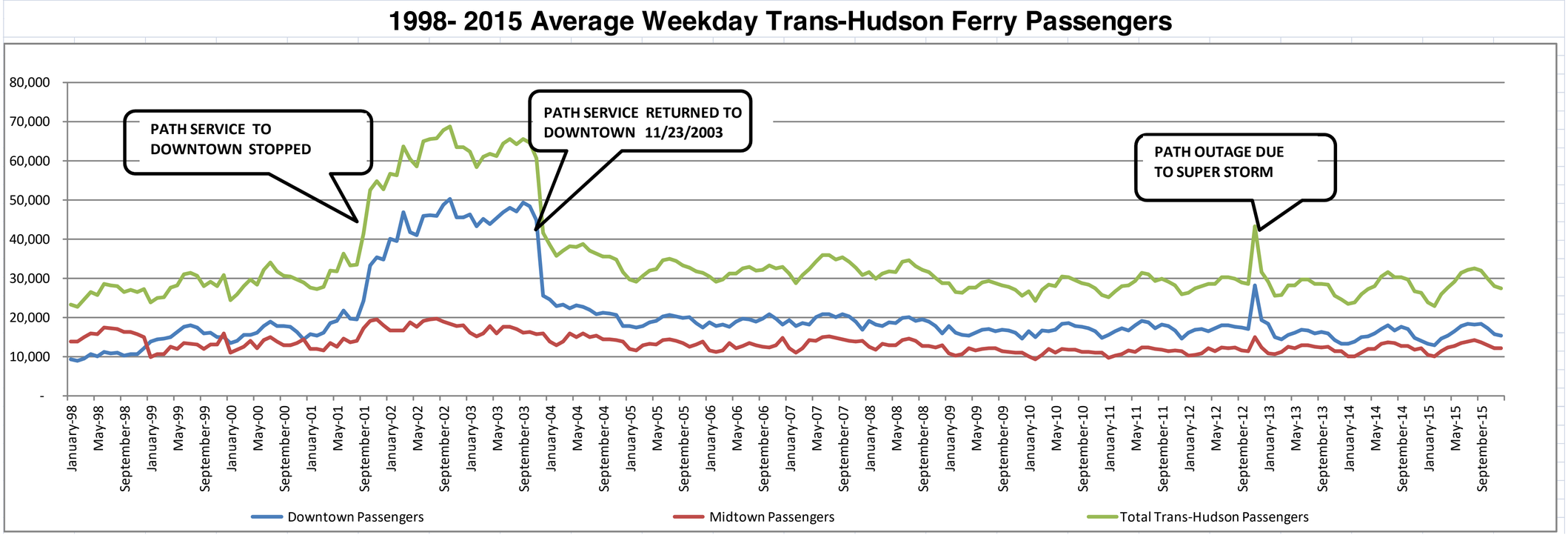
Water view looking east toward World Financial Center and Battery Park City.

