Mapping with Tableau

Jeff Sternberg

Research Methods

Alex Alden

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Northeastern University

NULab for Texts, Maps, and Networks

Introduction

This hands-on tutorial introduces using Tableau for basic point mapping. Students will:

- Learn about the Boston Area Research Initiative Data Portal
- Learn about Tableau
- Understand how to import and modify data in the Tableau environment
- Plot coordinate points onto a basemap
- Craft research questions in relation to the dataset and attempt to answer them through filtering the data in a variety of ways to produce custom visualizations

To follow along, visit **bit.ly/diti-spring2020-alden-tableau**

Discussion Post

Write a paragraph Discussion Post on Blackboard Responding to these Questions:

If you could map anything spatially, or say in the neighborhood of you live in, what would it be?

- **Why would it be interesting to map?**
- **What would being able to map it add to your understanding of the location/region/neighborhood you are studying and/or live in?**

How do we Begin to Map Something?

To map something, we need that thing to be located in space, a relatively discrete spatial unit, object, site, location or region. What this means is that whatever we are mapping needs to have Latitude and Longitude Coordinates to be able to place it on a projection of the earth, aka a map.

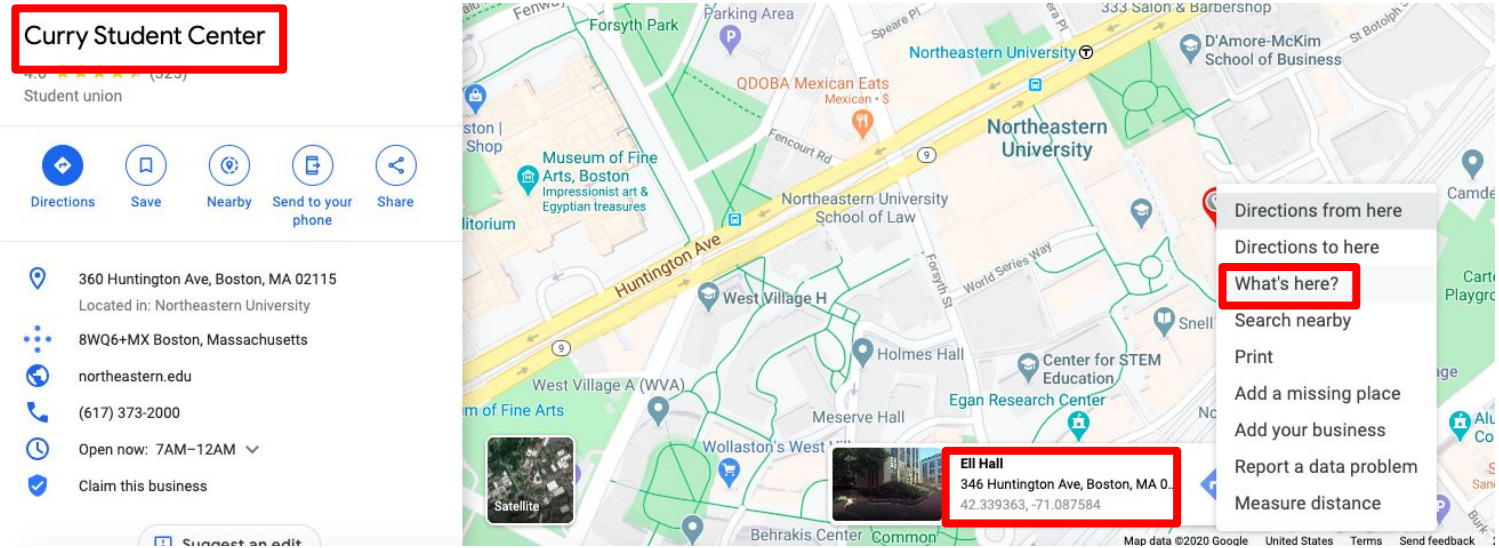
If we have Longitude and Longitude Coordinates we can map anything!

Things we can map: Cities, restaurants in cities, locations of public transit, public libraries, parks, neighborhoods and regions (if we have the four corner coordinate pairs we can use to draw a box around the region), movement over time if we have our locations time stamped, etc.

How do we Make/Get Spatial Data?

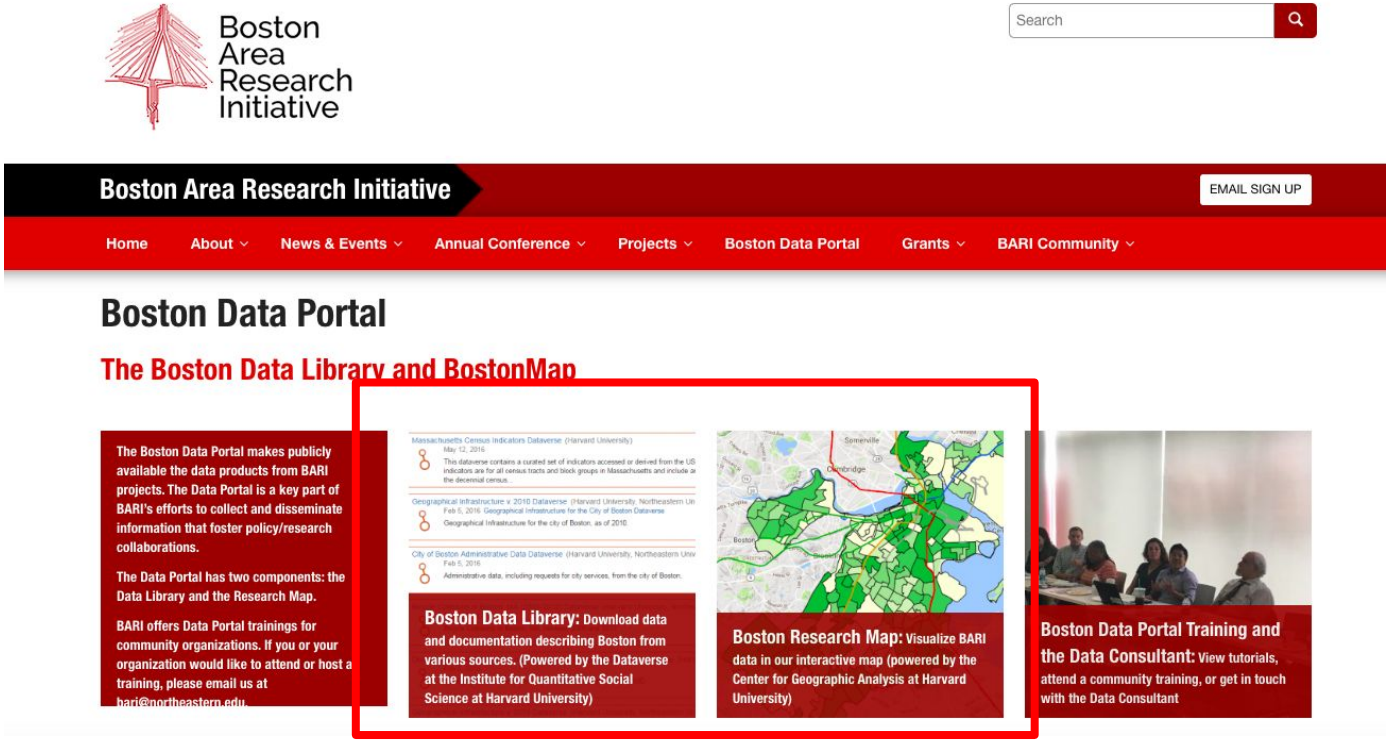
We can add anything we want to map and make it spatial data if we just look up and add the coordinates to whatever we want to map, which is as easy as using google maps, clicking on a location and copying the coordinates attached to it. This process of adding coordinates to data is called geo-coding. In the example below we searched for the Curry Student Center on Campus, right-clicked on the location, clicked on “What’s Here”, which opened the “Ell Hall” Box below it with the Lat/Long of -42.39,-71.08.

We could now map the Curry Student Center if we wanted to. This is how you make data into spatial data. What if we don’t want to make it?

