

Mapping with Tableau

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Current Issues in Cities and Suburbs

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Spring 2020



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
- Filter data in a variety of ways to produce custom visualizations

To follow along, visit

<http://bit.ly/diti-spring2020-rabrenovic-tabelau>

If you could map anything in your neighborhood of study, what would it be? Why would it be interesting to map? What would being able to map it add to your understanding of the neighborhood?

Boston Area Research Initiative - Data Portal



Boston Area Research Initiative

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Boston Data Portal

The Boston Data Library and BostonMap

The Boston Data Portal makes publicly available the data products from BARI projects. The Data Portal is a key part of BARI's efforts to collect and disseminate information that foster policy/research collaborations.

The Data Portal has two components: the Data Library and the Research Map.

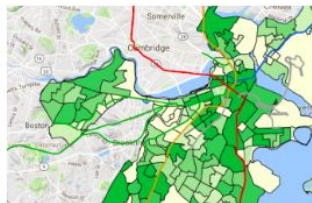
BARI offers Data Portal trainings for community organizations. If you or your organization would like to attend or host a training, please email us at [b Bari@northeastern.edu](mailto:bari@northeastern.edu).

Massachusetts Census Indicators Database (Harvard University)
May 12, 2016
This database contains a curated set of indicators accessed or derived from the US indicators are for all census tracts and block groups in Massachusetts and include as the decennial census.

Geographical Infrastructure v. 2010 Database (Harvard University, Northeastern Univ)
Feb 5, 2016 Geographical Infrastructure for the City of Boston Database
Geographical Infrastructure for the city of Boston, as of 2010.

City of Boston Administrative Data Database (Harvard University, Northeastern Univ)
Feb 5, 2016
Administrative data, including requests for city services, from the city of Boston.

Boston Data Library: Download data and documentation describing Boston from various sources. (Powered by the Dataverse at the Institute for Quantitative Social Science at Harvard University)

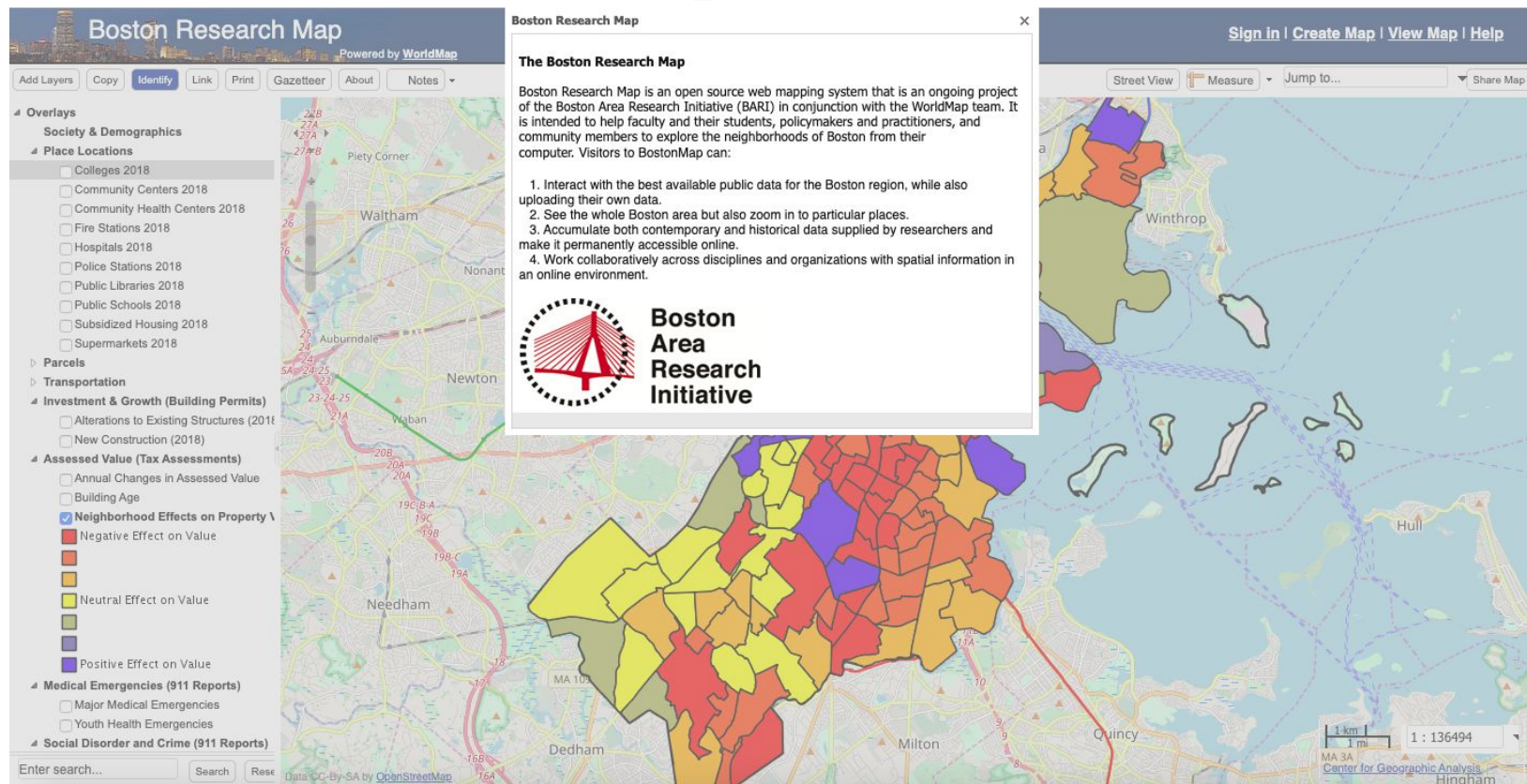


Boston Research Map: Visualize BARI data in our interactive map (powered by the Center for Geographic Analysis at Harvard University)



Boston Data Portal Training and the Data Consultant: View tutorials, attend a community training, or get in touch with the Data Consultant

Boston Research Map



Boston Area Research Initiative Dataverse



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☒ Datasets (9)

☒ Datasets (25)

☐ Files (263)

Dataverse Category

Research Project (7)

Publication Year

2019 (9)

2018 (7)

2016 (6)

2017 (6)

2012 (3)

More...

Subject

Social Sciences (26)

Earth and Environmental Sciences (3)

Other (1)

Author Name

O'Brien, Daniel T. (7)

de Benedictis-Kessner, Justin (6)

O'Brien, Dan (4)

Sheini, Saina (4)

Shields, Michael (3)

More...

Author Affiliation

Northeastern University / Harvard University

(14)

Harvard University (6)

1 to 10 of 34 Results

Geographical Infrastructure for the City of Boston v. 2

Dec 5, 2019

O'Brien, Daniel T.; Phillips, Nolan; de Benedictis for the City of Boston v. 2018", <https://doi.org/10.7910/DVN/N4BL71> [fileUNF]

The Boston Area Research Initiative's Geographical Infrastructure for the City of Boston, MA across various geographic levels—ir

Geographical Infrastructure for the City of Boston v. 2

Dec 4, 2019

O'Brien, Daniel T.; Phillips, Nolan Edward; Sheini, Saina, 2019, "Geographical Infrastructure for the City of Boston v. 2", <https://doi.org/10.7910/DVN/N4BL71> [fileUNF]

The Boston Area Research Initiative's Geographical Infrastructure for the City of Boston, MA across 17 levels, including land parcels, streets, census geographies, and other administrative regions. The levels are organize...

Building Permits

Nov 25, 2019

O'Brien, Daniel T.; Barrett W. Montgomery; de Benedictis-Kessner, Justin; Sheini, Saina, 2019, "Building Permits", <https://doi.org/10.7910/DVN/N4BL71>, Harvard Dataverse, V3, UNF:6:MoA2dRjgDfFBW9B5KUNsA== [fileUNF]

This dataset contains various files detailing the City of Boston's building permits applications from September 26, 2006 to the recent present. The raw data were originally gathered and released by the Inspectional Service Department (ISD) of the City of Boston. It details variou...