Mark Seaman

NEW YORK HARBOR COMMUTER FERRY ROUTES

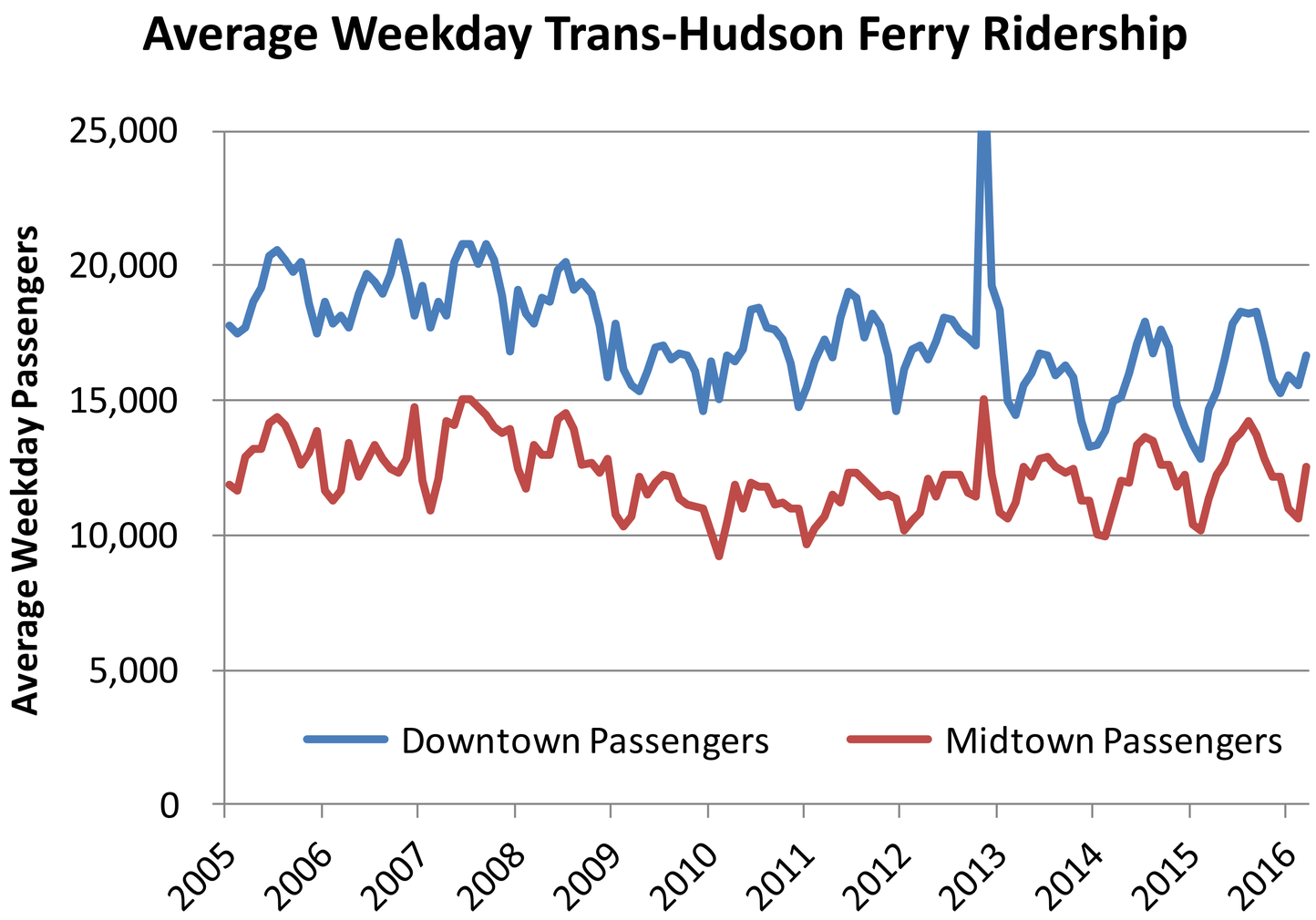


What is the trend in ridership?