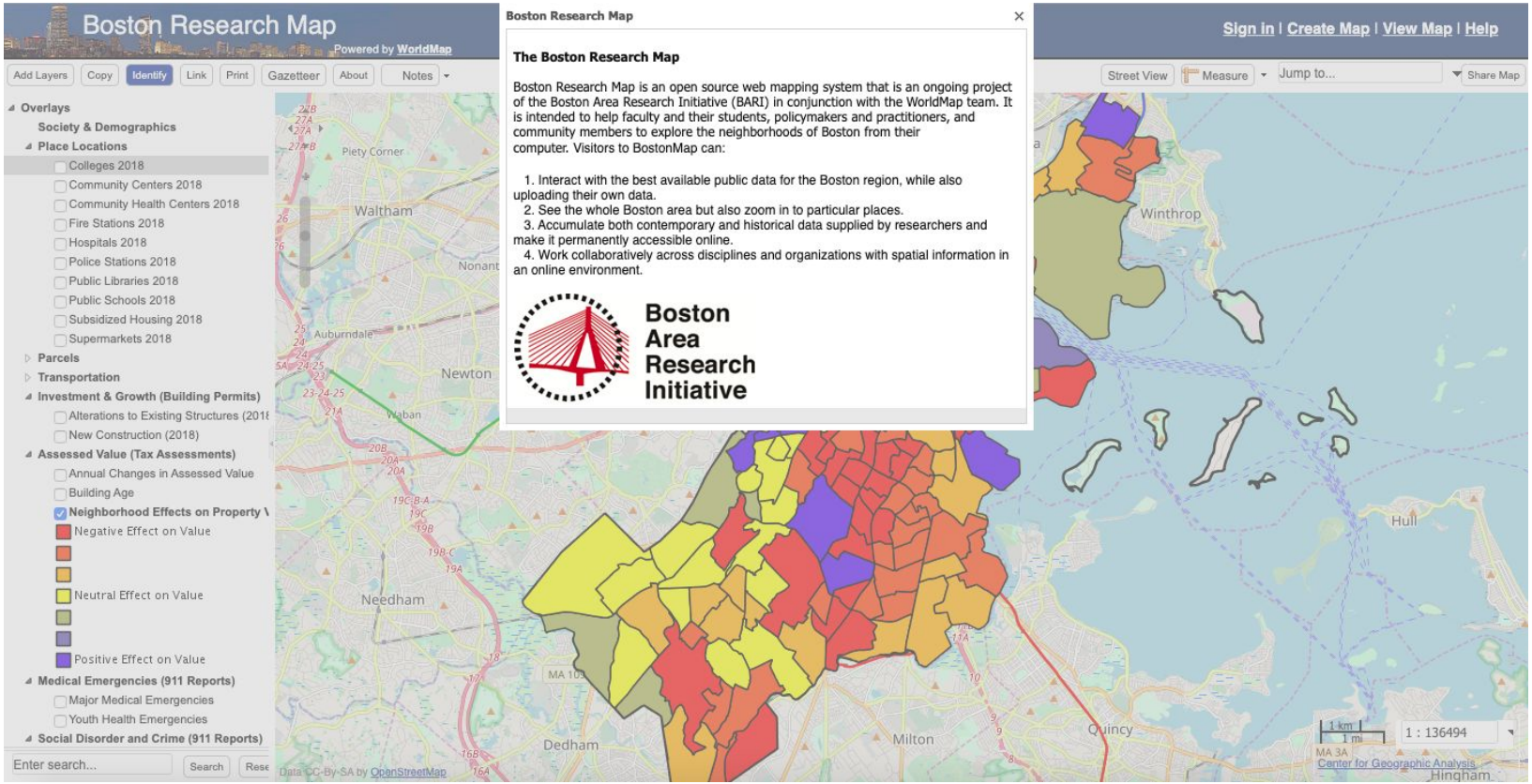


Find It!

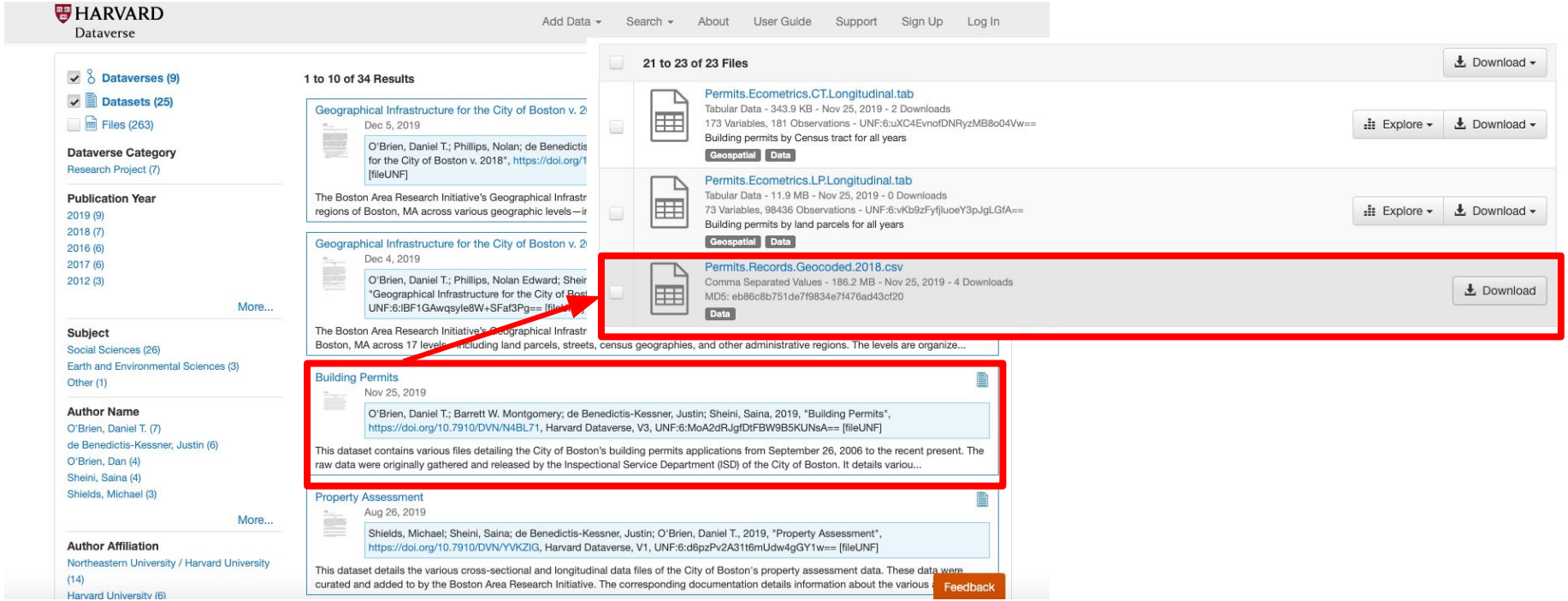
Boston Area Research Initiative - Data Portal



Boston Research Map



Boston Area Research Initiative Dataverse



What types of research questions could be asked using the building permits data set? If we restrict our investigation to the Neighborhoods of Fenway, Jamaica Plain, and Roxbury, what do you hypothesize we'll find in each neighborhood?

Tableau Basics

Tableau is a powerful visualizations tool. It can produce a variety of beautiful charts and graphs that look much nicer than basic Excel visualizations.

Tableau can also do basic mapping!

A Tableau license is available for free to students with a .edu email address. You can use the key on two different devices.

Link to Tableau for students:
https://www.tableau.com/academic/students

Key Terminology

- **X/Y Coordinates**: Numerical values that allow every location on earth to be pinpointed.
    - **Latitude/Longitude:** Latitude is the north/south coordinate of a location based upon its distance from the equator. Longitude is the west/east coordinate of a location based upon its distance from the standard meridian.
- **Dimension:** Qualitative values (such as names, dates, or geographical data). You can use dimensions to categorize or segment your data.
- **Measure:** Numeric, quantitative values that you can measure. Measures can be aggregated. When you drag a measure into the view, Tableau applies an aggregation to that measure (by default).

Installing Tableau

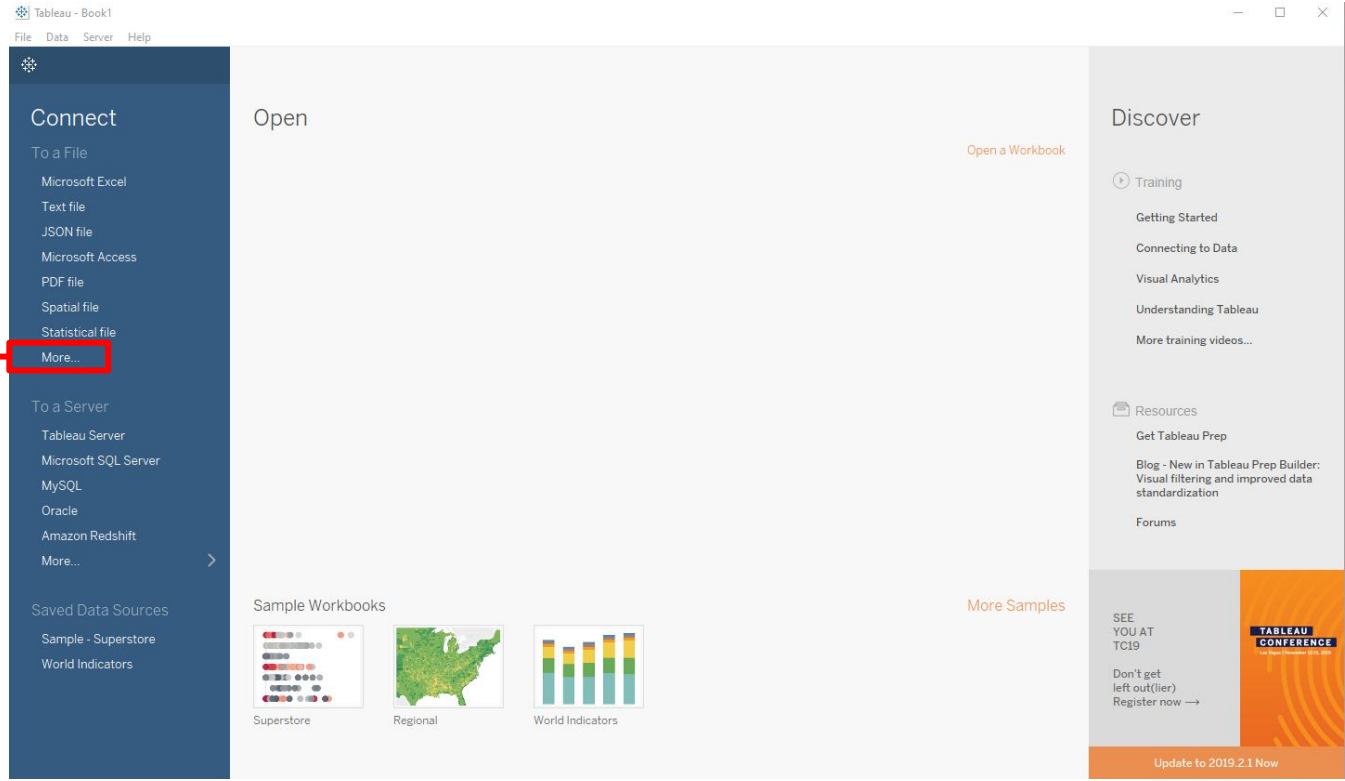
- Tableau is a part of the Salesforce product suite, but it is available for **free** to .edu email accounts. Please follow the links below: you will need to input your .edu email address as well as “Northeastern University”
- Unfortunately, in this time of pandemic, the Tableau Student License Portal is down. Please go to this link and sign up for a free 14-day trial for the purposes of this tutorial.
    - **Free 14-day Trial:** https://www.tableau.com/products/trial
    - If you need more help with installation, watch this installation video: https://www.youtube.com/watch?v=P_xHIpgSxJE .
- Later on you should be able to sign up for a free 1-year Student License when the portal is fixed.
- For further Installation instructions, go to this Installation Handout

Using Tableau
Step One: Connecting to Data

First, we need to connect to our data.

For the purposes of this exercise, we will be using building permit data for the City of Boston in csv format.

Select ‘More’ and navigate to the data file that was sent via email, or available for download here.