Property Assessment

Aug 26, 2019

Shields, Michael; Sheini, Saina; de Benedictis-Kessner, Justin; O'Brien, Daniel T., 2019, "Property Assessment", <https://doi.org/10.7910/DVN/N4BL71>, Harvard Dataverse, V1, UNF:6:d6pZpV2A31t6mUdw4gY1w== [fileUNF]

This dataset details the various cross-sectional and longitudinal data files of the City of Boston's property assessment data. These data were curated and added to by the Boston Area Research Initiative. The corresponding documentation details information about the various

Feedback

21 to 23 of 23 Files

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Permits.Ecometrics.CT.Longitudinal.tab

Tabular Data - 343.9 KB - Nov 25, 2019 - 2 Downloads
173 Variables, 181 Observations - UNF:6:uXC4EvnoDNRyzMB8o04Vw==
Building permits by Census tract for all years

Geospatial Data

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Permits.Ecometrics.LP.Longitudinal.tab

Tabular Data - 11.9 MB - Nov 25, 2019 - 0 Downloads
73 Variables, 98436 Observations - UNF:6:vKb9zFyJlueY3pJgLGfA==
Building permits by land parcels for all years

Geospatial Data

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Permits.Records.Geocoded.2018.csv

Comma Separated Values - 186.2 MB - Nov 25, 2019 - 4 Downloads
MD5: eb86c8b751de7f9834e7f476ad43cf20

Data

Download

What types of research questions could be asked using the building permits data set?
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).

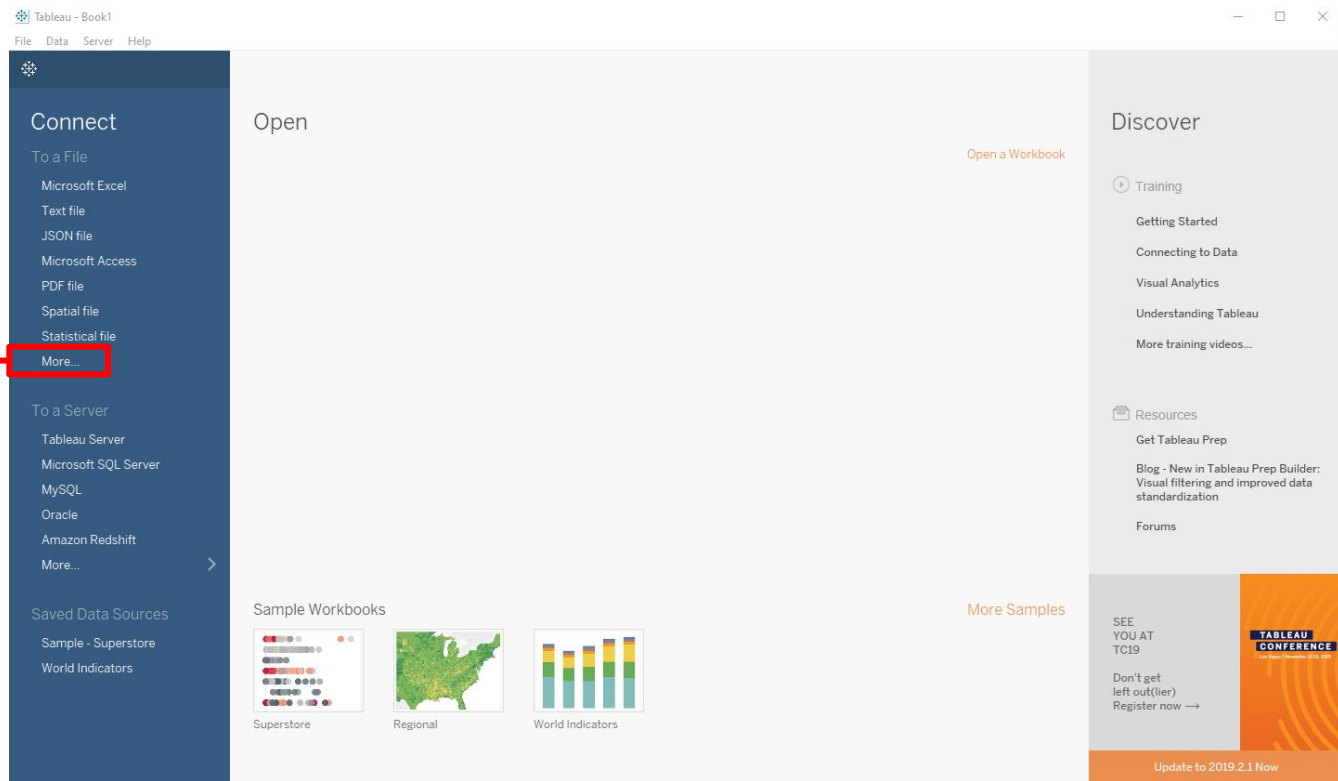
Using Tableau

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 'Microsoft Excel' and navigate to the data file that was sent via email.



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

The screenshot shows the Tableau interface with a data source named 'Permits.Records.Geocoded.2018'. The 'Columns' shelf contains several fields: 'State', 'ZIP', 'Location', 'Property ID', 'Parcel Num', and 'Latitude'. The 'Latitude' field is highlighted with a red box. A context menu is open for the 'Latitude' field, showing options like 'Number (decimal)', 'Date & Time', 'Date', 'String', 'Boolean', 'Default', 'Geographic Role', 'Longitude', 'State/Province', 'ZIP Code/Postcode', and 'Create from'. The 'Geographic Role' option is highlighted with a red box, and the 'Longitude' option is also highlighted with a red box. The 'Data Source' tab is selected at the bottom.

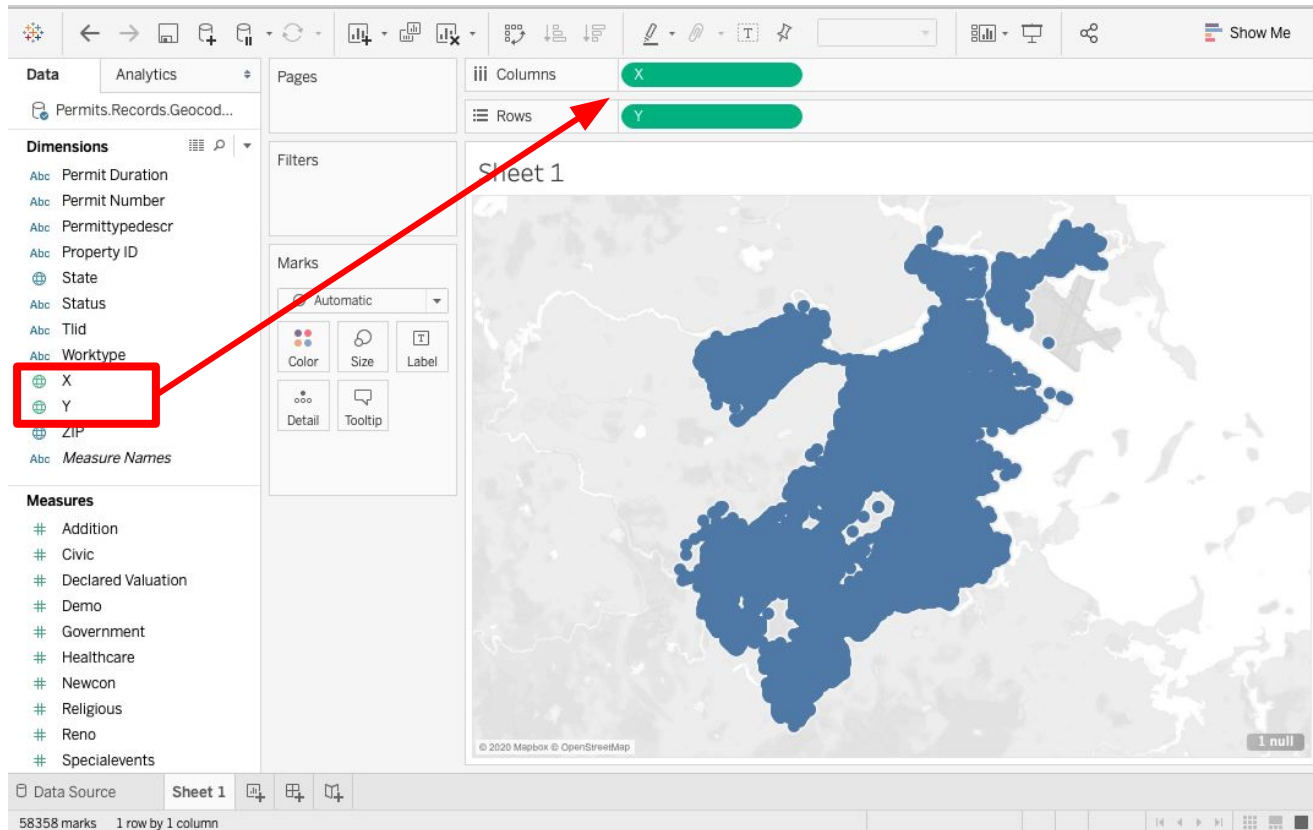
State	ZIP	Location	Property ID	Parcel Num	Latitude	Longitude	Area Code (U.S.)	CBSA/MSA (U.S.)	Congressional District (U.S.)	Country/Region	County
MA	02116	null	NA	NA	-71.029539	42.379356	1	250250509011034	25	250250509011034	25
MA	02210	null	NA	NA	-71.029539	42.379356	1	250250509011034	25	250250509011034	25
MA	02128	null	NA	NA	-71.029539	42.379356	1	250250509011034	25	250250509011034	25
MA	02118	null	NA	801720000	-71.029539	42.379356	1	250250509011034	25	250250509011034	25
MA	02118	null	NA	801720000	-71.029539	42.379356	1	250250509011034	25	250250509011034	25
MA	02126	null	NA	1804116000	-71.029539	42.379356	1	250250509011034	25	250250509011034	25
MA	02129	null	NA	203517600	-71.078625	42.287088	1	250250509011034	25	250250509011034	25
MA	02124	null	NA	1701902000	-71.029539	42.379356	1	250250509011034	25	250250509011034	25
MA	02124	null	NA	1701902000	-71.029539	42.379356	1	250250509011034	25	250250509011034	25
MA	02135	null	NA	2205126010	-71.154788	42.342280	1	250250509011034	25	250250509011034	25
MA	02135	null	NA	2205126010	-71.029539	42.379356	1	250250509011034	25	250250509011034	25

