

Interdisciplinary Collaboration and Visualizations using Tableau

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POLS 4701 Senior Capstone
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Spring 2020



Workshop Agenda

This hands-on tutorial introduces Tableau for mapping and data visualization. Students will:

- Discuss best practices for collaboration
- 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-bormann>



Collaboration Discussion

- What are some of the issues and obstacles you have encountered during group work or collaboration?
- What would make collaboration and group work easier?
- Have you used any digital tools/software during group work and collaboration?
 - If so, which tools?
 - If not, why not?



Best Practices for Collaboration

Create a Work Plan: Before the work begins, create a collaborative work plan together

- **Determine Roles:** Determine roles and who will be doing what. Designate one person to act as “project manager” to make sure everyone is meeting deadlines
- **Deadlines:** Establish deadlines early on for when specific work needs to get done. Write these deadlines down and communicate clearly about expectations

Respect: Respect different perspectives and points of view. Give space for everyone to talk.

Accountability: Hold yourself and others accountable for meeting deadlines, attending any group meetings, etc. However, mistakes happen, so...

Be Flexible: Be flexible, compassionate, and understanding when this happens. Set up new deadlines or come up with a new work plan. Sometimes we dream bigger than what we can actually accomplish, and that is okay!

Providing Feedback: If you and your group decide to provide feedback, be constructive and positive.



Collaborative Tools

Collaboration is easier with modern tools and software. Why?

- Many digital tools facilitate communication between members of a group outside of traditional email and face-to-face channels.
- Tools can make collaboration visible. Visibility:
 - Makes people aware of tasks and priorities.
 - Helps make people accountable.
 - Opens new avenues of communication and idea creation.



Digital Tools for Collaboration - GitHub

GitHub - Primarily used by computer and data scientists for sharing code, but can be used for other collaborative projects.

Useful for version control and cloud sharing/publishing and storage.

DITI uses GitHub for storing and distributing modules.

415 commits

2 branches

0 packages

0 releases

9 contributors

Branch: master


New pull request

Create new file

Upload files


Find file

Clone or download



caramessina updating Somy's Kim


Latest commit 4120738 3 days ago



citation_management

updating office link


3 days ago



data_analysis/soc_research_methods...

Update README.md


2 months ago



data_ethics

Create handout.pdf


10 days ago



data_visualization

bormann module


3 days ago



digital_archives

Delete .DS_Store


5 months ago



digital_storytelling/writing_boston-s...

updating Somy's Kim


3 days ago



intro_excel

Merge branch 'master' of https://github.com/NULabNortheastern/digital...


28 days ago



intro_python

Delete Icon


6 months ago



intro_r/labor_economics_fall2019-m...

Added contact info and urls


5 months ago



intro_stata/applied_econometrics-sp...

Update README.md


8 months ago



intro_wordpress/coop-fall2018-doh...

Create README.md


8 months ago



mapping

Create Documentation.pdf


24 days ago



podcasting

Update README.md


2 months ago



text_analysis

updating office hours


7 days ago



twitter

Update README.md


8 months ago



web_scraping

Update readme.md

8 days ago



README.md

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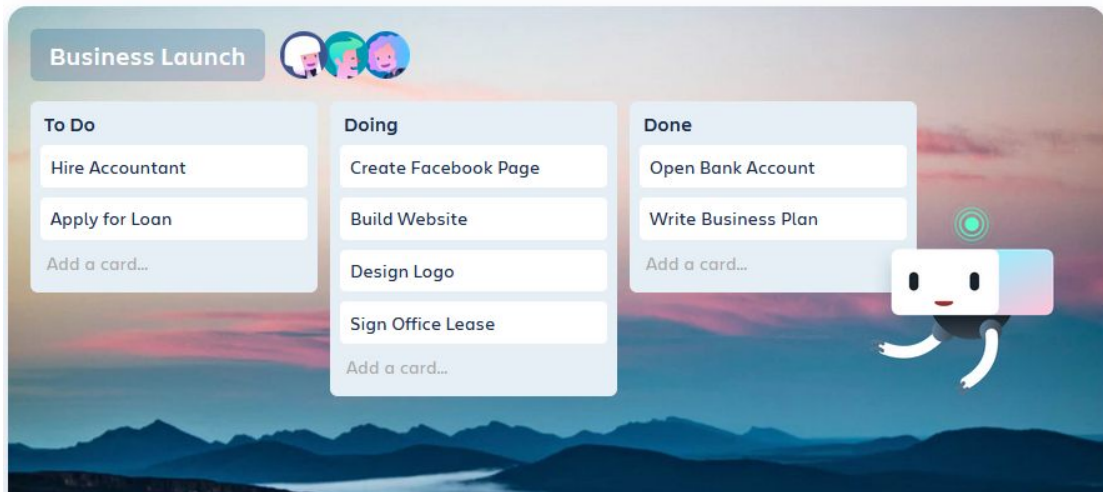


Digital Tools for Collaboration - Trello

Trello - Used by many different groups and companies to **track goals and assign tasks**.

Useful for communication, accountability, task-tracking.

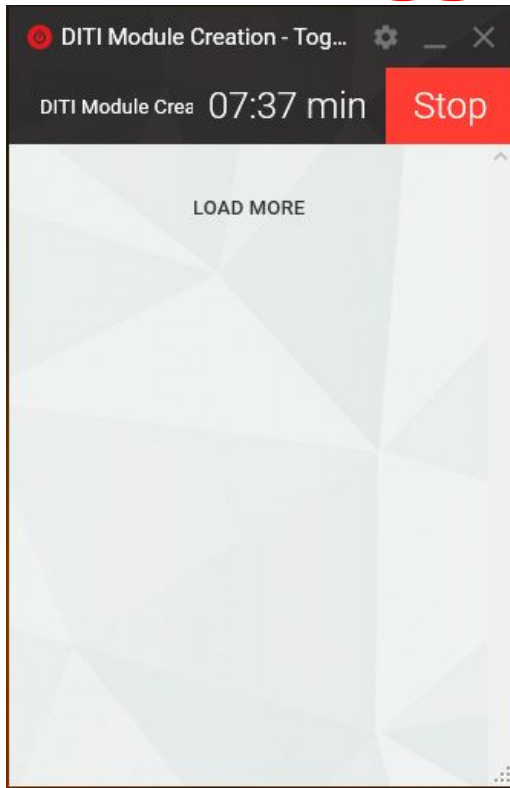
Available in browser, desktop, and mobile app forms.



Digital Tools for Collaboration - Toggl

Toggl - A simple time tracking application that is useful for cataloguing **time spent on specific tasks**.