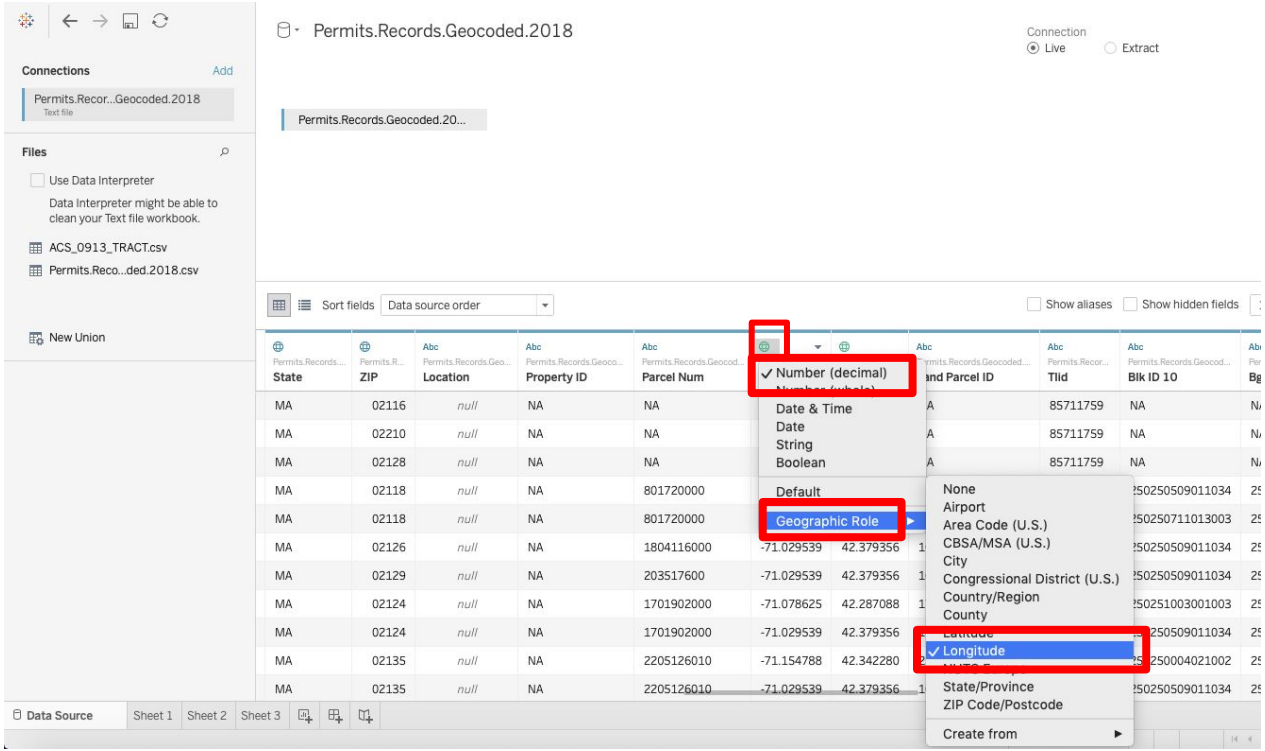
Using Tableau, Step Two: Convert Coordinate Column to Geo Data

We can change the data type of our columns by clicking on the # or abc at the top of the column display.

In order to map our data, we have to first convert the X/Y data into a coordinate class.

We can do this by clicking on the abc, and changing the data type from String to Number (decimal), then clicking on the # and hovering over 'Geographic Role,' and clicking on Latitude or Longitude. Convert:

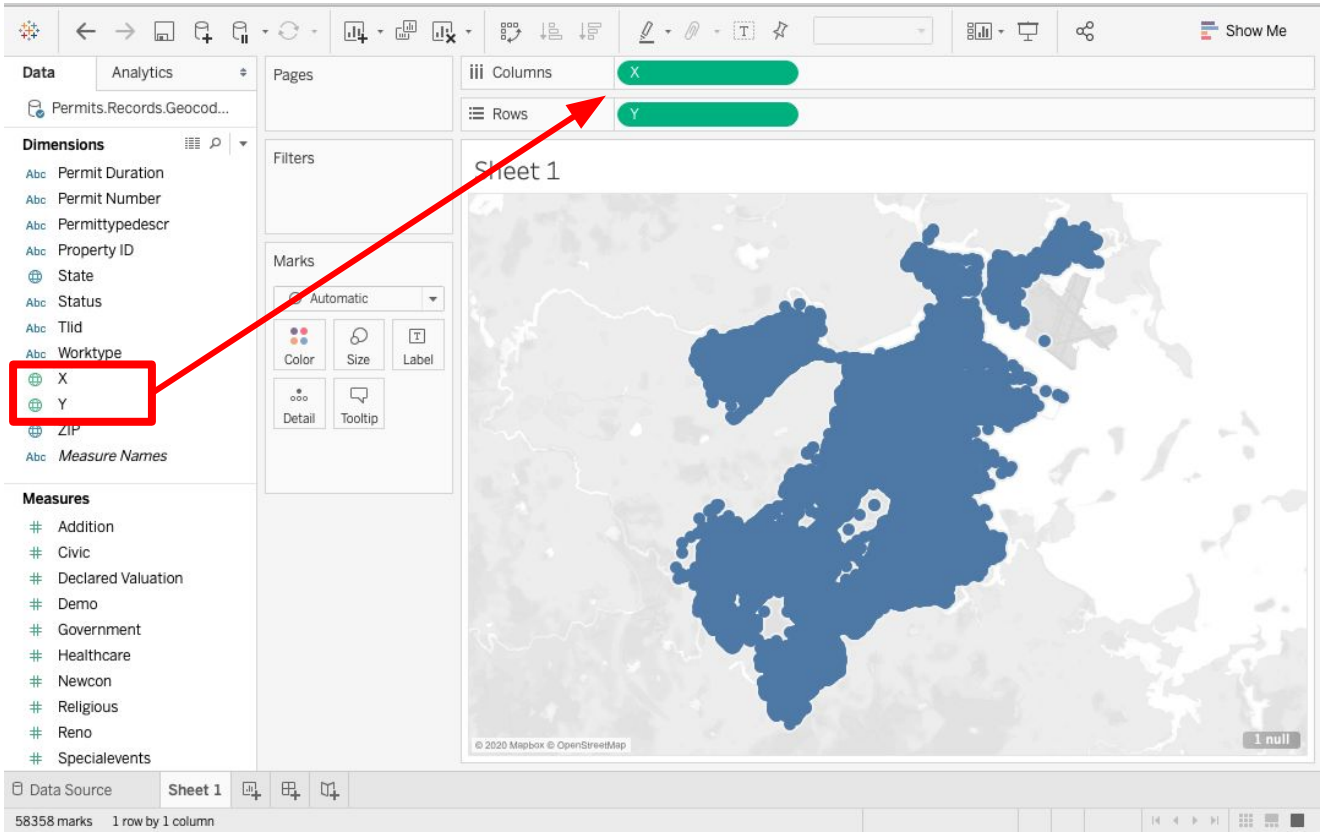
X -> Longitude
Y -> Latitude



Using Tableau
Step Three: Plot our Points

To map our data points, we drag our Y data into the ‘columns’ area, and our X data in the ‘rows’ area.

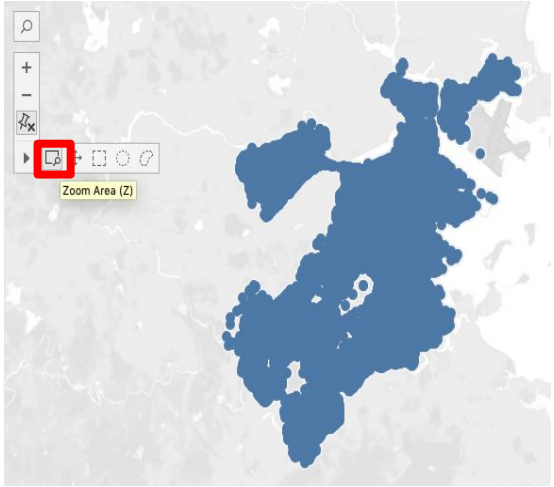
Tableau will automatically plot our points based upon the X/Y coordinates.



Using Tableau
Step Four: Zoom Controls

The navigation and zoom controls are in the top left of the plot area. We can use the zooming and panning tools to navigate to our area of interest.

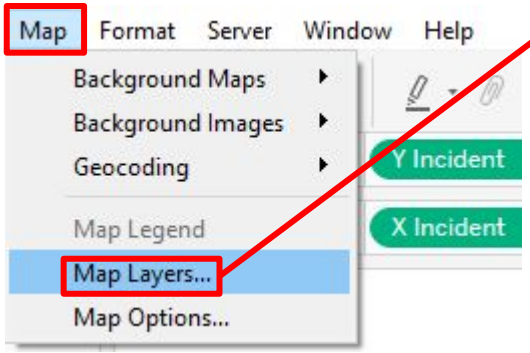
We have zoomed into the Downtown Boston, Fenway/Kenmore, Jamaica Plain, Roxbury areas.