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.

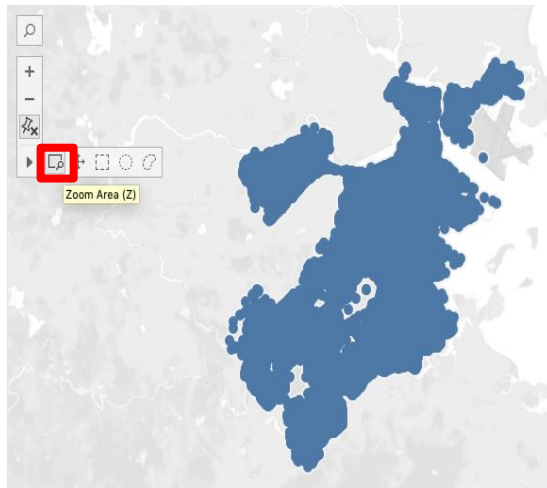


Using Tableau

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.

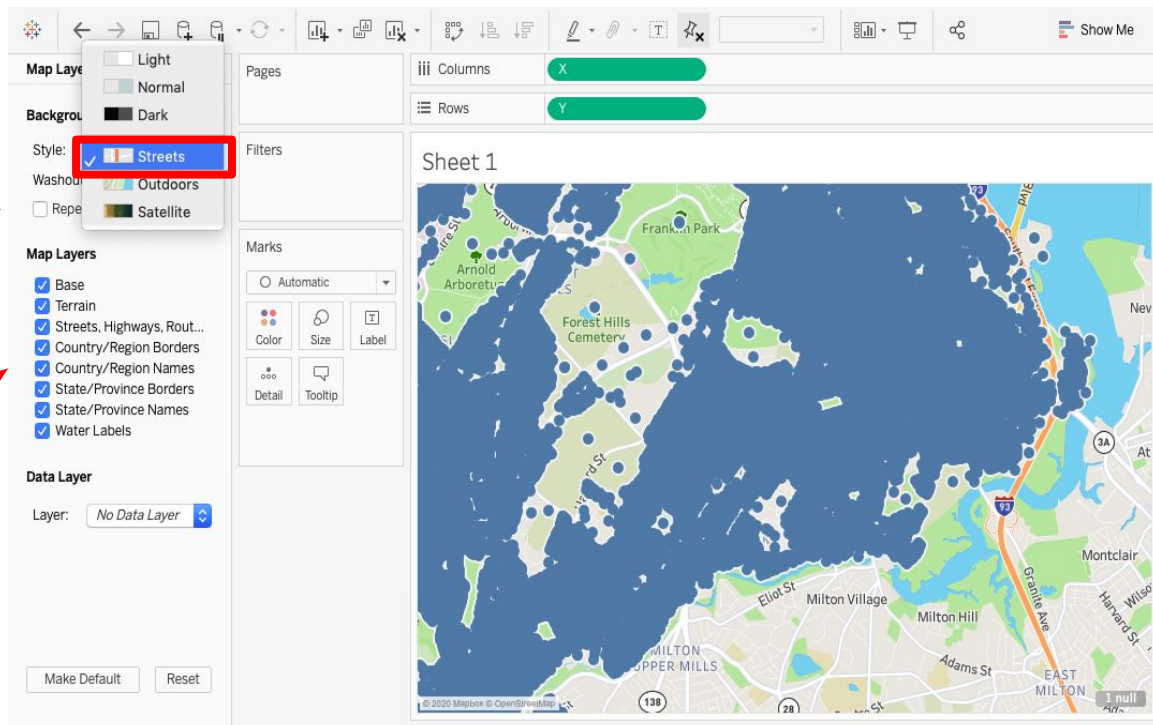
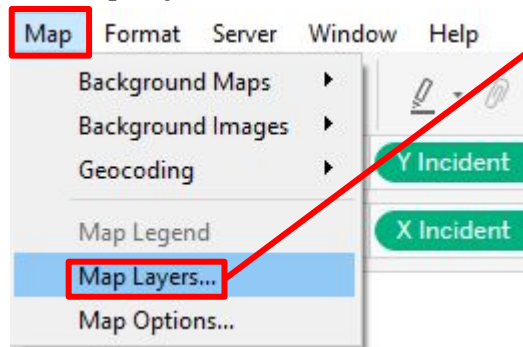