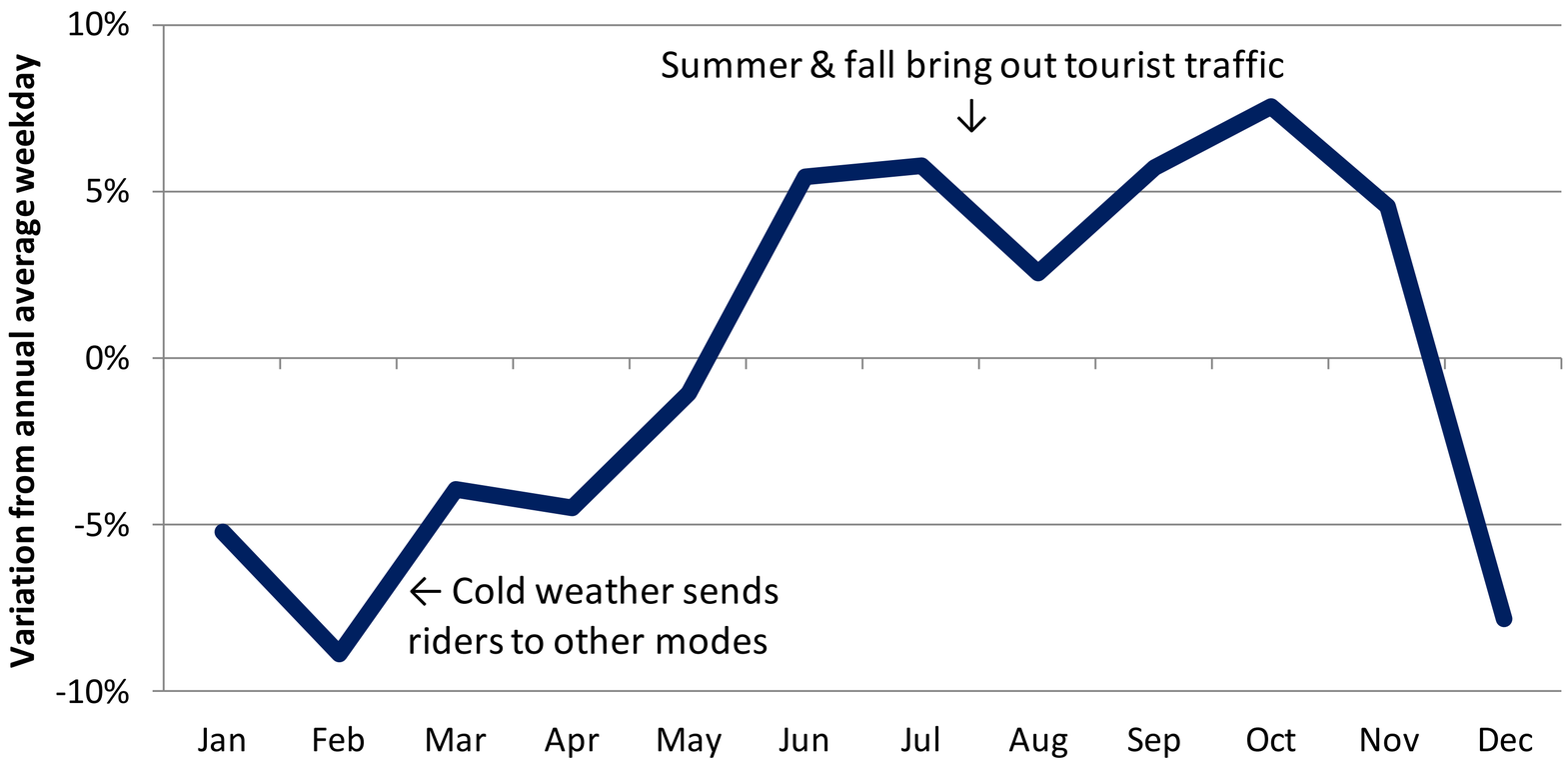
Problems:

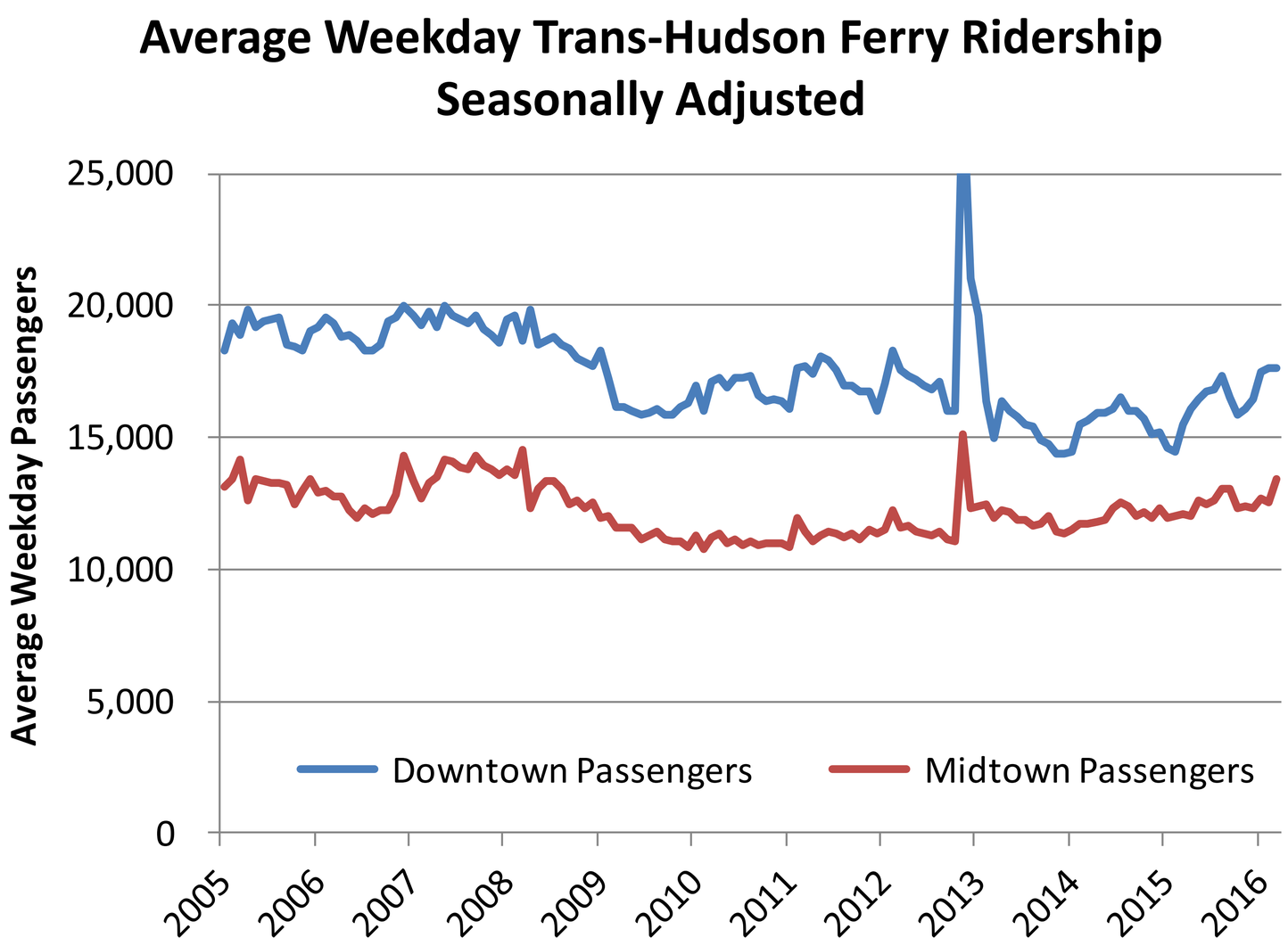
- **Vertical scale makes it hard to see