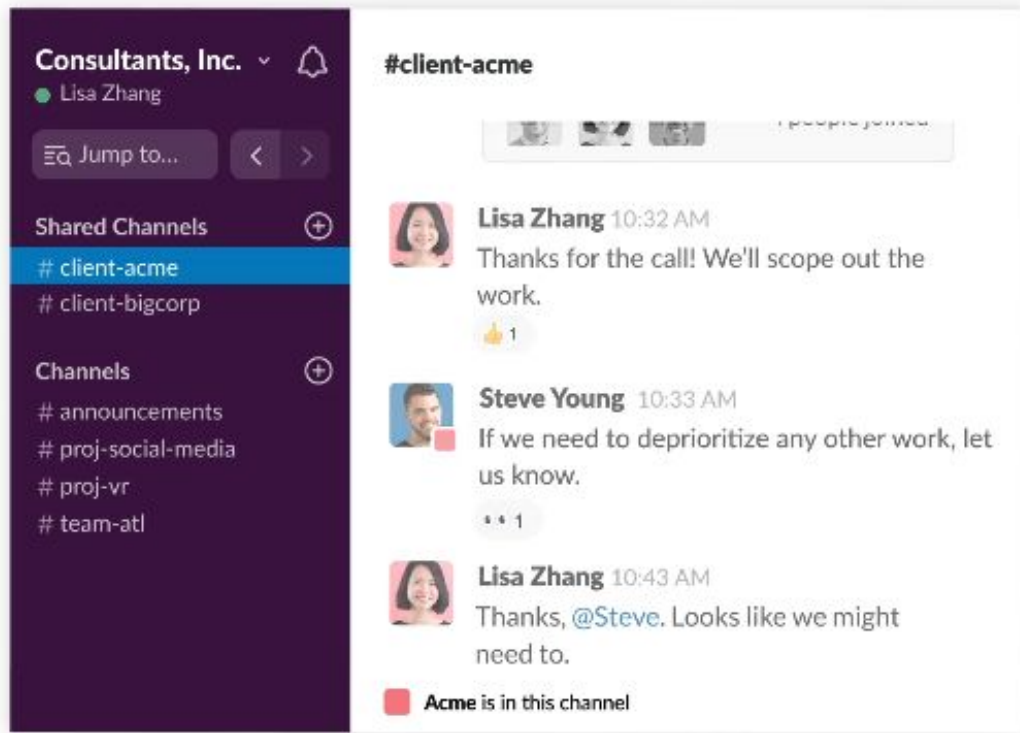
This can be useful for task equity and spreading the work across collaborators.



Digital Tools for Collaboration - Slack

Slack - A communication platform that allows for sub-channels and document sharing. Integrates nicely with Google Suite.

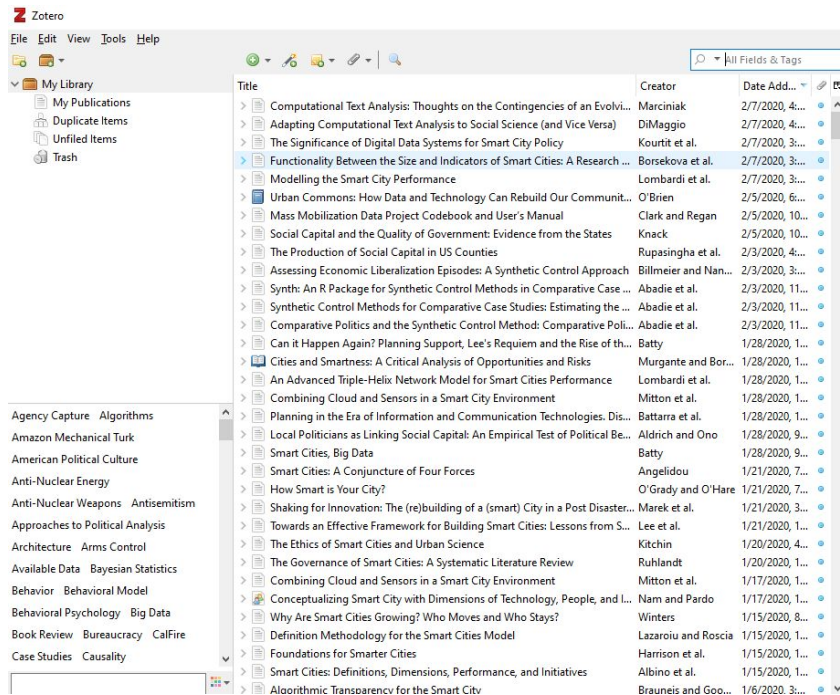
DITI uses Slack for communication, coordination, and collaboration on projects and modules.



Digital Tools for Collaboration - Citation Management

Zotero, RefWorks, EndNote,
Mendeley - Citation

management software can be used for sharing sources and data through the use of **shared folders/groups/libraries**.



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Feel free to ask questions at any point during the presentation!

Digital Tools for Collaboration - Google

What are some of the best ways to use Google suite apps for collaboration?

- Create a workflow document using Google Docs to create and document steps that needs to be taken in a task
- Create a spreadsheet of tasks using Google Sheets to track goals and accountability.
- Create documentation for any data uploaded and files created. Version control and naming conventions are key!



Tableau Basics

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



Where did the data come from?



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 bari@northeastern.edu.

Massachusetts Census Indicators Dataservice (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 in the decennial census.

Geographical Infrastructure v. 2010 Dataservice (Harvard University, Northeastern Univ)



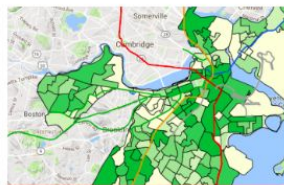
Feb 5, 2016 Geographical Infrastructure for the City of Boston Dataservice
Geographical Infrastructure for the city of Boston, as of 2010.

City of Boston Administrative Data Dataservice (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 Dataservice 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)