Using Tableau

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

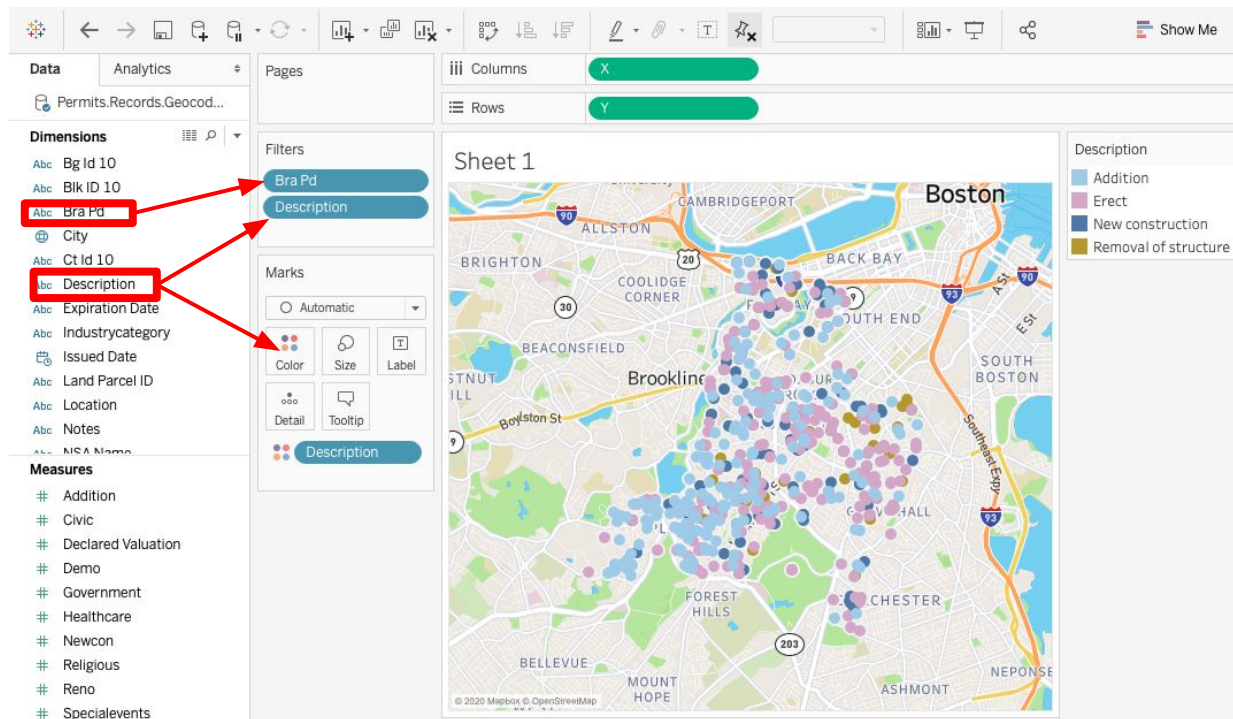
Using Tableau

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

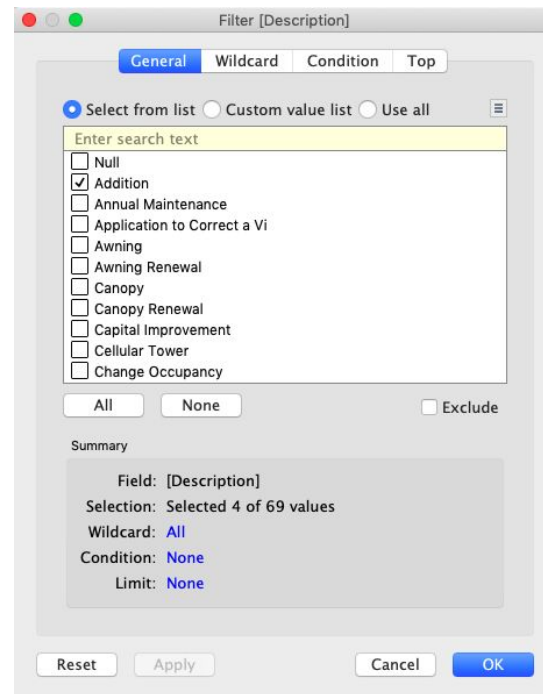
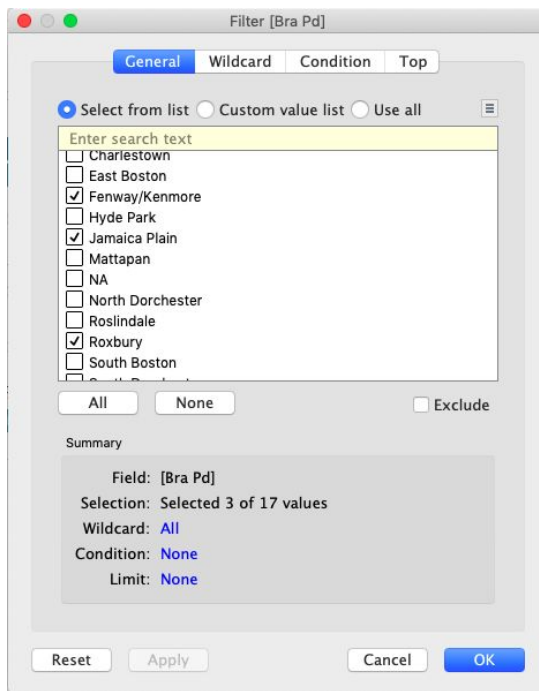
Step Seven: Create Filters Continued

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.

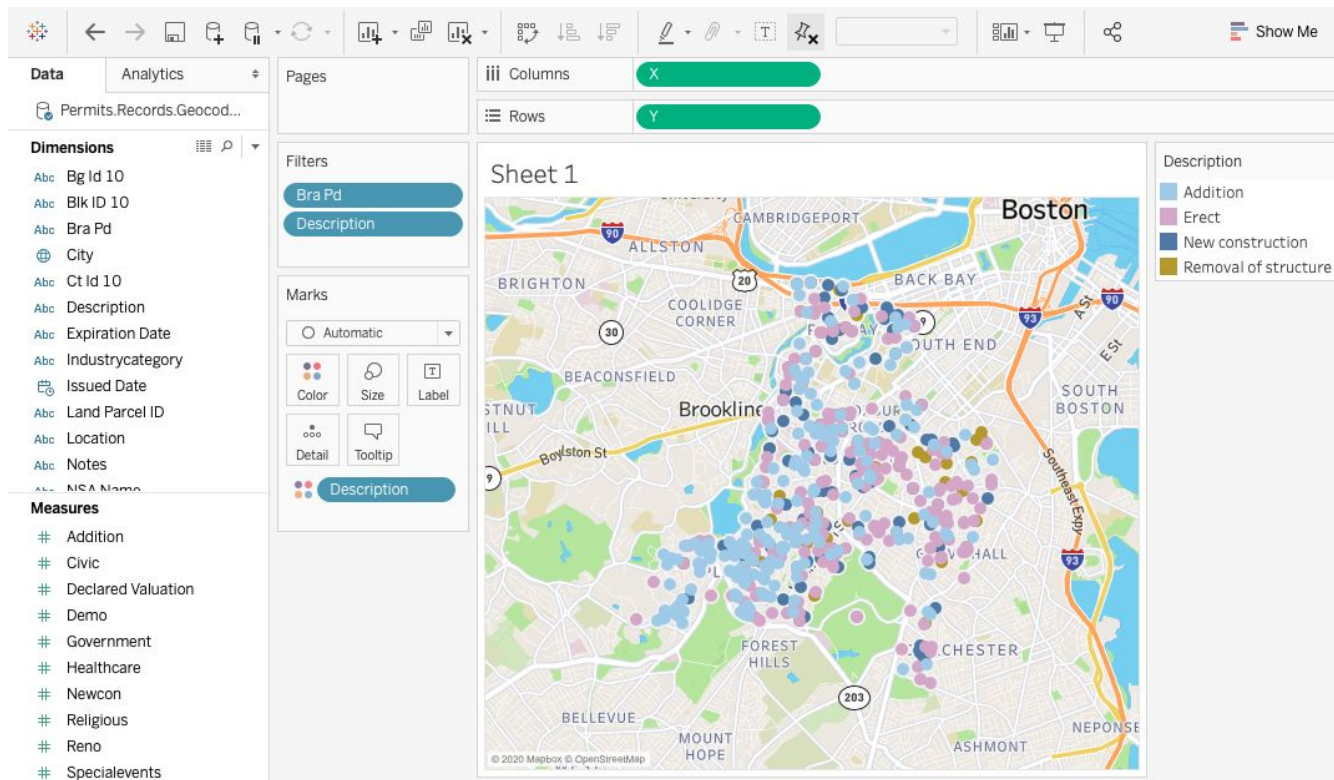
Now we will deselect all and then check the boxes for Fenway/Kenmore, Jamaica Plain and Roxbury.