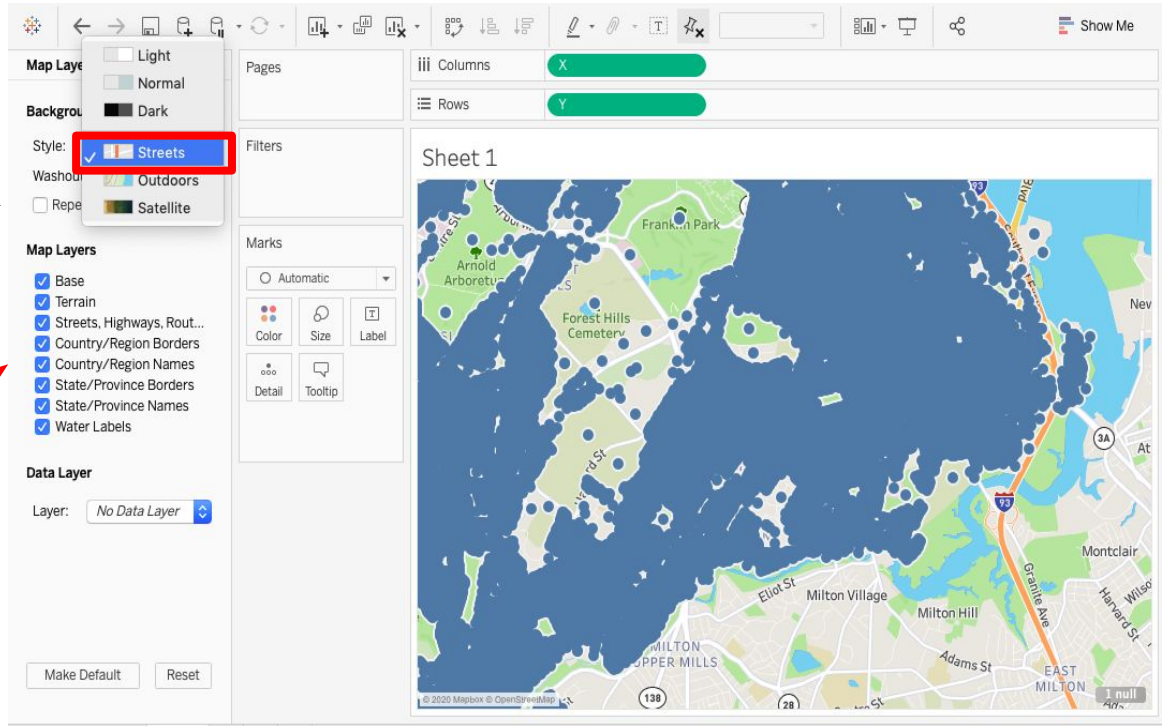


Using Tableau
Step Five: Modify Basemap

We can use the ‘Map’ > ‘Map Layers…’ option from the toolbar to modify our basemap.

We have changed our Style to ‘street.’ You may also want to toggle other Map Layers like ‘Streets, Highways, Routes.’
When you are done, click the X at the top of the map layers sidebar.





Hypothesis: **Gentrification will look different in each neighborhood of study.**

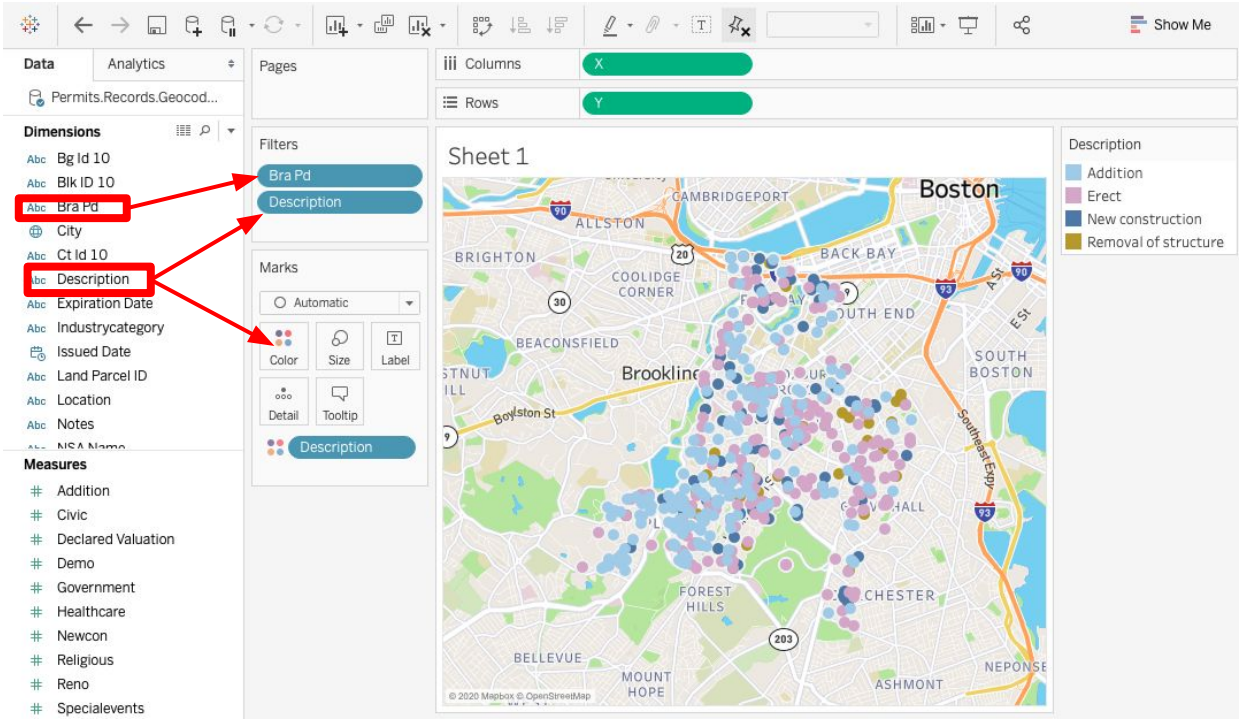
Operationalization: **Gentrification can be tracked by filtering out Addition, Erection, New Construction, and Removal of Structure building permits**

Using Tableau
Step Six: Create Filters

To create different filters and visualization parameters, drag a dimension or measure into the ‘marks’ box. Change marks to “Map” in dropdown option.

To specify a type of visualization, drag the parameter of choice onto ‘color,’ ‘size,’ etc.

For this exercise, we have mapped Description of Permit Type as a color, and filtered by neighborhood and description of permit type (which will appear as a tooltip).



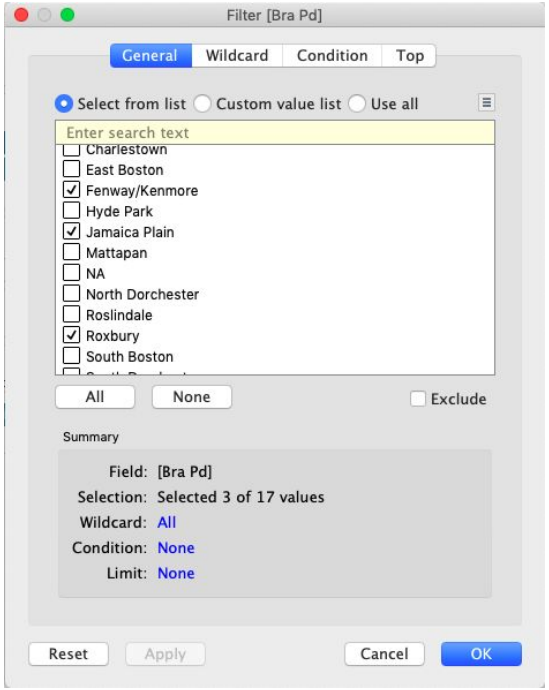
Using Tableau
Step Seven: Create Filters Continued

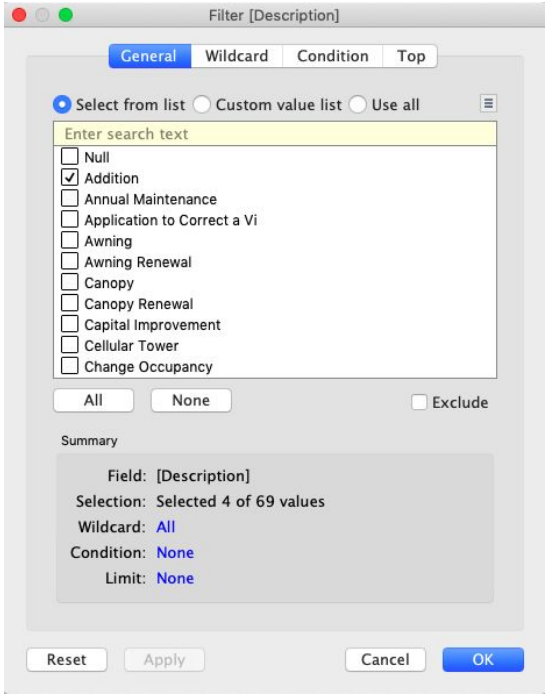
For this exercise, we want to filter our neighborhood data parameter to only display Fenway/Kenmore, Jamaica Plain and Roxbury.

We click on 'Filter…' This will bring up the filter box.

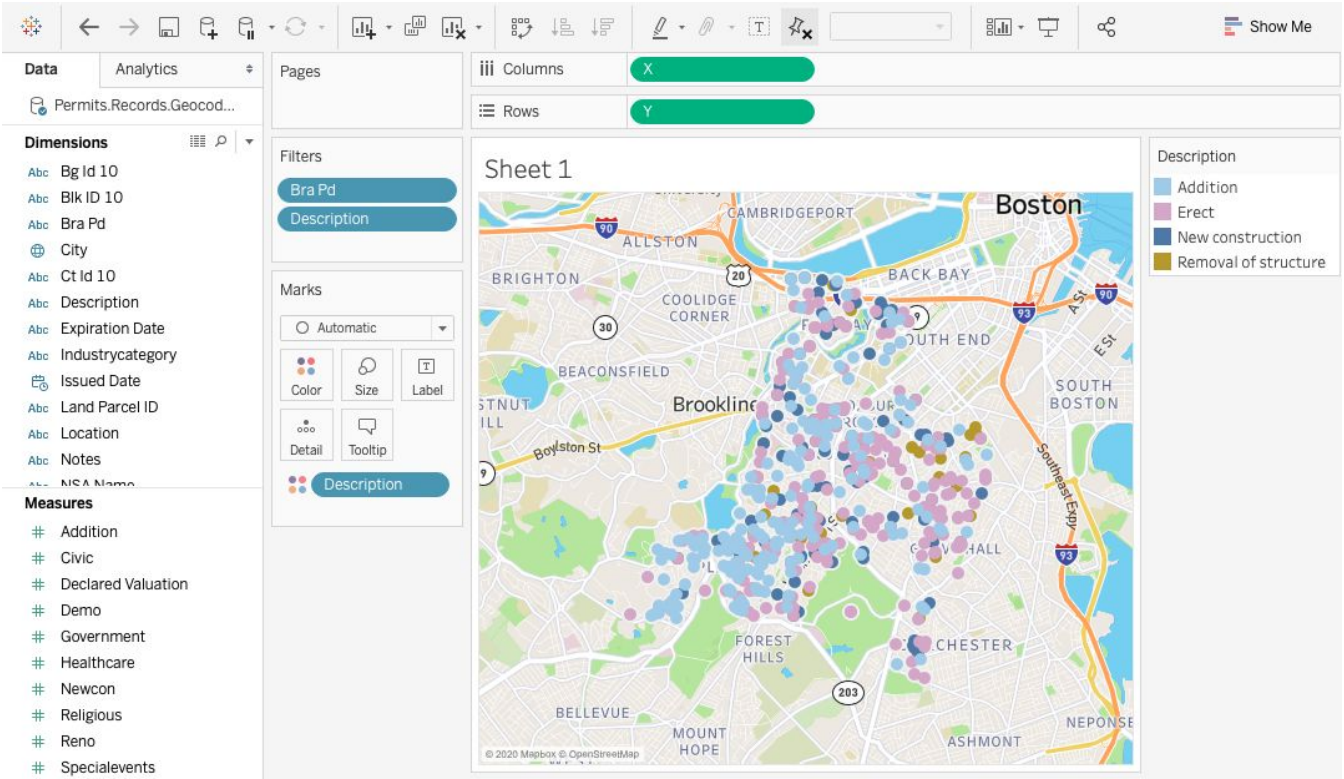
Now we will deselect all and then check the boxes for Fenway/Kenmore, Jamaica Plain and Roxbury.