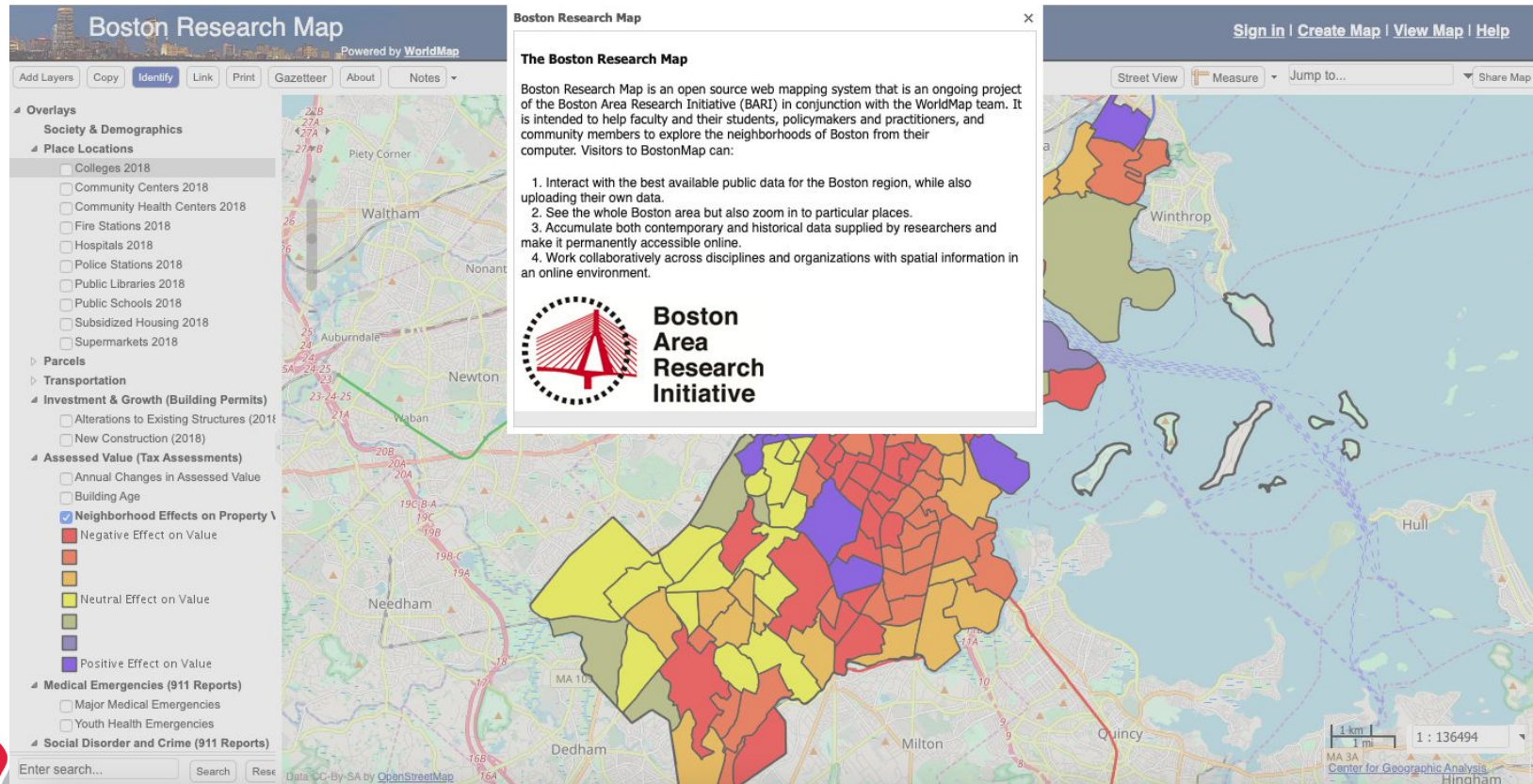
Boston Data Portal Training and the Data Consultant: View tutorials, attend a community training, or get in touch with the Data Consultant



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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 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. 2018", <https://doi.org/10.7910/DVN/N4BL71> [fileUNF]

The Boston Area Research Initiative's Geographical Infrastructure 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

Download



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

Explore

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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:vKb9ZfYfJlueY3pJgLGfA==
Building permits by land parcels for all years

Geospatial Data

Explore

Download



Permits.Records.Geocoded.2018.csv

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

Data

Download



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Feel free to ask questions at any point during the presentation!

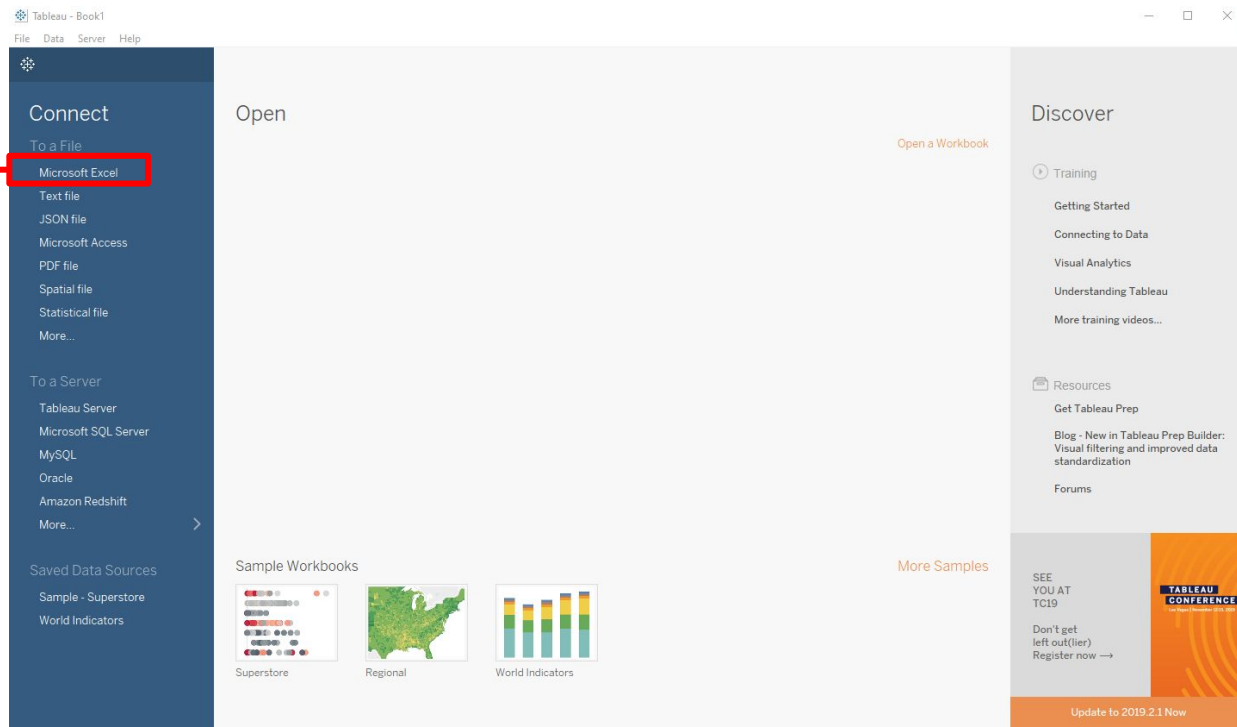
Using Tableau

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 a field with a dropdown menu open. The dropdown menu shows 'Number (decimal)' selected, and 'Geographic Role' is highlighted. The 'Geographic Role' dropdown is also open, showing 'Longitude' selected. The 'Rows' shelf contains 'and Parcel ID', 'Tlid', 'Blk ID 10', and 'Bg'. The 'Marks' shelf is empty. The 'Data Source' pane on the left shows the 'Permits.Records.Geocoded.2018' text file. The 'Connections' pane shows 'Permits.Records.Geocoded.2018' and 'Permits.Reco...ded.2018.csv'. The 'Files' pane shows 'ACS_0913_TRACT.csv' and 'Permits.Reco...ded.2018.csv'. The 'Data Source' pane shows 'Permits.Records.Geocoded.2018' and 'Permits.Reco...ded.2018.csv'. The 'Columns' shelf contains 'State', 'ZIP', 'Location', 'Property ID', 'Parcel Num', and a field with a dropdown menu open. The dropdown menu shows 'Number (decimal)' selected, and 'Geographic Role' is highlighted. The 'Geographic Role' dropdown is also open, showing 'Longitude' selected. The 'Rows' shelf contains 'and Parcel ID', 'Tlid', 'Blk ID 10', and 'Bg'. The 'Marks' shelf is empty. The 'Data Source' pane on the left shows the 'Permits.Records.Geocoded.2018' text file. The 'Connections' pane shows 'Permits.Records.Geocoded.2018' and 'Permits.Reco...ded.2018.csv'. The 'Files' pane shows 'ACS_0913_TRACT.csv' and 'Permits.Reco...ded.2018.csv'. The 'Data Source' pane shows 'Permits.Records.Geocoded.2018' and 'Permits.Reco...ded.2018.csv'.