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



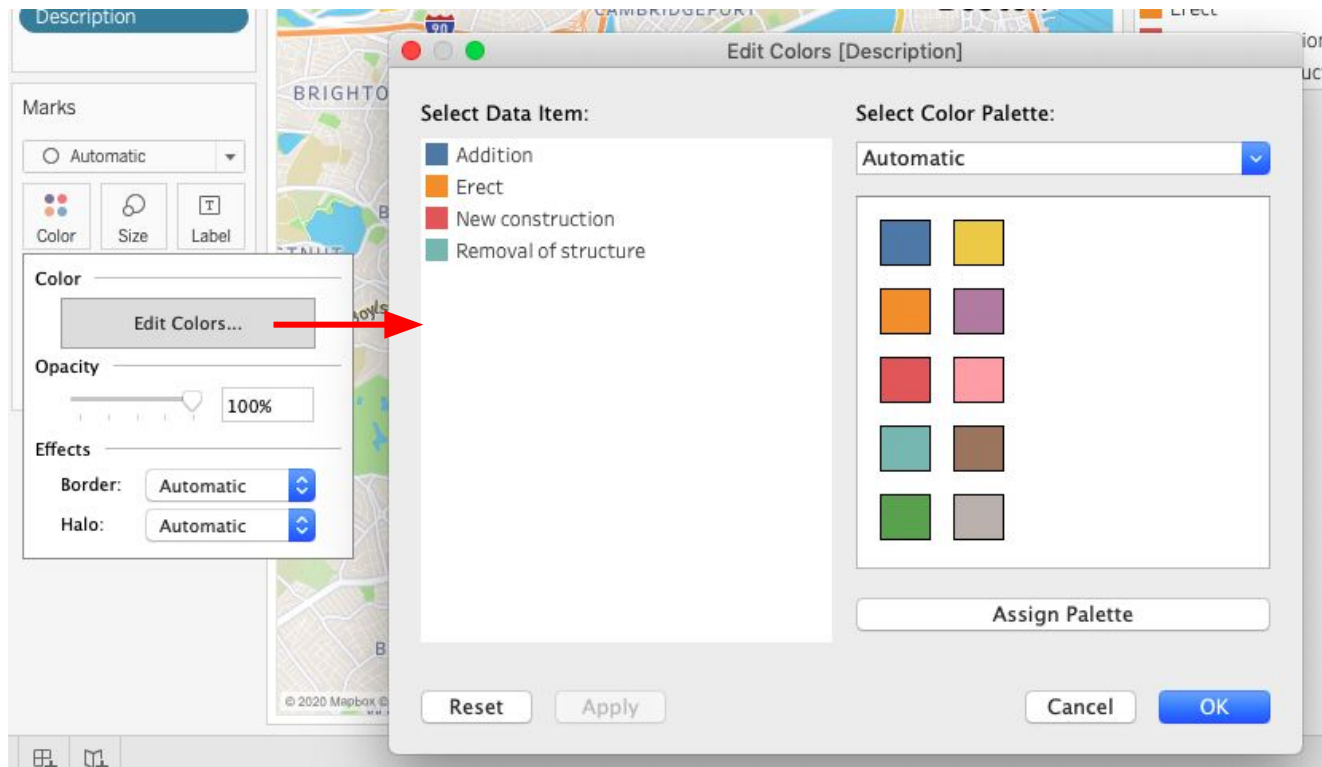
Using Tableau

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.

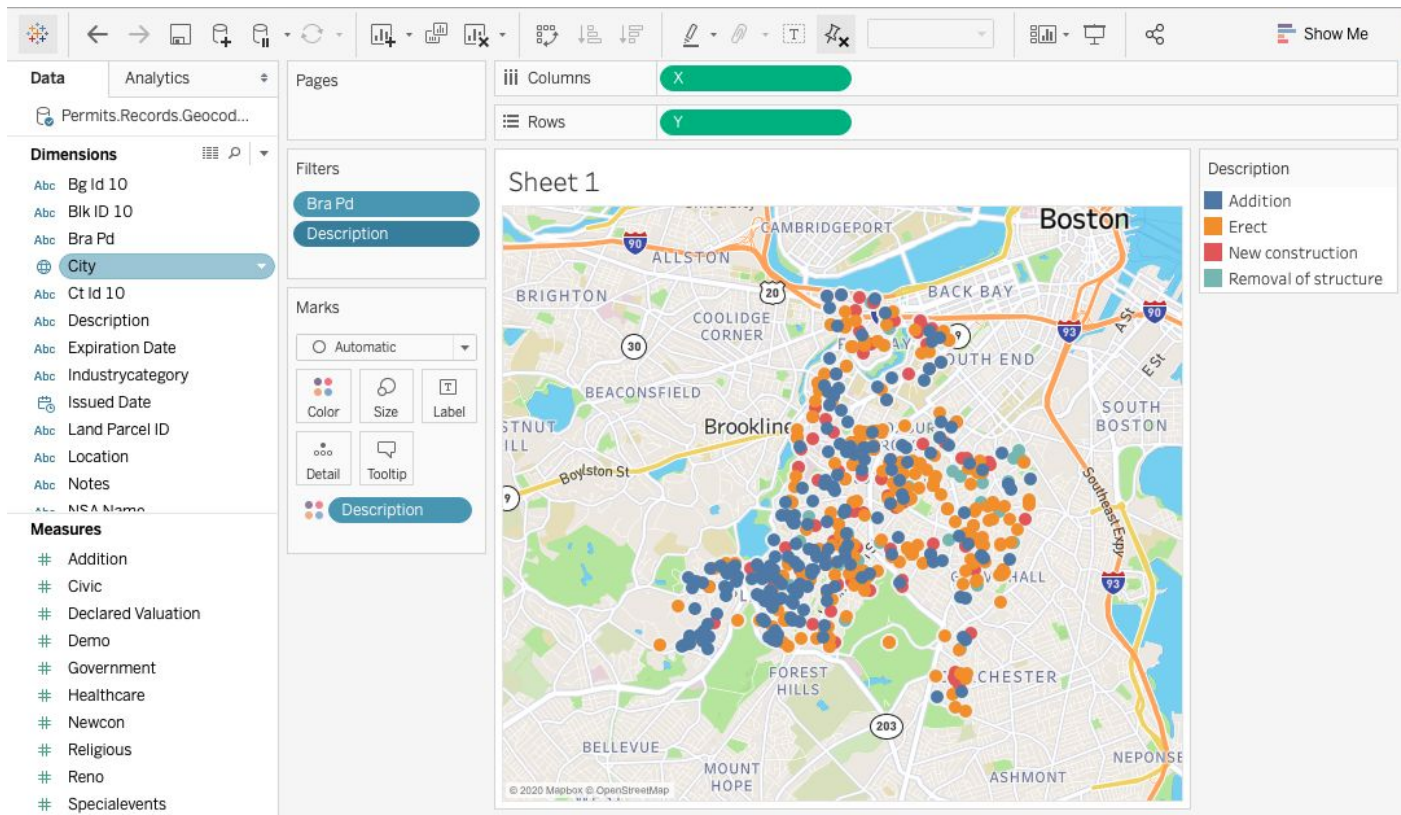
On the Bra Pd (neighborhoods) sidebar, click the drop down arrow, then click on 'edit colors...'