changes in normal ridership**
- **Horizontal scale shows too long a time period**



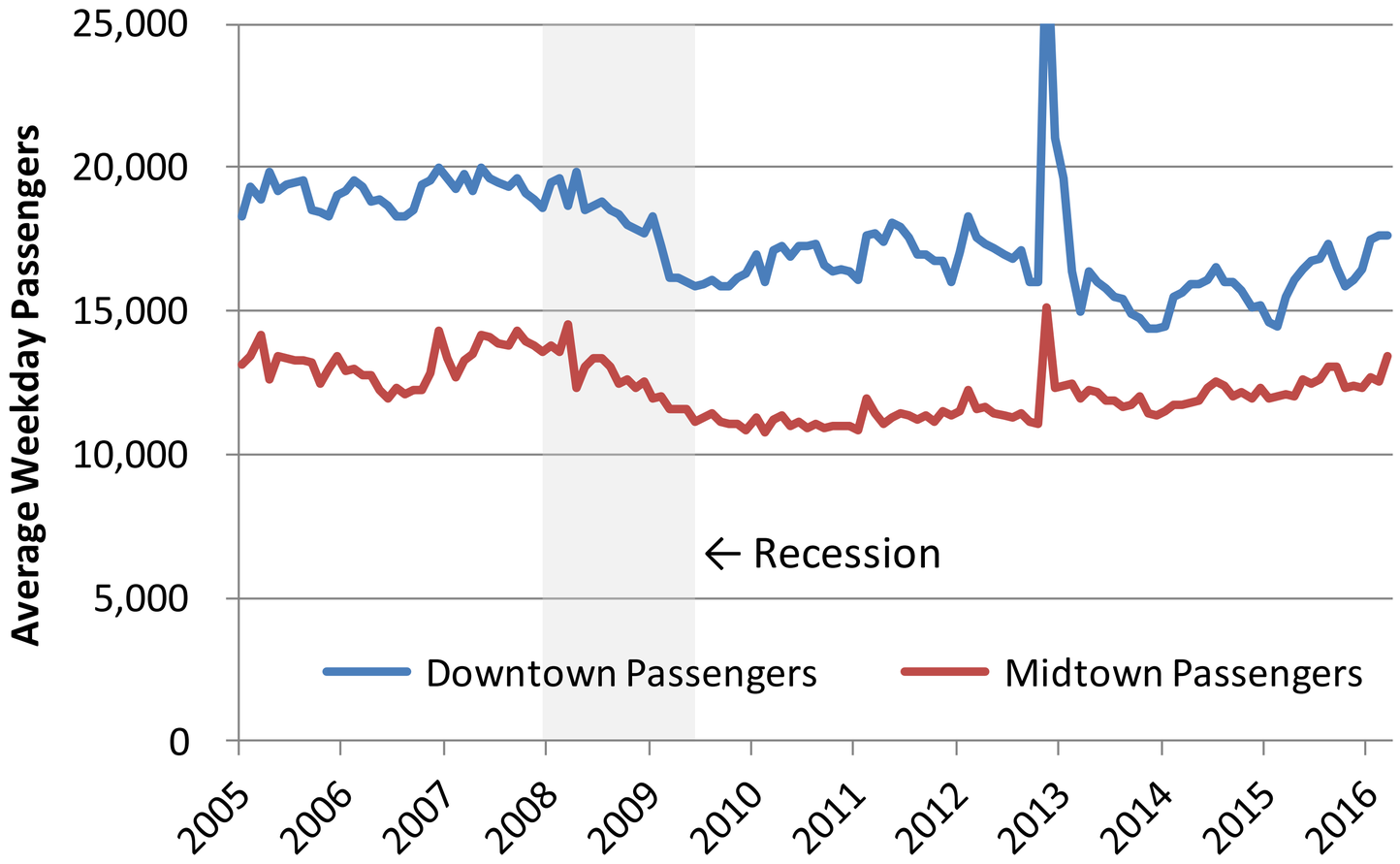