State	ZIP	Location	Property ID	Parcel Num	and Parcel ID	Tlid	Blk ID 10	Bg
MA	02116	null	NA	NA		85711759	NA	Nu
MA	02210	null	NA	NA		85711759	NA	Nu
MA	02128	null	NA	NA		85711759	NA	Nu
MA	02118	null	NA	801720000				25
MA	02118	null	NA	801720000				25
MA	02126	null	NA	1804116000				25
MA	02129	null	NA	203517600				25
MA	02124	null	NA	1701902000				25
MA	02124	null	NA	1701902000				25
MA	02135	null	NA	2205126010				25
MA	02135	null	NA	2205126010				25

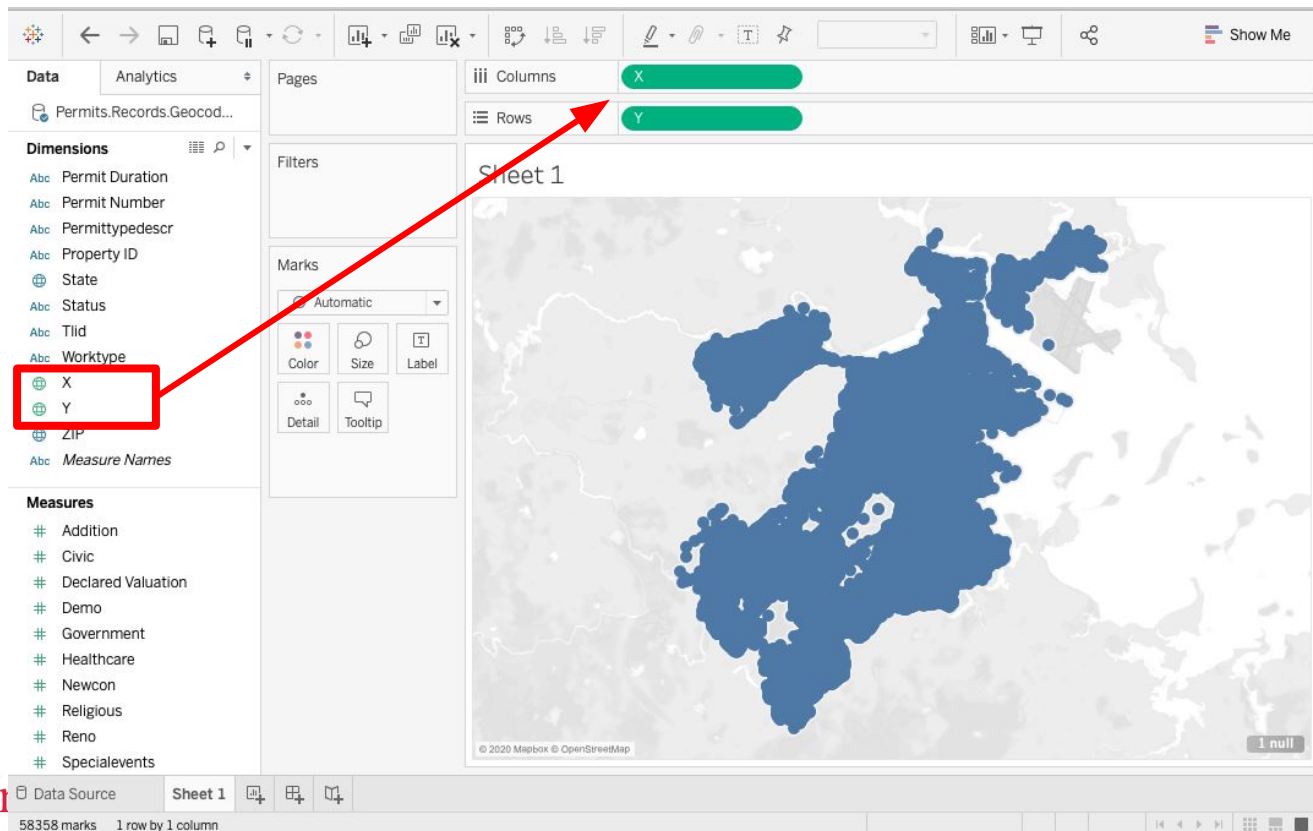


Using Tableau

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.

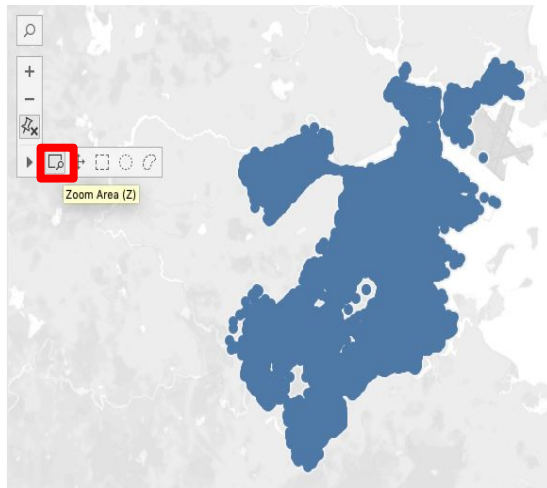


Using Tableau

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.