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



Using Tableau

Step Eight: Modify Colors Results



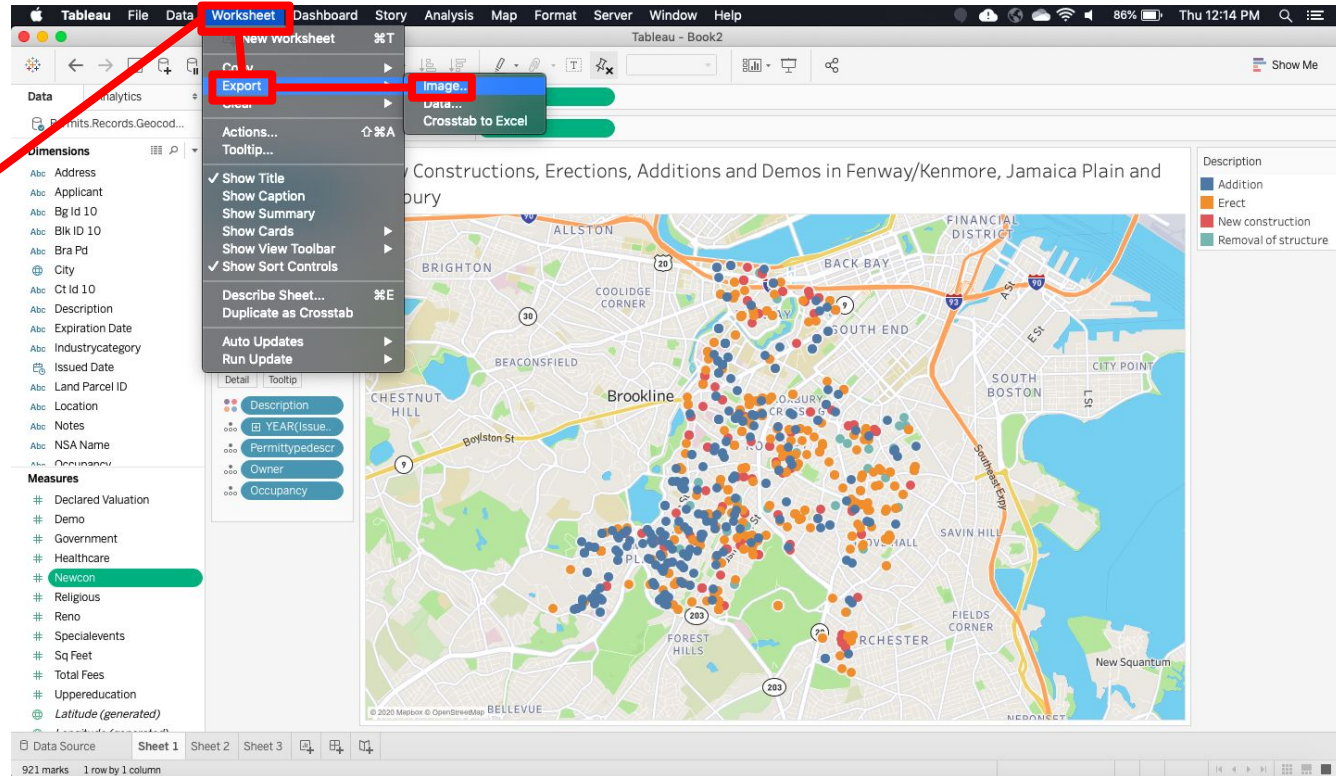
Using Tableau

Step Nine: Exporting Images

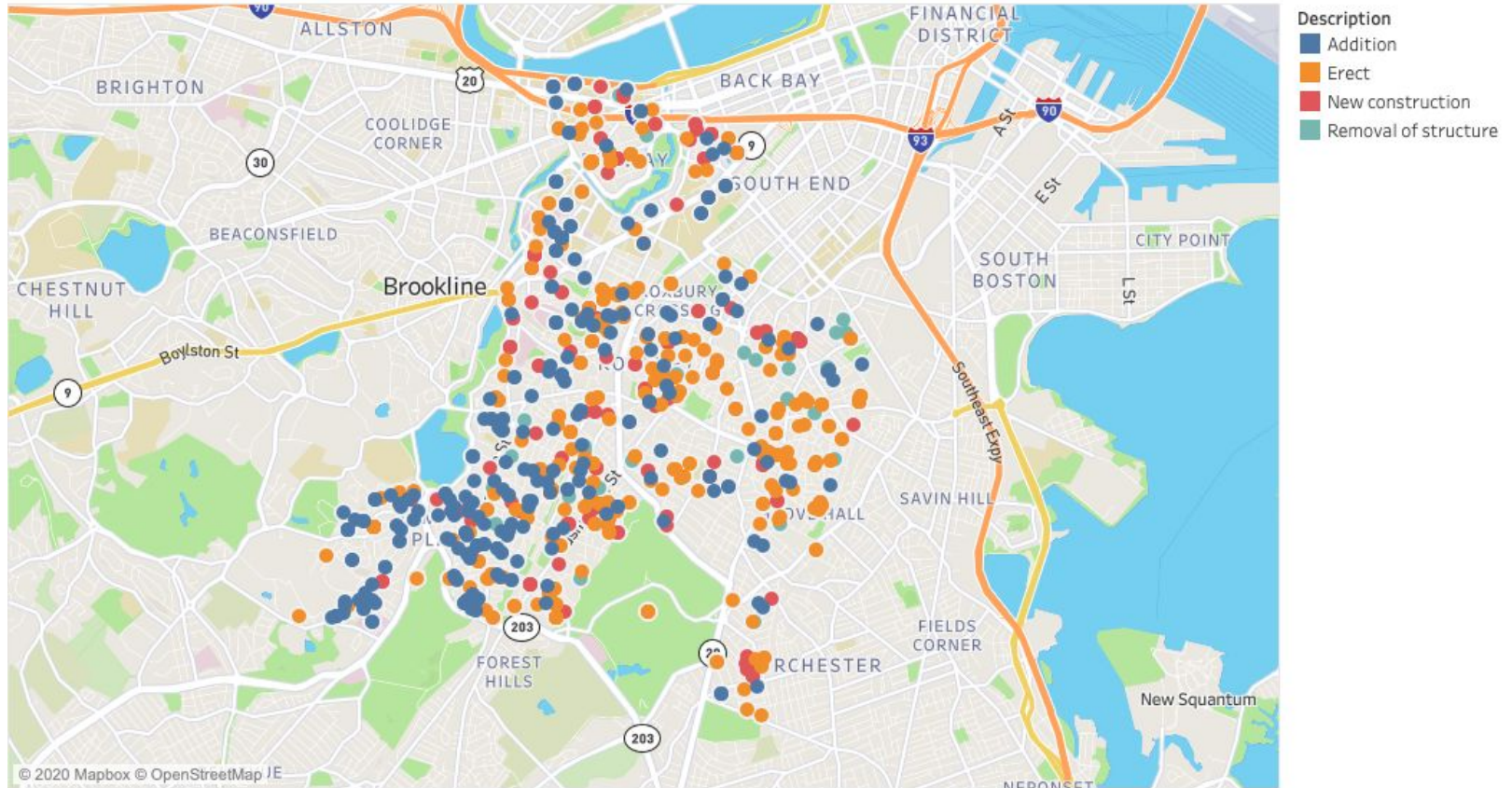
Once we are happy with our map after filtering for different data points, we can export our image.

From the 'Worksheet' drop-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



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.

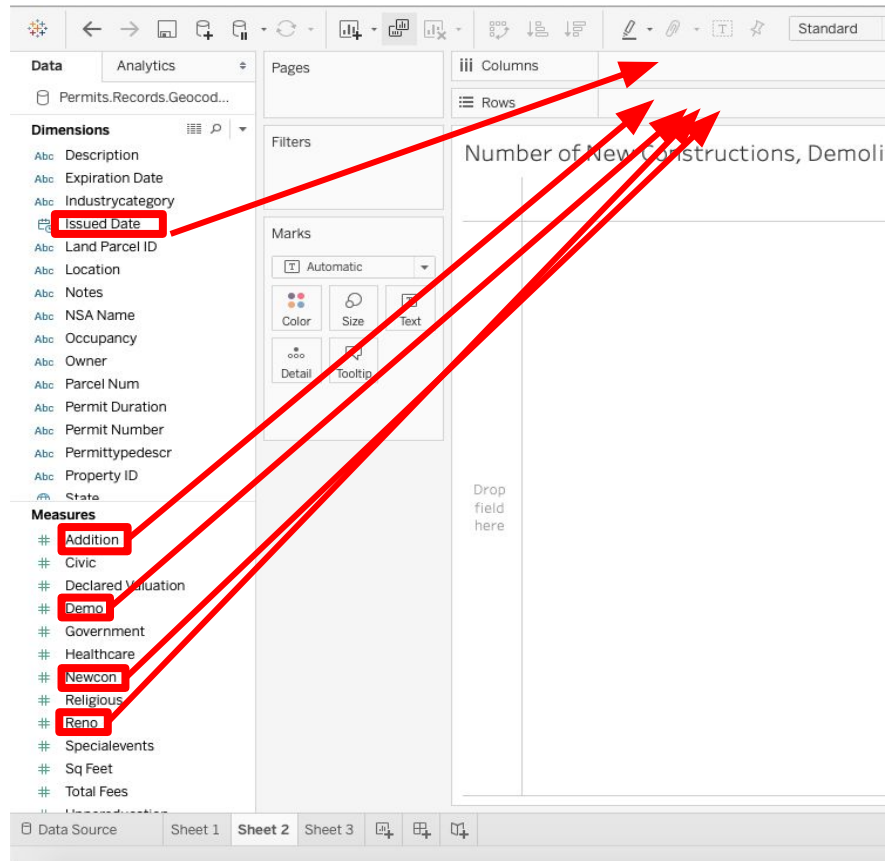
Graphs with Tableau: Drag & Drop

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.