- But lots of ups and downs make it difficult to clearly see trend

Lots of seasonal variation

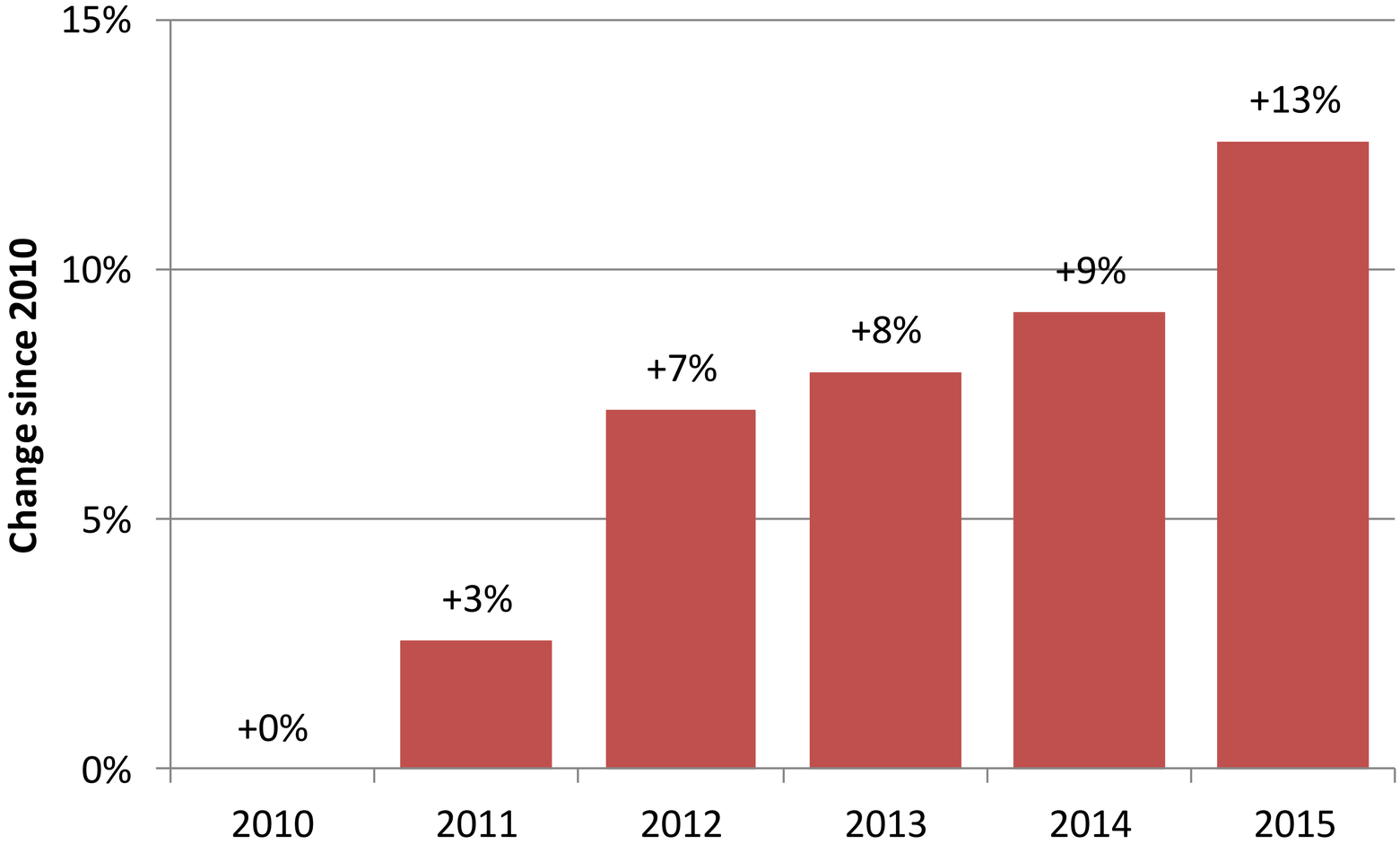