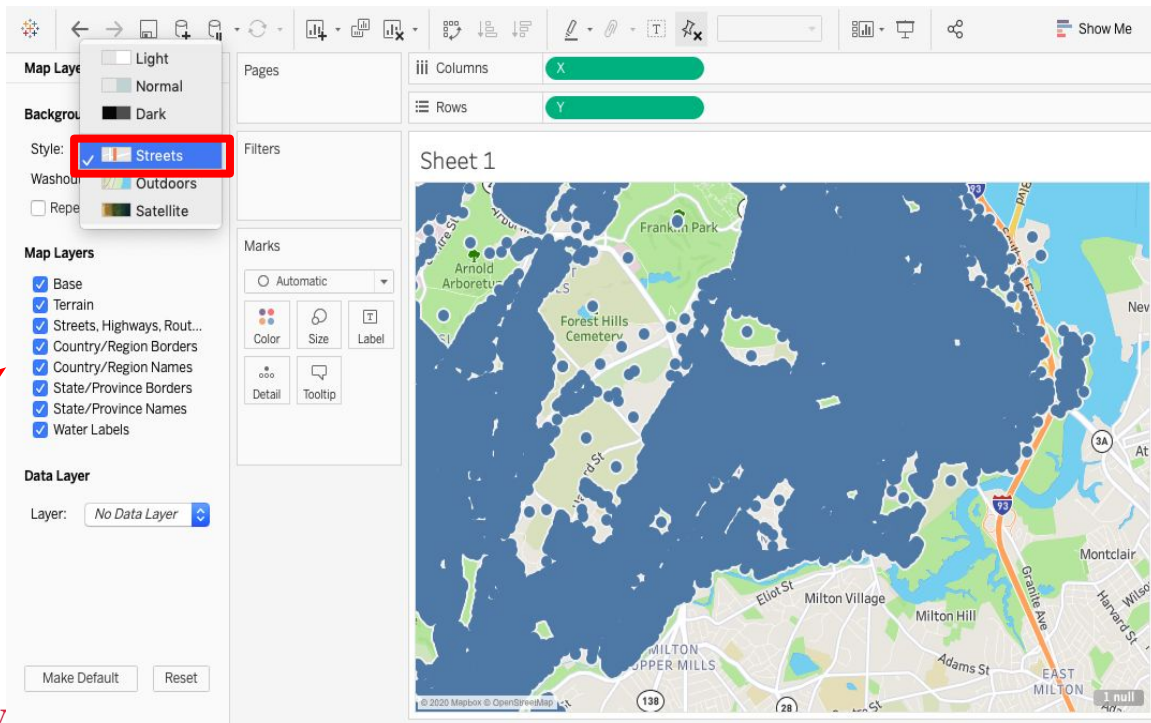
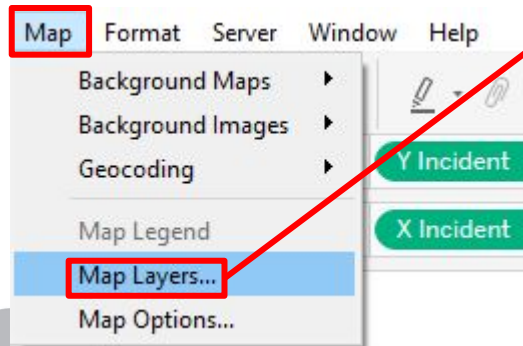


Using Tableau

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



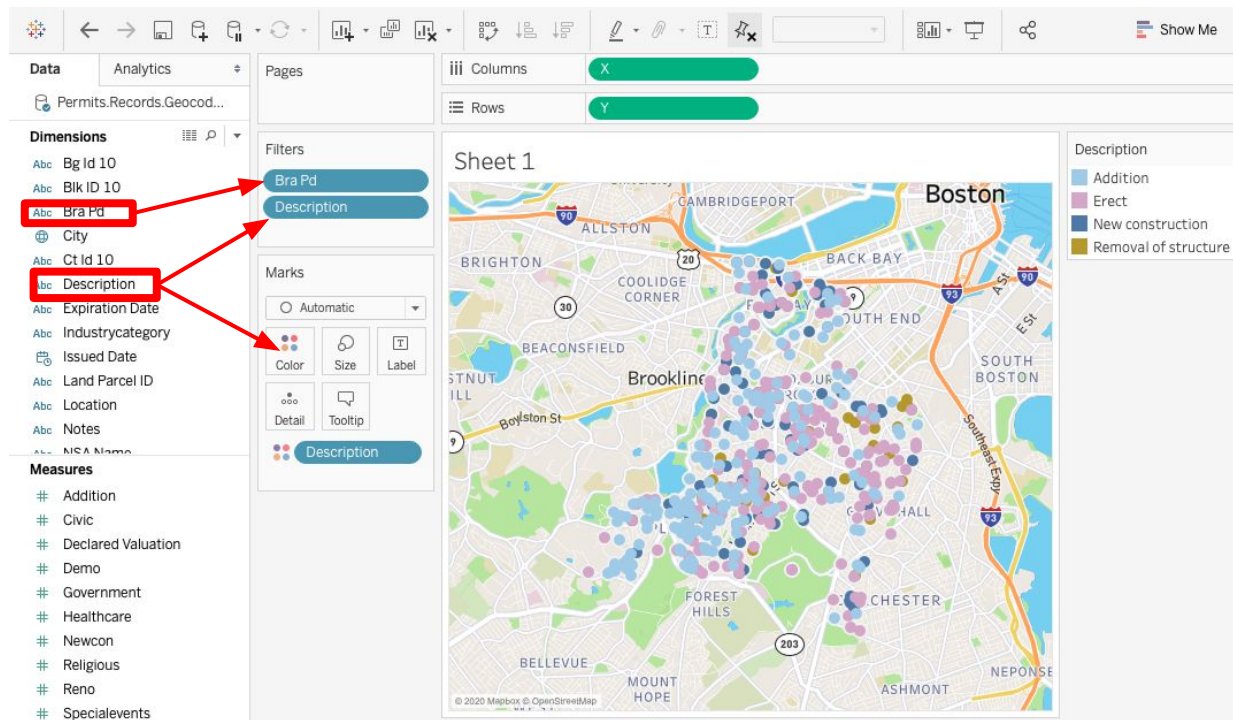
Using Tableau

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.

Filter [Bra Pd]

General Wildcard Condition Top

☒ Select from list ☐ Custom value list ☐ Use all

Enter search text

- ☐ Charlestown
- ☐ East Boston
- ☒ Fenway/Kenmore
- ☐ Hyde Park
- ☒ Jamaica Plain
- ☐ Mattapan
- ☐ NA
- ☐ North Dorchester
- ☐ Roslindale
- ☒ Roxbury
- ☐ South Boston

All None ☐ Exclude

Summary

Field: [Bra Pd]
Selection: Selected 3 of 17 values
Wildcard: All
Condition: None
Limit: None

Reset Apply Cancel OK

Filter [Description]

General Wildcard Condition Top

☒ Select from list ☐ Custom value list ☐ Use all

Enter search text

- ☐ Null
- ☒ Addition
- ☐ Annual Maintenance
- ☐ Application to Correct a Vi
- ☐ Awning
- ☐ Awning Renewal
- ☐ Canopy
- ☐ Canopy Renewal
- ☐ Capital Improvement
- ☐ Cellular Tower
- ☐ Change Occupancy

All None ☐ Exclude

Summary

Field: [Description]
Selection: Selected 4 of 69 values
Wildcard: All
Condition: None
Limit: None