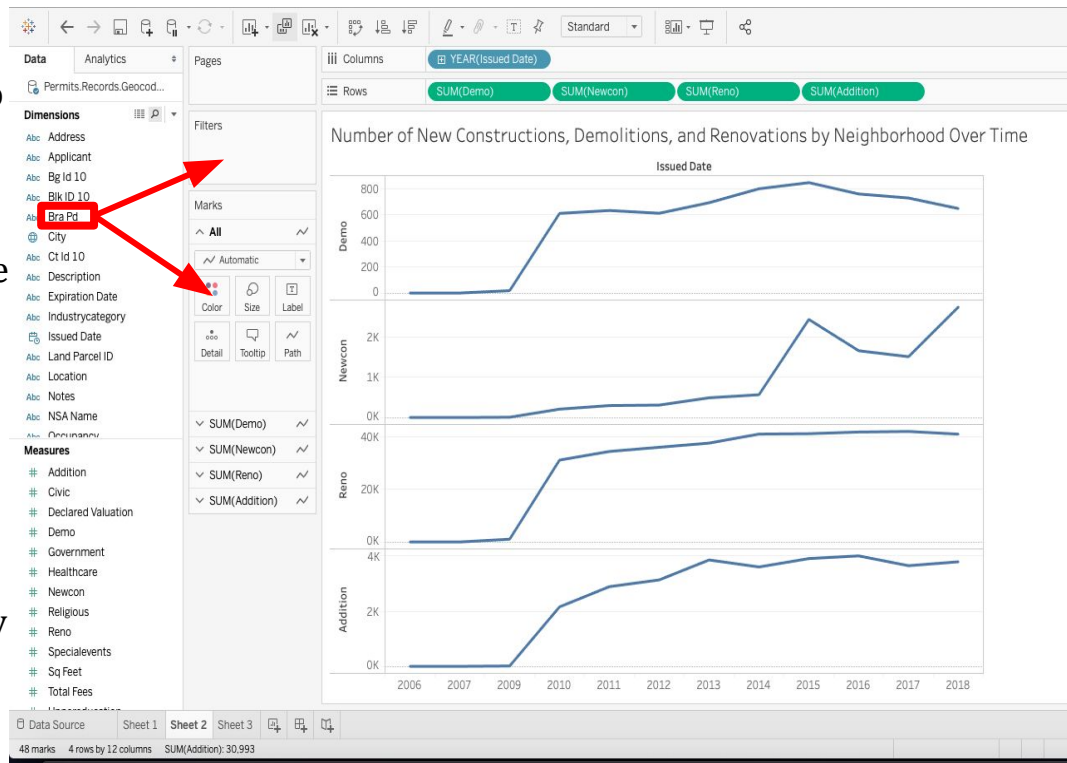
Graphs with Tableau: Drag & Drop

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

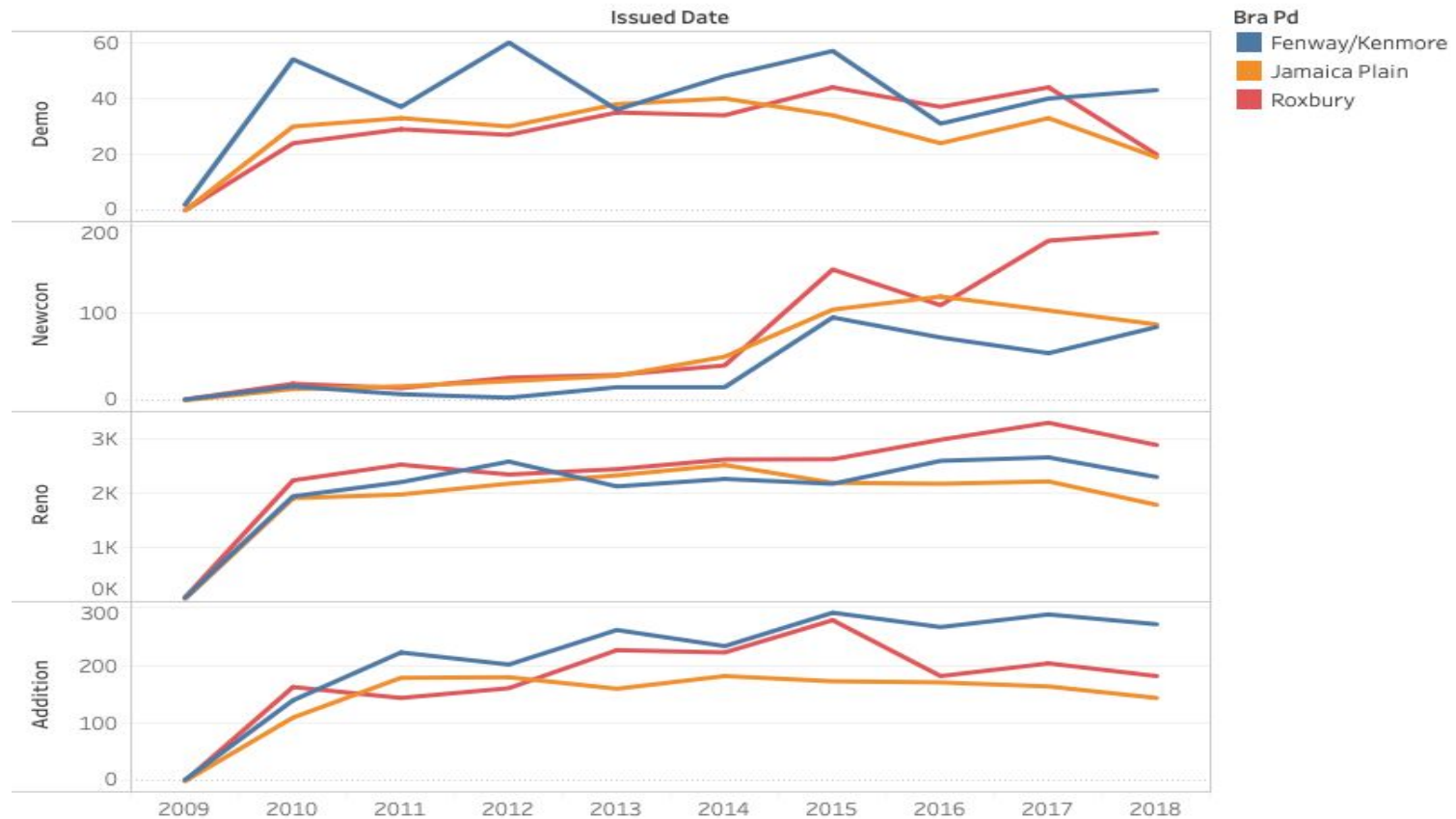
Next, we drag and drop our “Bra pd” measure onto both the filter box and the colors in the marks box to the left of our new graph. Filter your neighborhoods to include only Fenway/Kenmore, Jamaica Plain and Roxbury.

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



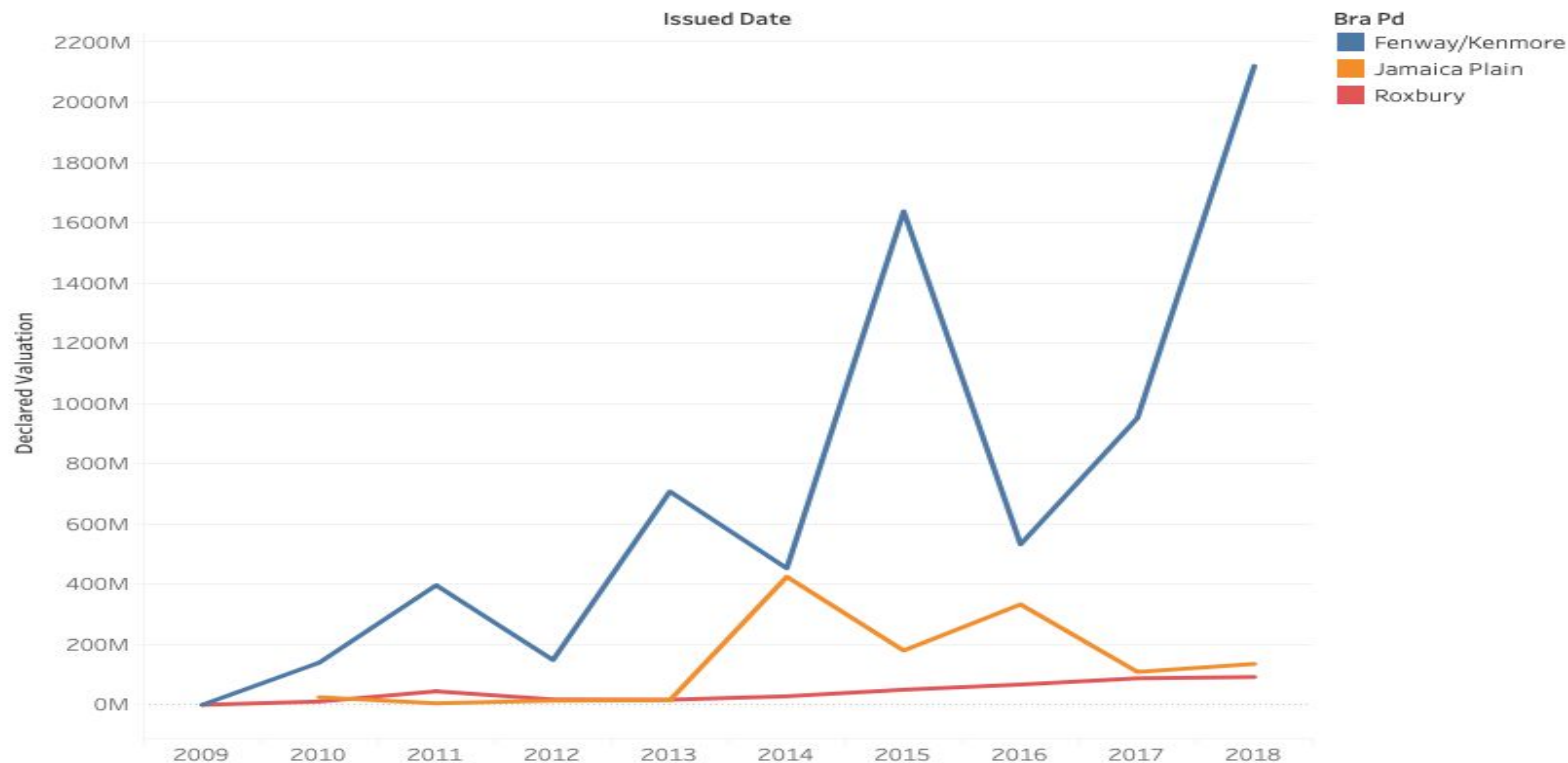
The trends of sum of Demo, sum of Newcon, sum of Reno and sum of Addition for Issued Date Year. Color shows details about Bra Pd. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