Average Weekday Trans-Hudson Ferry Ridership
Seasonally Adjusted
Average Weekday Passengers
25,000
20,000
15,000
10,000
5,000
0
Downtown Passengers
Midtown Passengers
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

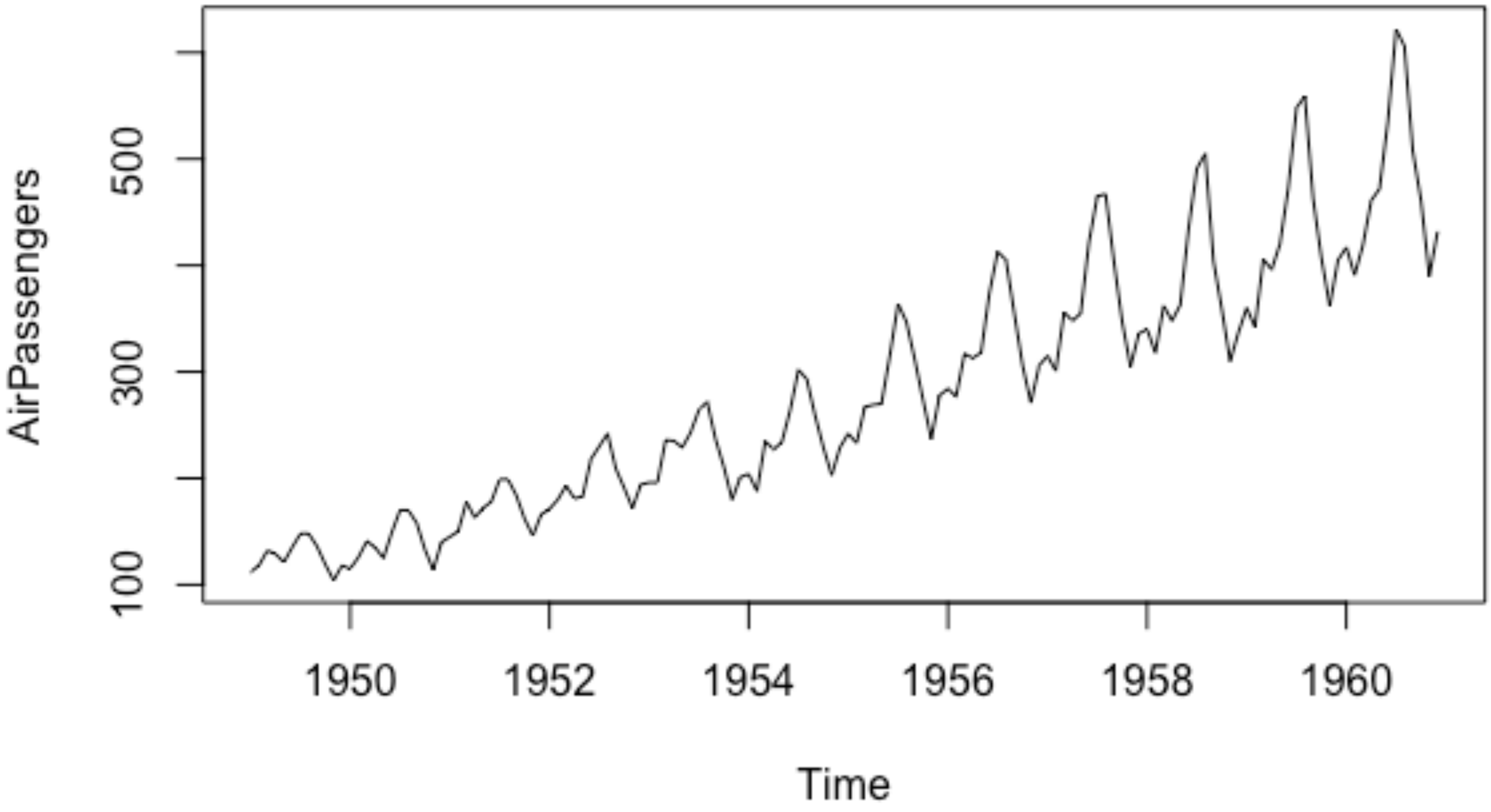
Now what can we see?