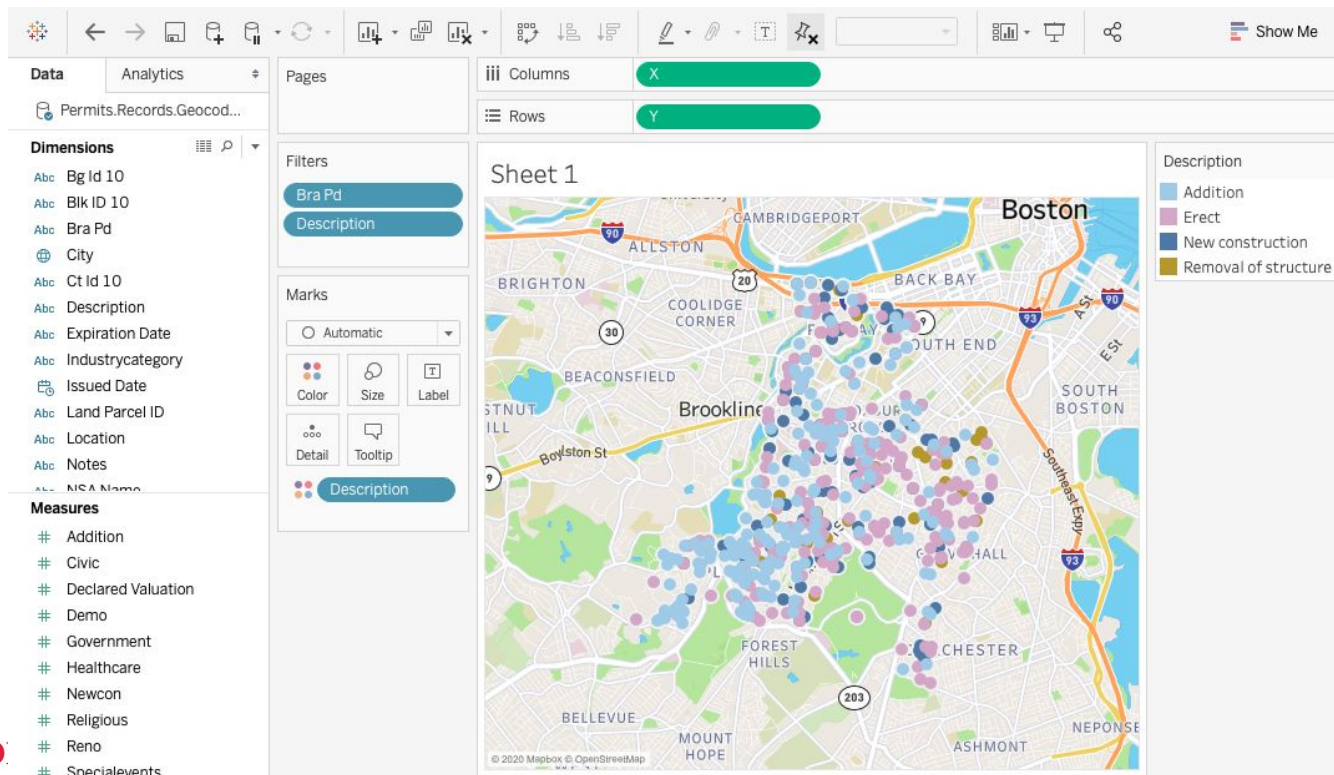
Reset Apply Cancel OK

Feel free to ask questions at any point during the presentation!



Using Tableau

Step Seven: Create Filters Results



No

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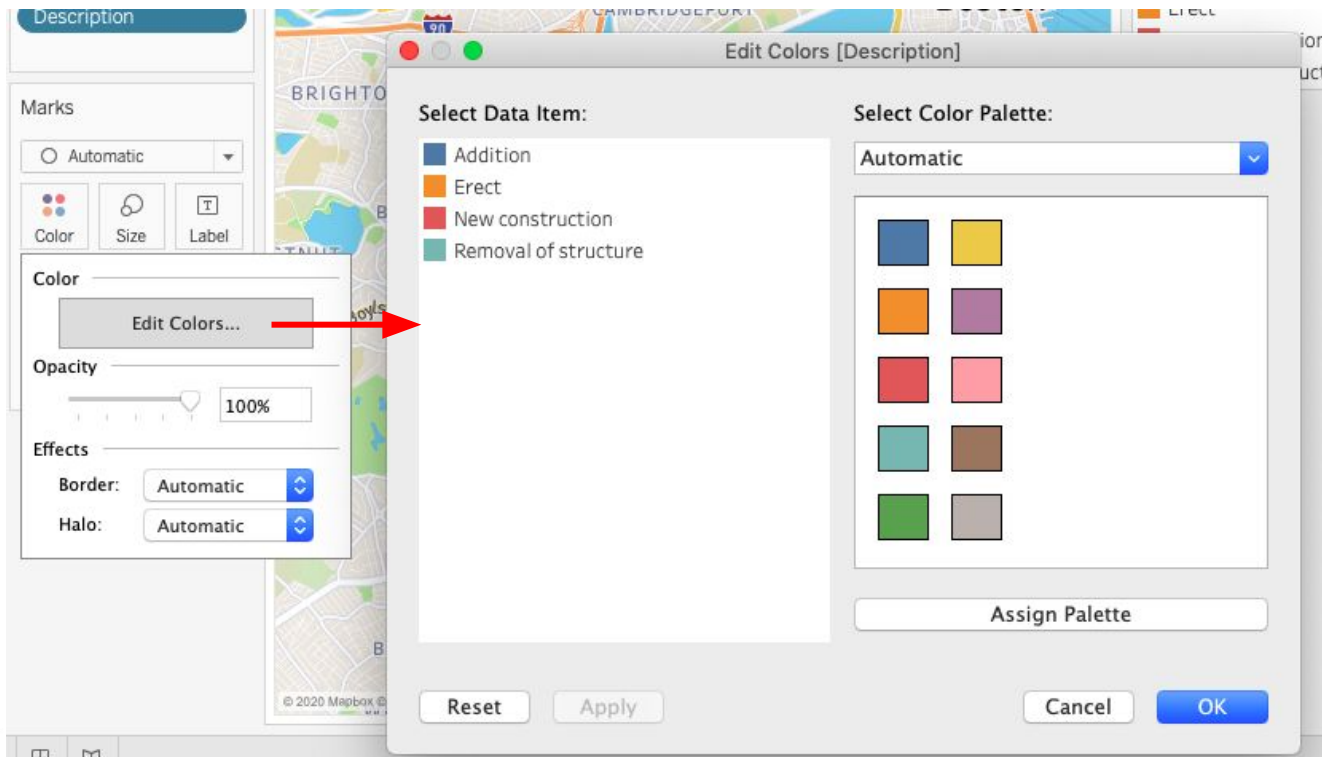
Using Tableau

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.