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?

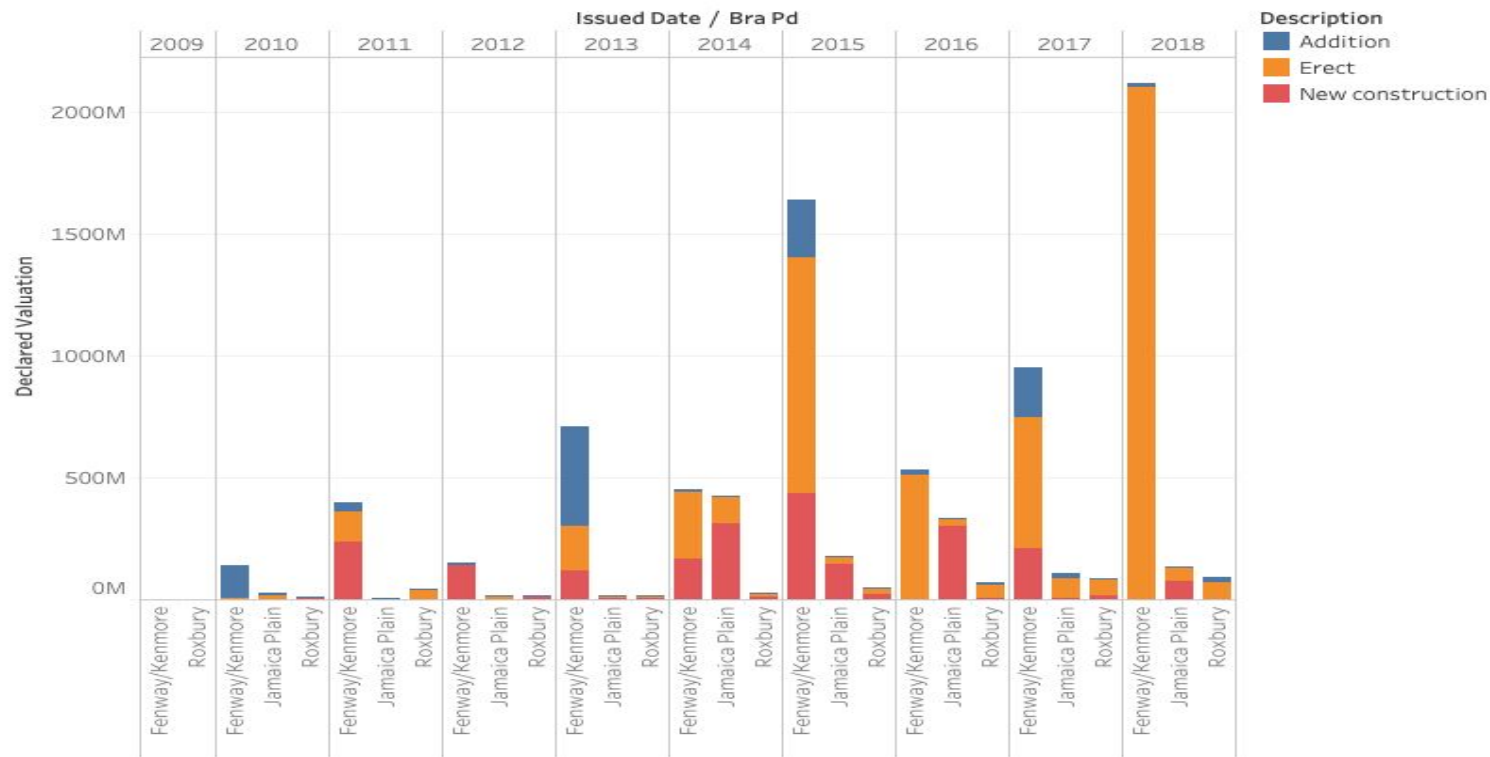
Declared Property Valuations by Neighborhood Over Time



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?

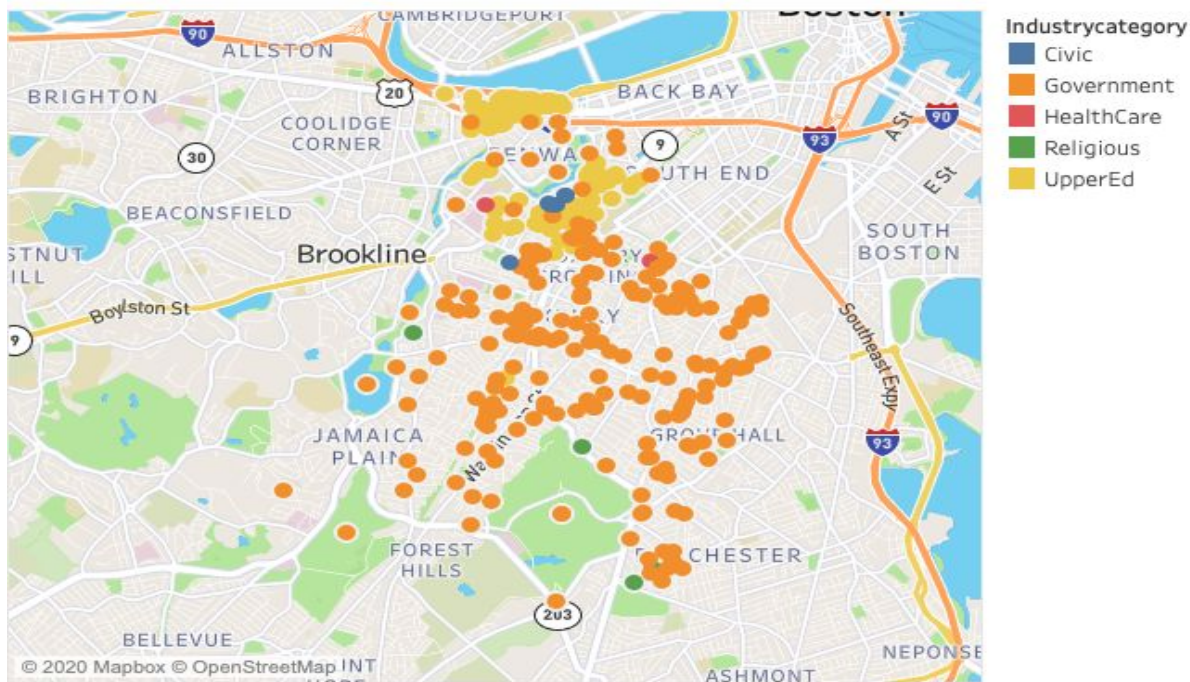
Declared Property Valuations by Neighborhood and Permit Type



Sum of Declared Valuation for each Bra Pd broken down by Issued Date Year. Color shows details about Description. 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.

What different types of industry are building in these neighborhoods?

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



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.

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.

Questions & Contact Information

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Find these slides, handouts, and more at

<http://bit.ly/diti-spring2020-rabrenovic-tabelau>

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



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