We do the same thing for permit description type, selecting the boxes for Addition, Erect, New Construction, and Removal of Structure.





Using Tableau
Step Seven: Create Filters Results

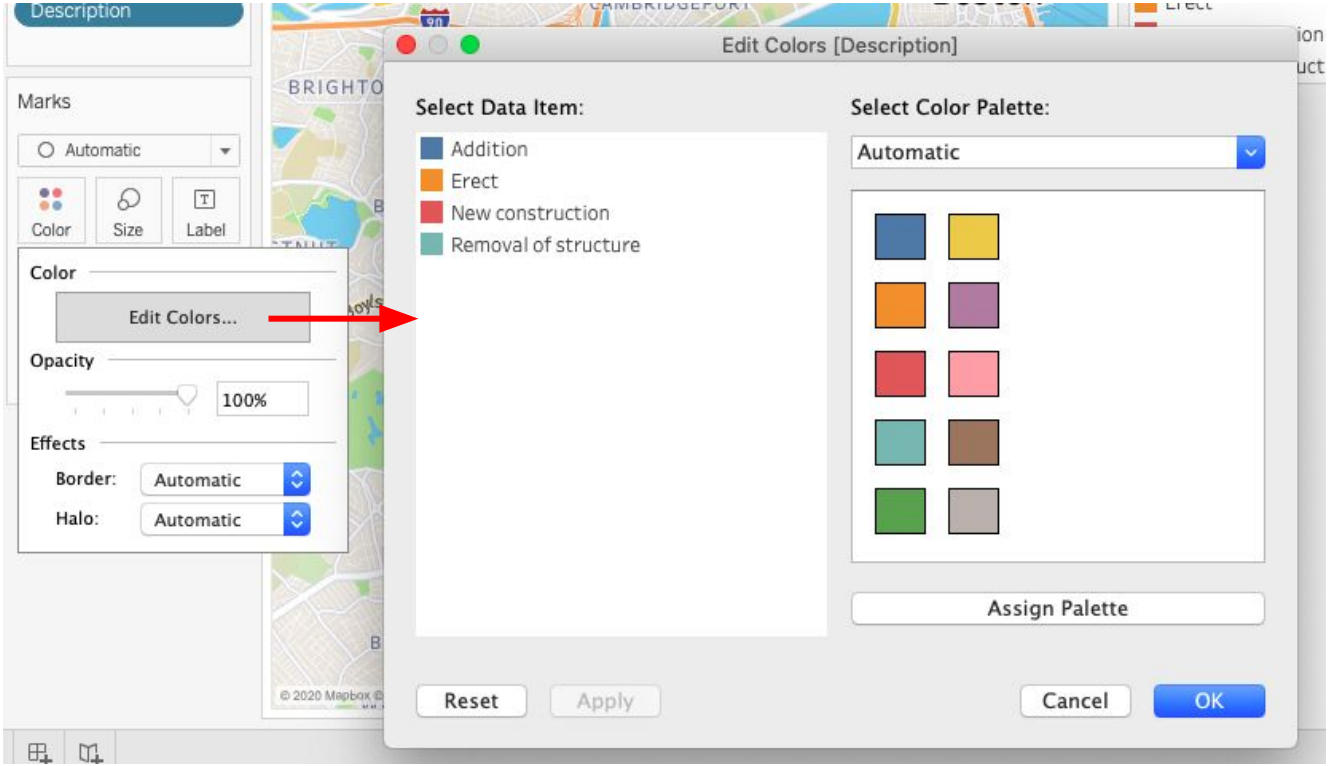


Using Tableau
Step Eight: Modify Colors

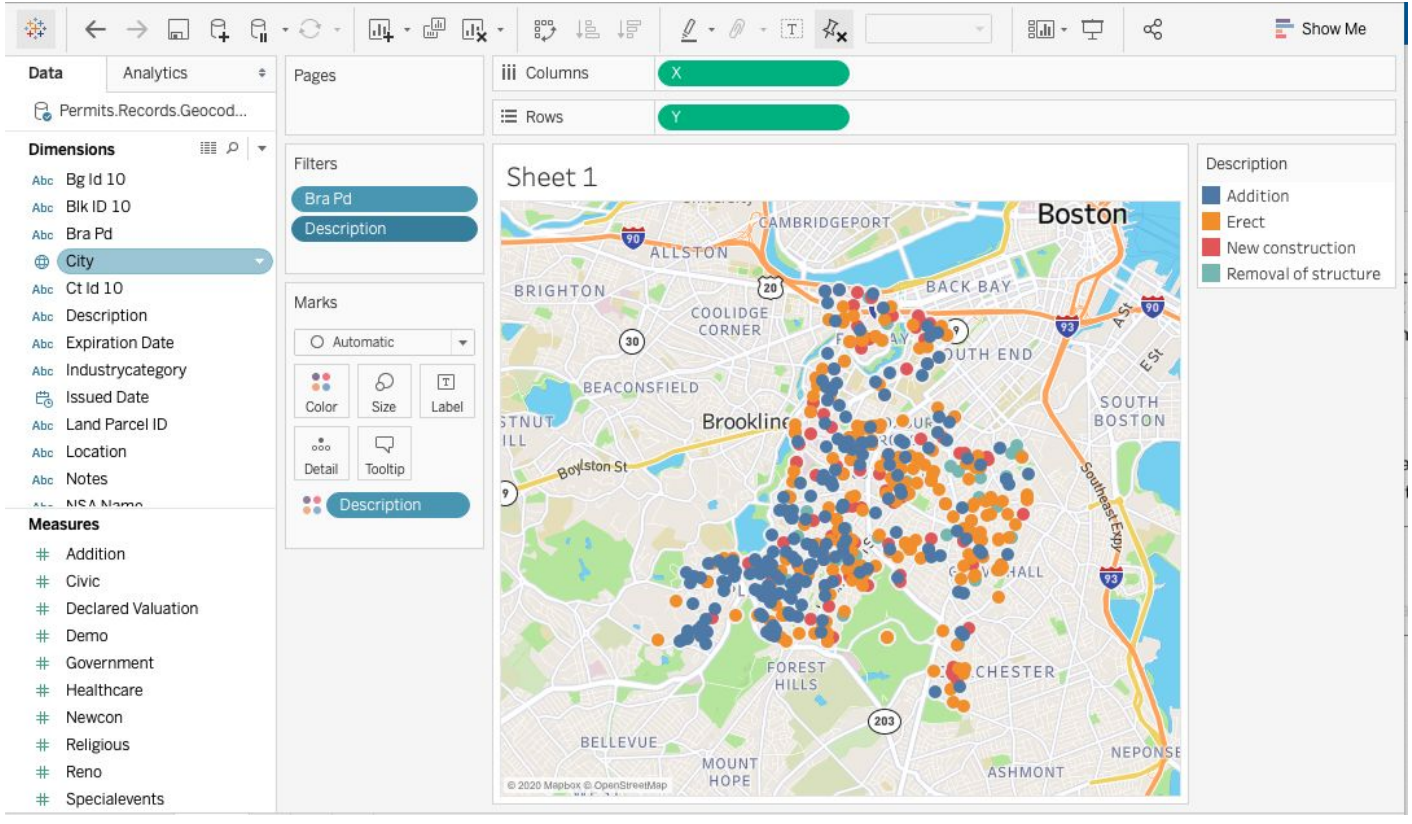
The light pink and blue for Addition and Erection do not contrast very well, so we will now change the colors.

On the Description sidebar, click the drop down arrow, then click on ‘edit colors…’

On the edit colors box we can now change our colors to contrast more for better visualization.