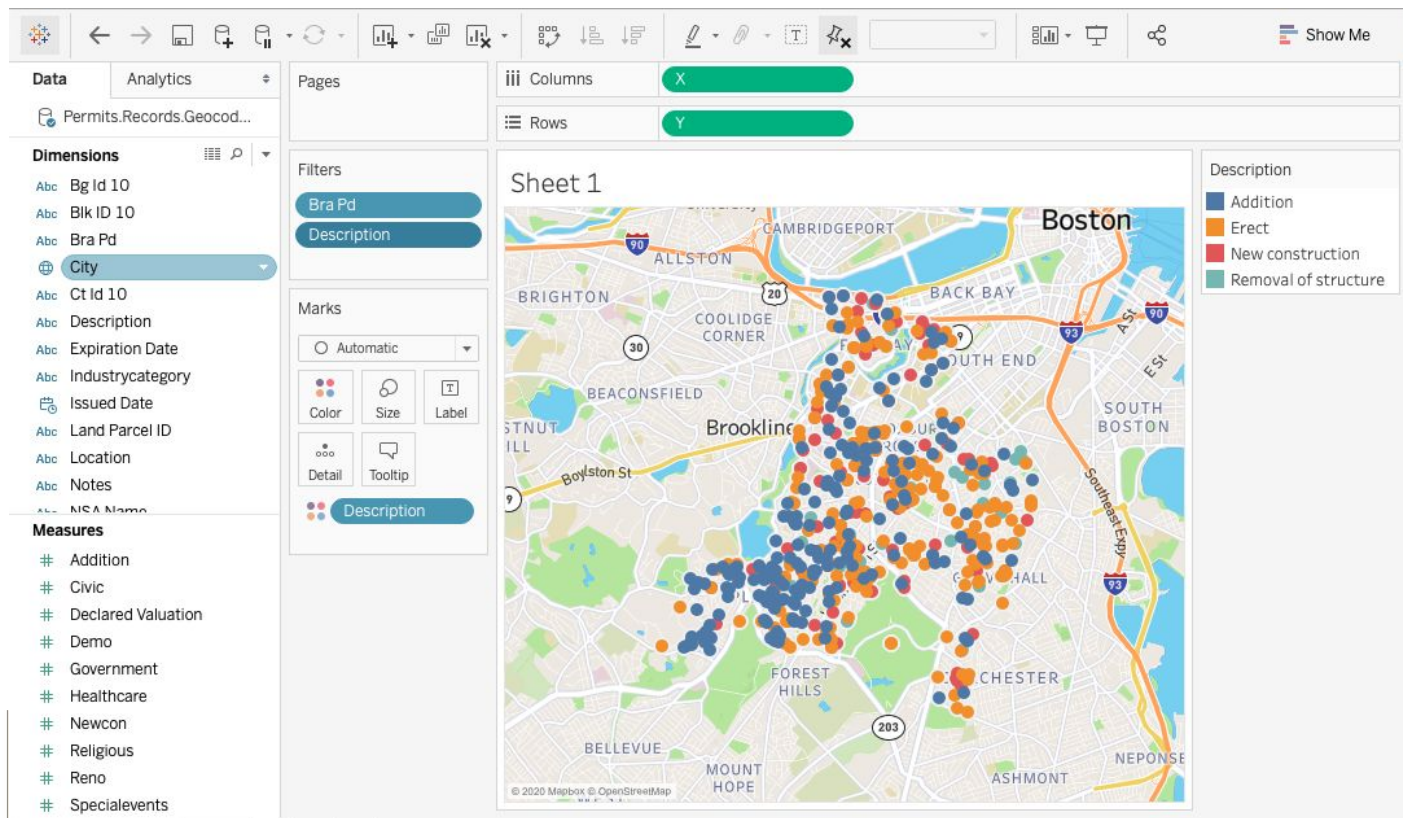
On the Bra Pd (neighborhoods) sidebar, click the drop down arrow, then click on 'edit colors...'

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



Using Tableau

Step Eight: Modify Colors Results



Questions at any point presentation!