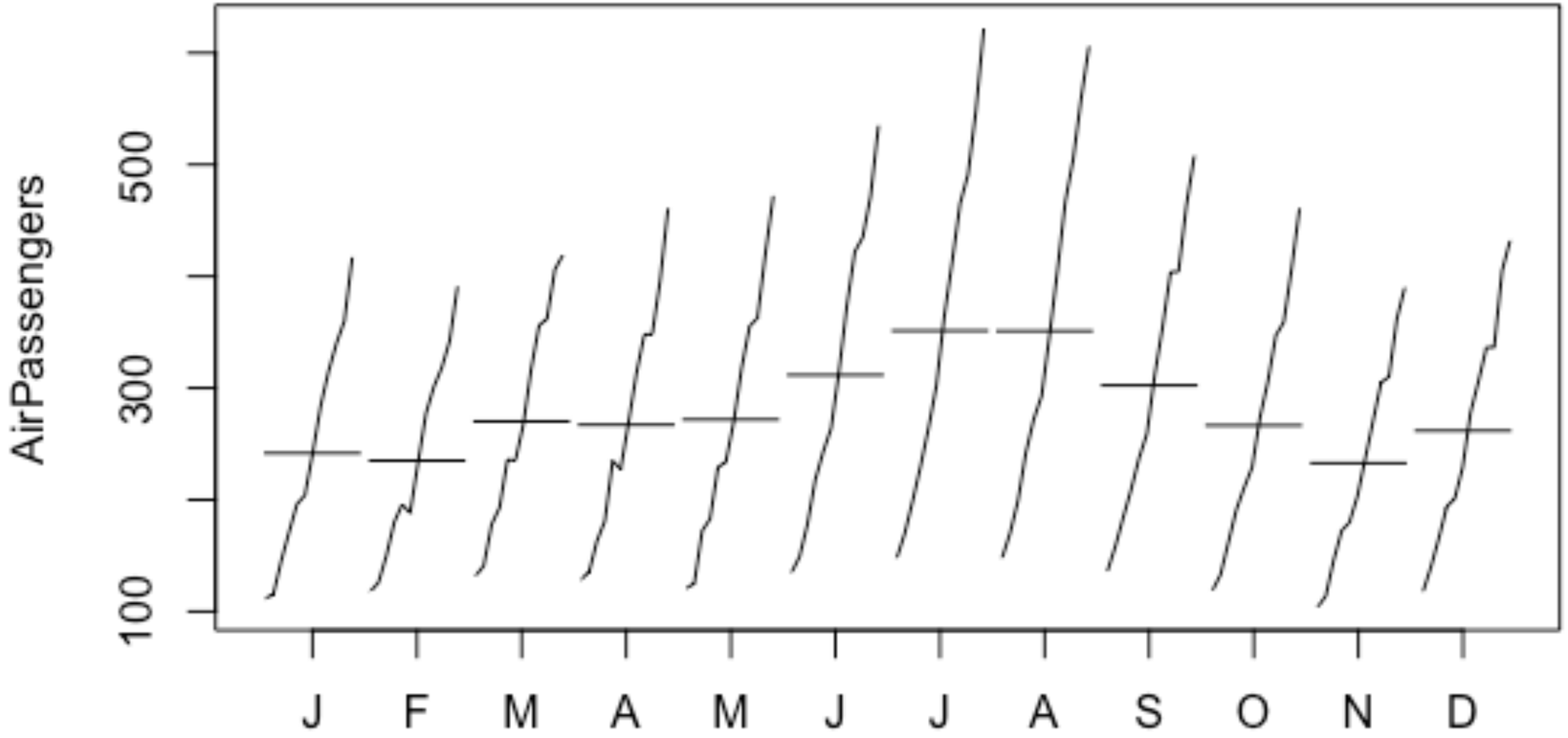
Change in Midtown ridership since 2010



```
>plot(AirPassengers)
```



```
>monthplot(AirPassengers)
```



Hidden Figures