Using Tableau
Step Eight: Modify Colors Results

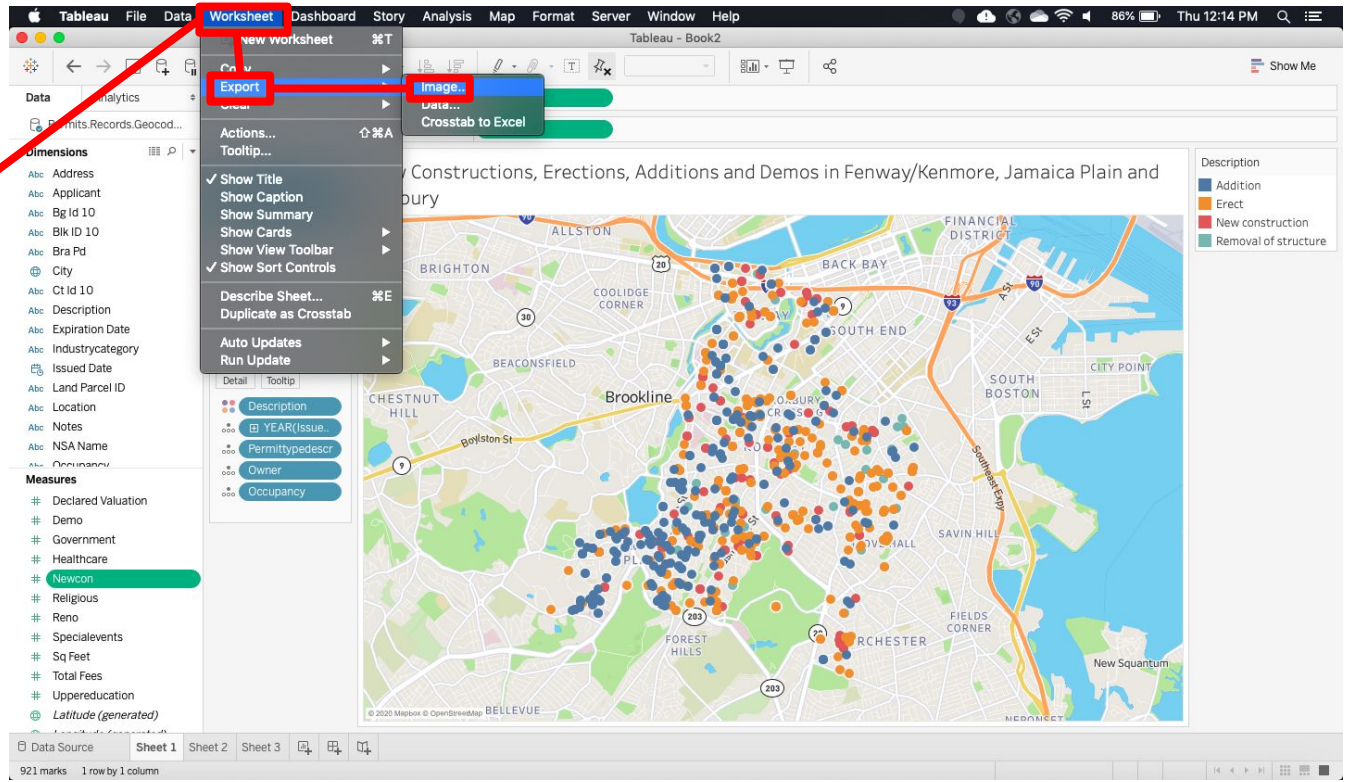


Using Tableau
Step Nine: Exporting Images

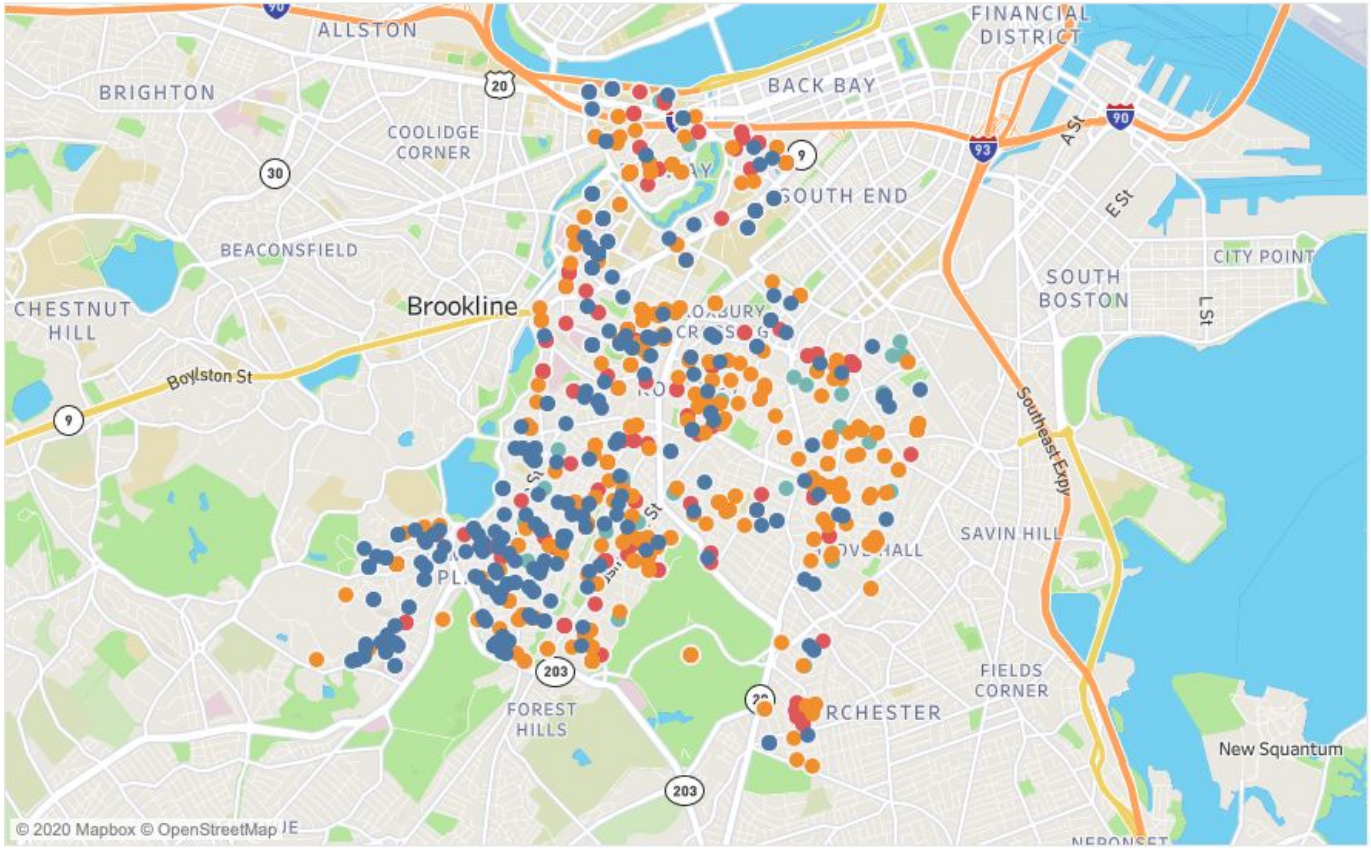
Once we are happy with our map after filtering for different data points, we can export our image.

From the ‘Worksheet’ drop-drop down menu, hover over ‘Export,’ then click on ‘Image…’ You can select the type of export then click ‘save.’

Navigate to where you would like to save the image, name it, and change the file type if you would like - then click ‘save.’



New Constructions, Erections, Additions and Demos in Fenway/Kenmore, Jamaica Plain and Roxbury



Description
- Addition
- Erect
- New construction
- Removal of structure

Map based on X and Y. Color shows details about Description. Details are shown for various dimensions. The data is filtered on Bra Pd and Worktype. The Bra Pd filter keeps Fenway/Kenmore, Jamaica Plain and Roxbury. The Worktype filter keeps ADDITION, ERECT, NEWCON and RAZE.

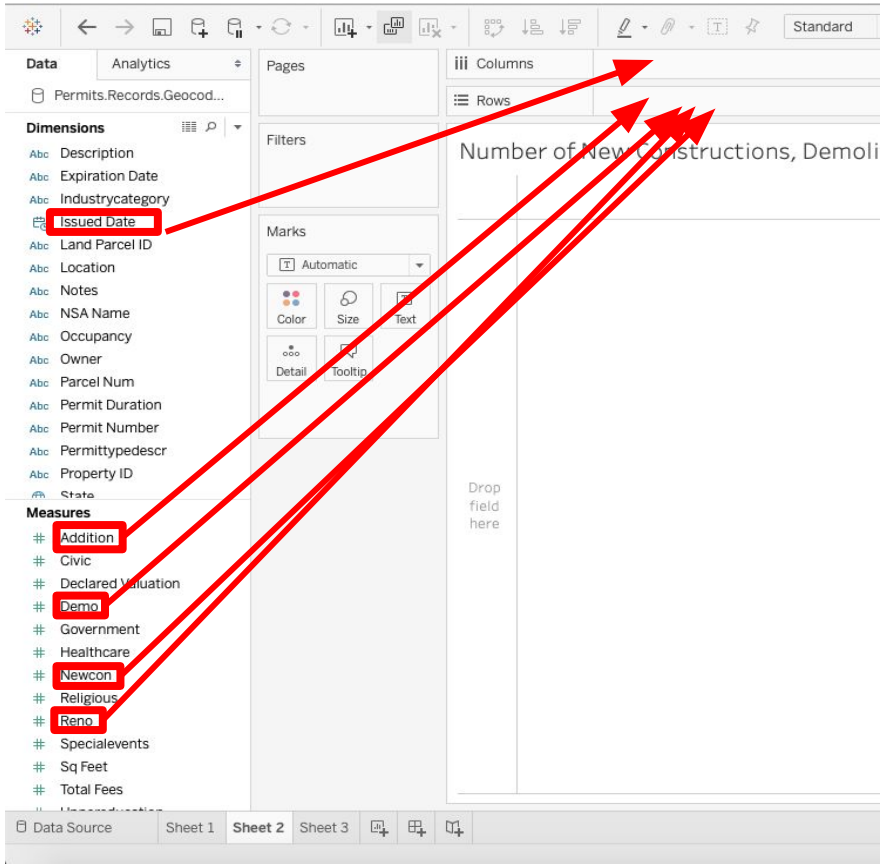
Graphs with Tableau: Drag & Drop

Similar to mapping, creating a graph is as simple as dragging and dropping our dimensions and measures.

In this demonstration, we will map the number of records over time according to permit type.

First, create a new sheet (click the + sign next to Sheet 1 at the bottom)

Next, we will drag and drop our ‘Issued Date’ dimension to the columns, and the ‘Addition, Demo, Newcon and Reno’ measures to the rows.



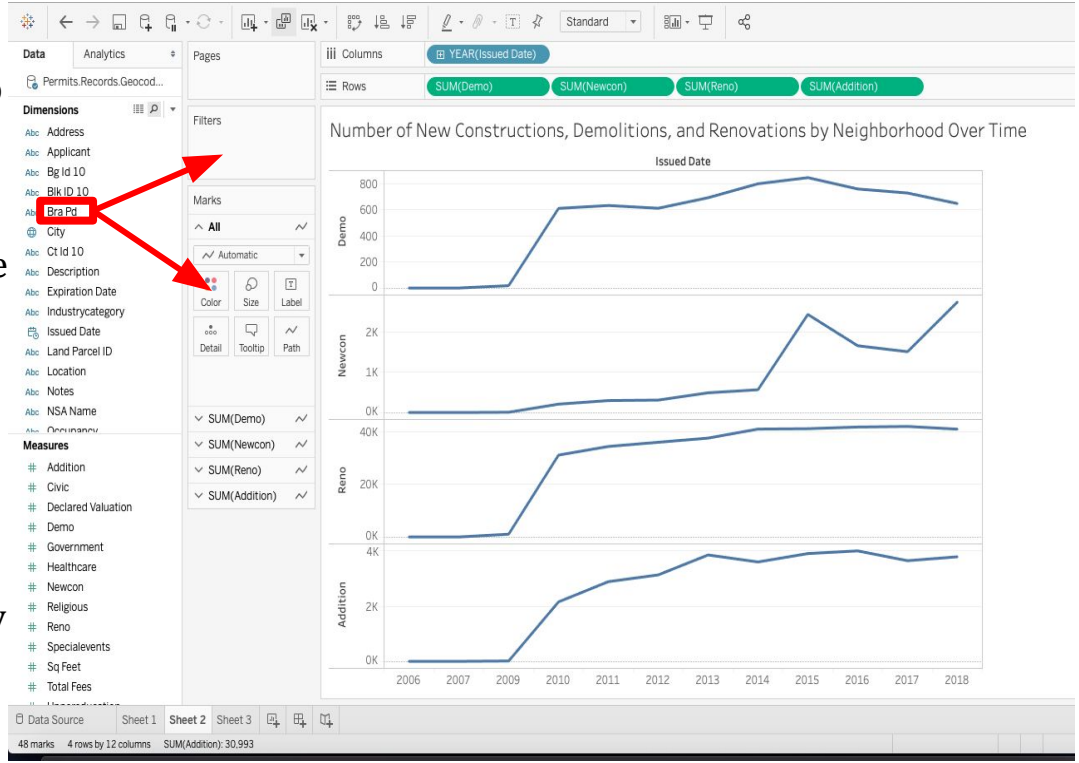
Graphs with Tableau: Drag & Drop

We now have a graph of different building permit records over time, but we still need to show their prevalence in specific neighborhoods.

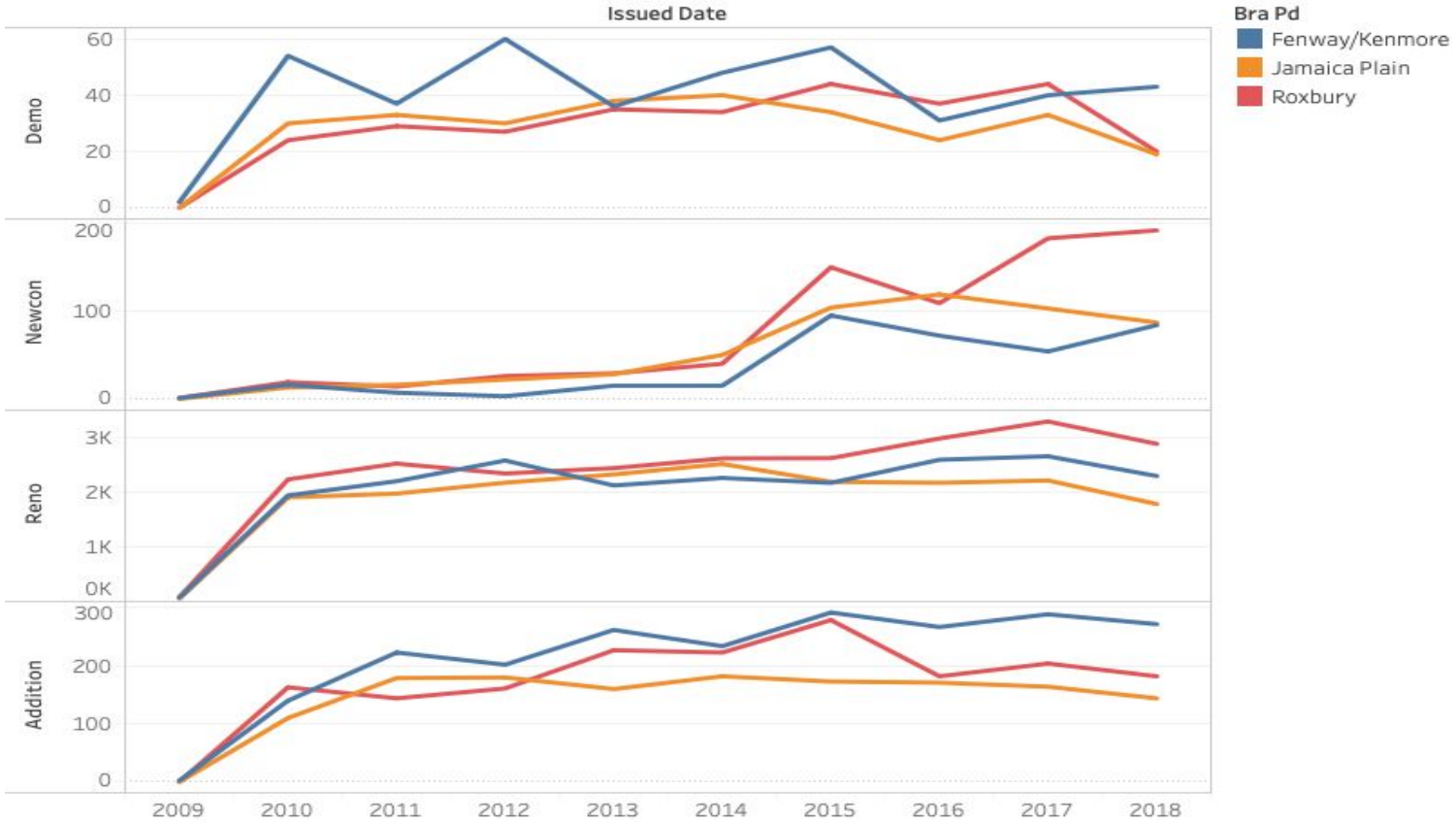
Next, we drag and drop our “Bra pd” measure onto both the filter box and the colors in the marks box to the left of our new graph. Filter your neighborhoods to include only Fenway/Kenmore, Jamaica Plain and Roxbury.

Tableau will automatically set each neighborhood to a different color and redraw our graph.

We will then export the graph in the same way we exported our map.



Number of New Constructions, Demolitions, and Renovations by Neighborhood Over Time

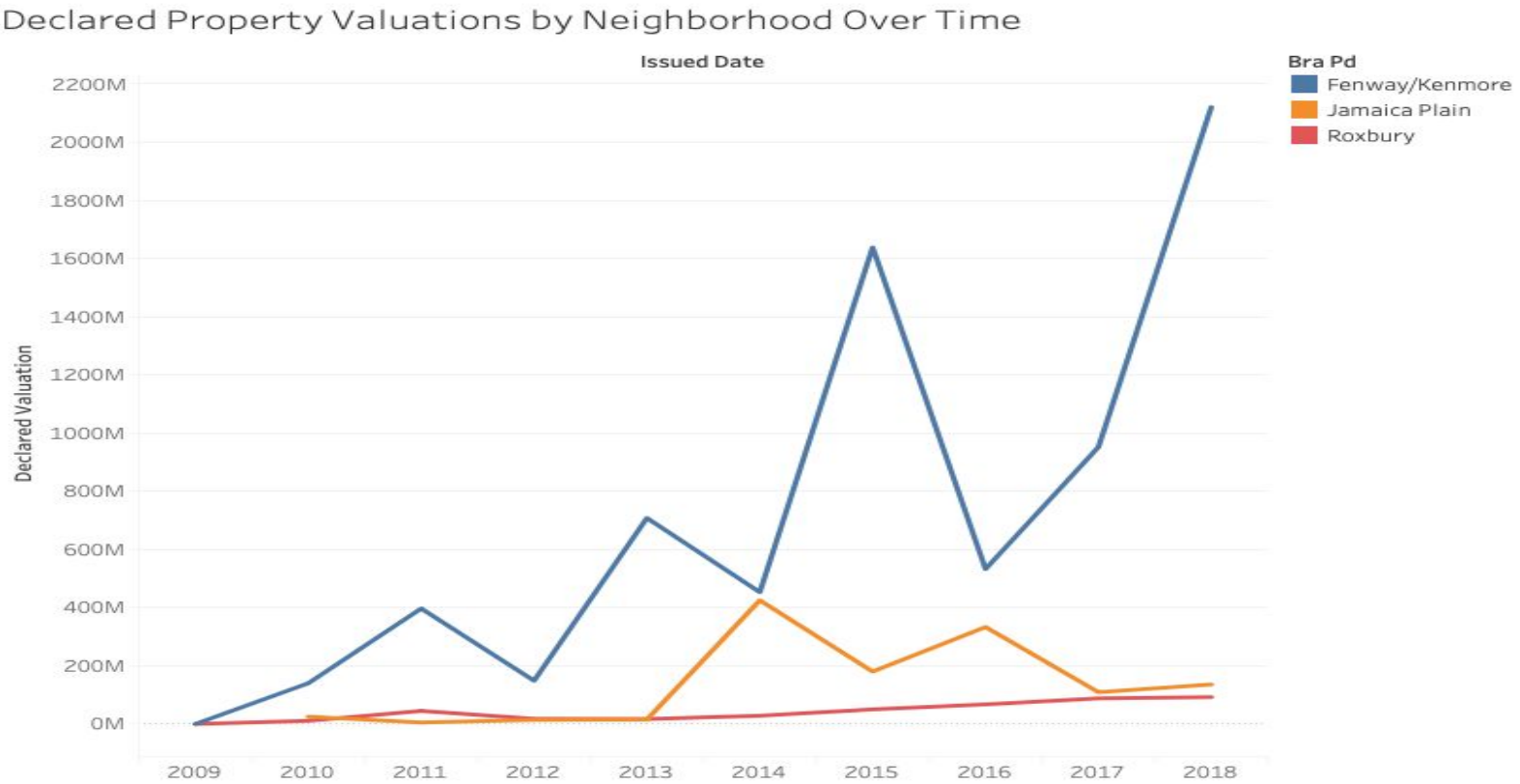


The trends of sum of Demo, sum of Newcon, sum of Reno and sum of Addition for Issued Date Year. Color shows details about Bra Pd. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

Example Research Questions

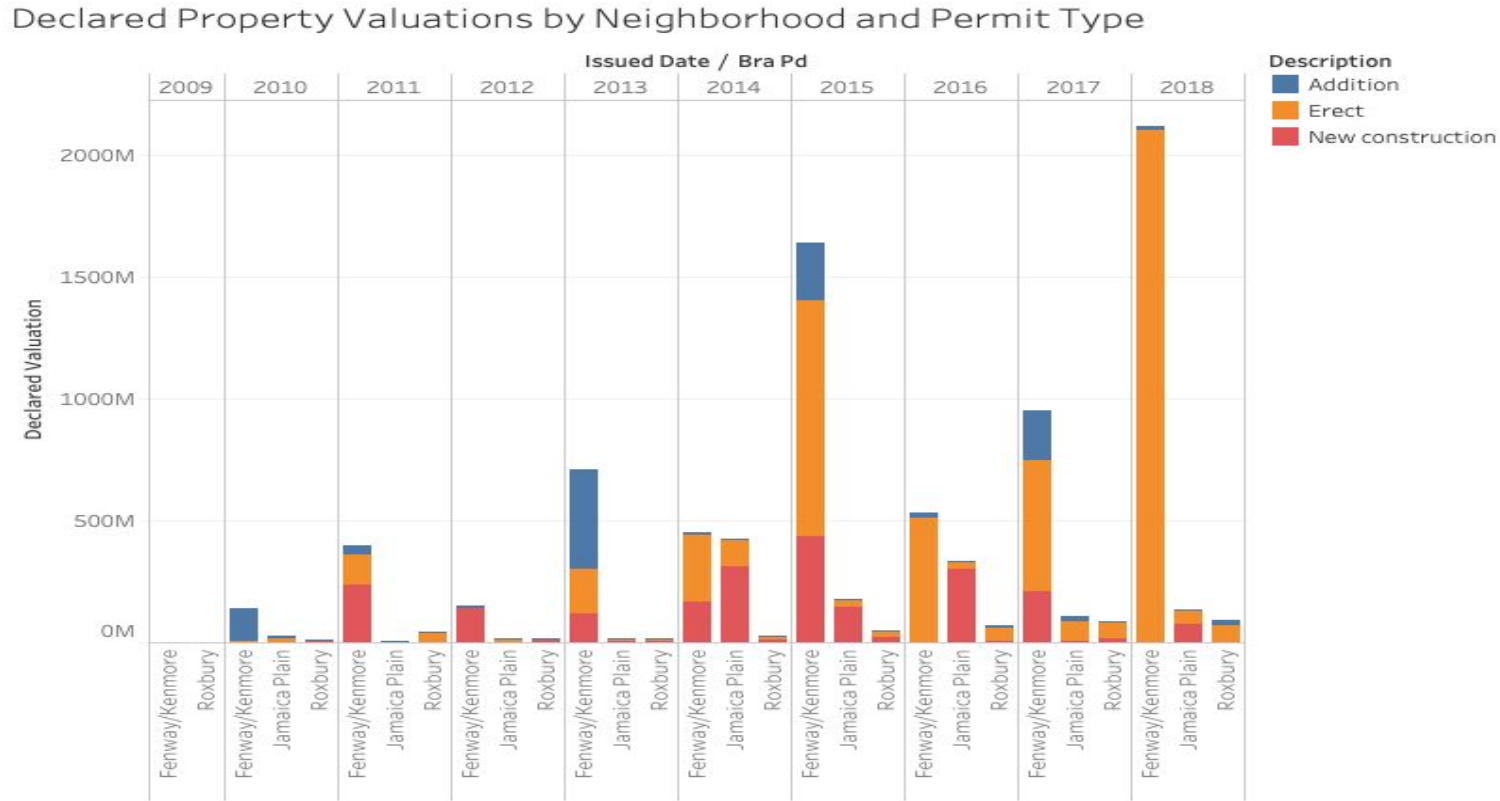
- How much value are new constructions and renovations adding to their neighborhood over time?
- How much value does each type of construction add to each neighborhood's overall valuation?
- What different types of industry are building in these neighborhoods?
- Who owns the buildings that are being renovated and constructed?
- What different building types are being constructed and renovated?

How Much Value are New Constructions and Renovations adding to their Neighborhoods over Time?



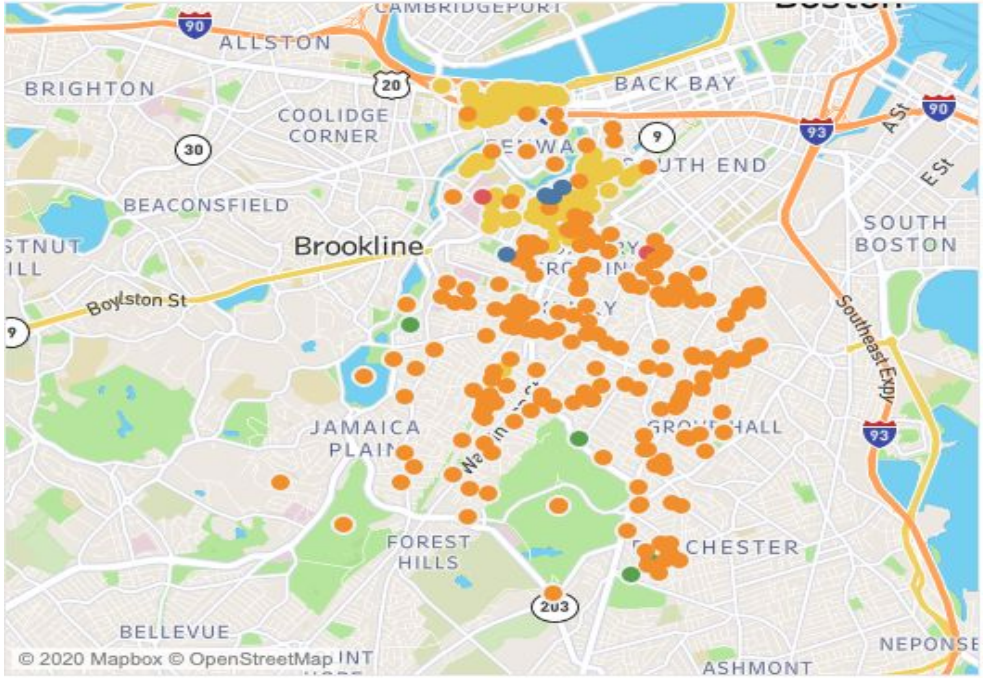
The trend of sum of Declared Valuation for Issued Date Year. Color shows details about Bra Pd. The data is filtered on Worktype, which keeps ADDITION, ERECT and NEWCON. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

How much value does each type of construction add to each Neighborhood's Overall Valuation?



What different types of industry are building in these neighborhoods?

Permits by Industry Type for Fenway/Kenmore, Jamaica Plain and Roxbury



Industrycategory
- Civic
- Government
- HealthCare
- Religious
- UpperEd

Map based on X and Y. Color shows details about Industrycategory. The data is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury. The view is filtered on Industrycategory, which keeps Civic, Government, HealthCare, Religious and UpperEd.

Optional Challenge

Make your own Research Question and Corresponding Visualization. Begin to start applying your own sociological imagination, and the skills you have learned in Research Methods thus far, to the Building Permit Dataset.

For anyone you thinks they made a question and visualization they are proud of, send it to me and/or Prof. Alden

For more on visualization you can watch these two visualization videos using Tableau on ACS/Census Data: Video 1, Video 2

Conclusion

Tableau is a powerful tool for quickly mapping coordinate points onto a simple map. Experiment with the many different options available for filtering and displaying data in different ways.

Tableau is also very powerful at creating a variety of charts and graphs, this can easily be done by dragging non-coordinates to the ‘column’ and ‘row’ areas.

Research questions can include a number of different dimensions and measures—do not be afraid of experimenting with different visualizations

For more powerful mapping software, see ArcGIS, QGIS, or CartoDB.

Want to Learn More Digital Methods? Take INSH 1500 for Summer 2

If anyone is interested in continuing to learn mapping as well as other digital methods, sign up for my Summer 2 Course, INSH 1500: Digital Methods for Social Science & Humanities, where we will learn to do this and more (including some Mapping & GIS, Network Analysis, Image Analysis) including going much more in depth into Computational Text Analysis using Python, teaching you new research methods to further social science inquiries. No coding experience Necessary!

INSH 1500: Digital Methods for Social Science & Humanities
Professor: Jeff Sternberg
Associated Term**:** Summer 2 2020 Semester (6/29/2020 - 8/18/2020)
CRN**:** 61178
Monday, Tuesday, Wednesday Thursday, 9:50 AM - 11:30 AM (Though Probably Online)

Additional Northeastern Digital Methods Courses and Resources

- Data Science course (DS 2000) – they have applied practicum, and one of them is the social sciences and humanities applied practicum
- Digital Humanities minor/Computational Social Science minor – talk to your academic advisors at some point
- Bostonography (but you need to take DS2000 first) – INSH course
- Jeff Sternberg - Digital Methods for the Social Sciences, Summer 2
- Technologies of Text class
- English Department Text Coding Class, summer 2
- Nick Beauchamp – computational stats class
- LYNDA – now LinkedIn Learning: https://www.linkedin.com/learning/ – Northeastern subscribes to it

Questions & Contact Information

Jeff Sternberg
Digital Integration Teaching Initiative
Research Fellow
PhD Candidate, Sociology
sternberg.je@husky.neu.edu

Find these slides, handouts, and more at
bit.ly/diti-spring2020-alden-tableau

Schedule a meeting: **https://calendly.com/diti-nu**

Northeastern University
NULab for Texts, Maps, and Networks