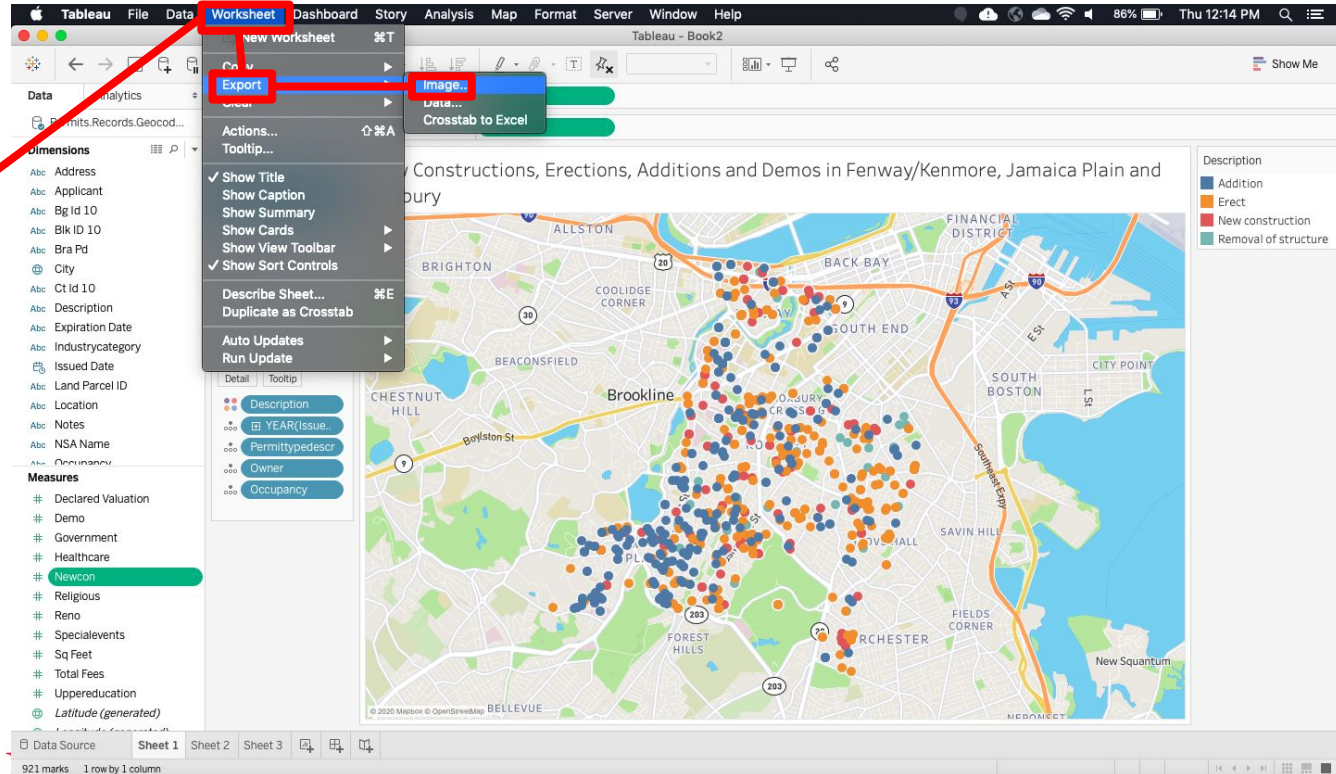
Using Tableau

Step Nine: Exporting Images

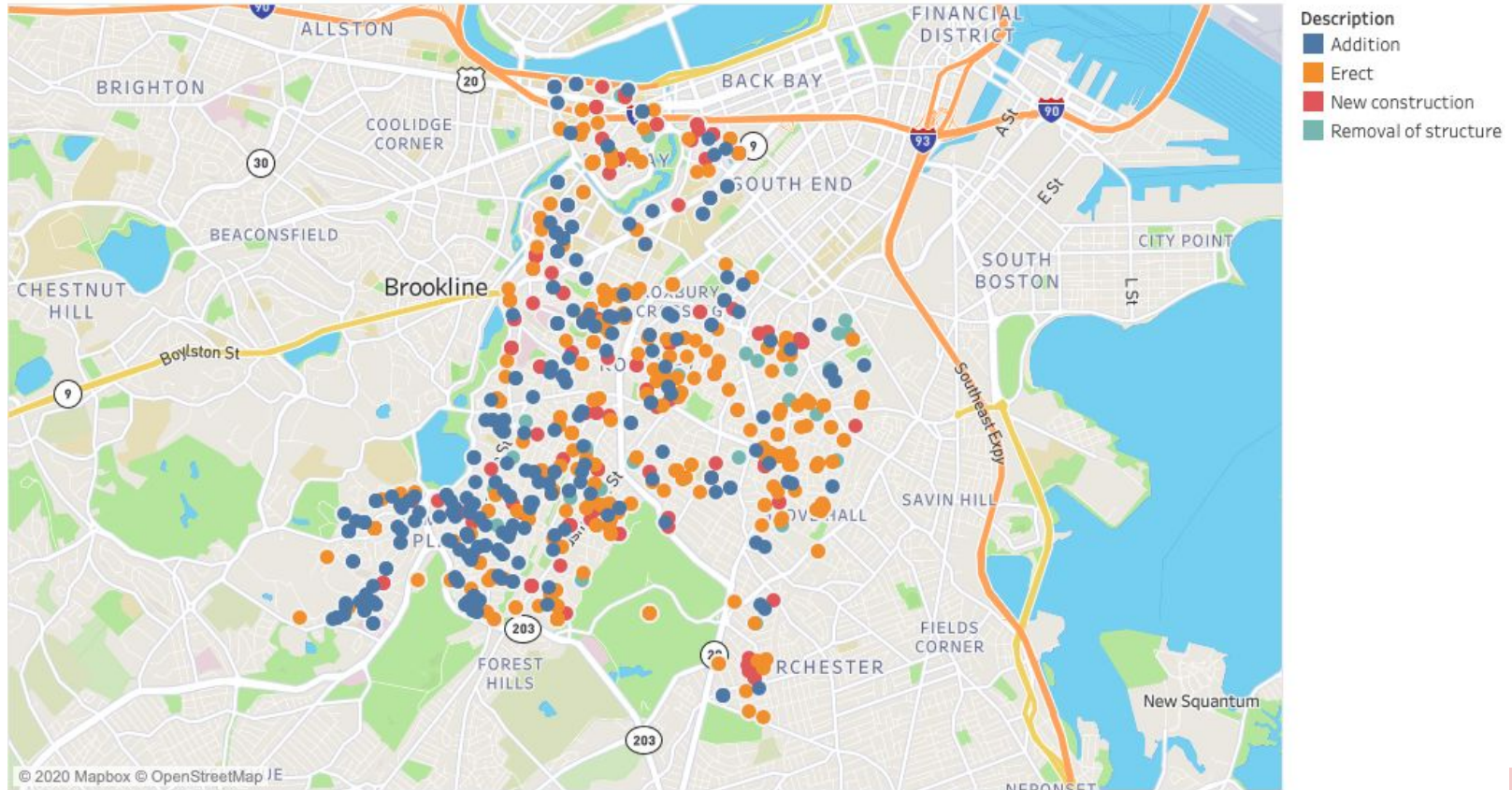
Once we are happy with our map after filtering for different data points, we can export our image.

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.

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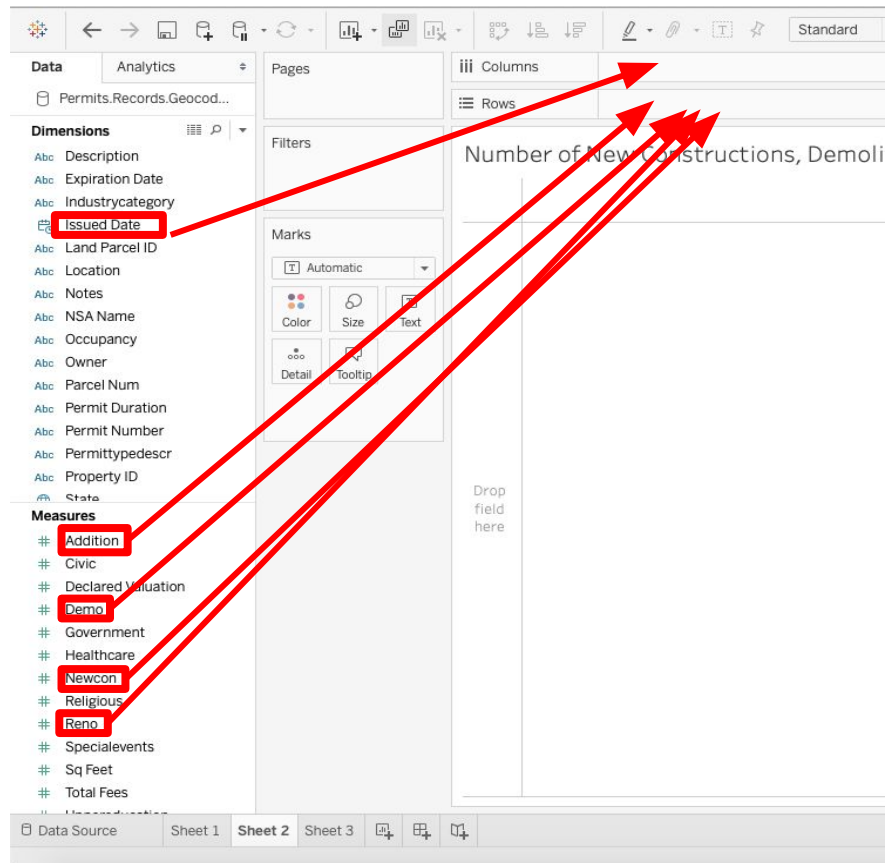
Graphs with Tableau: Drag & Drop

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.



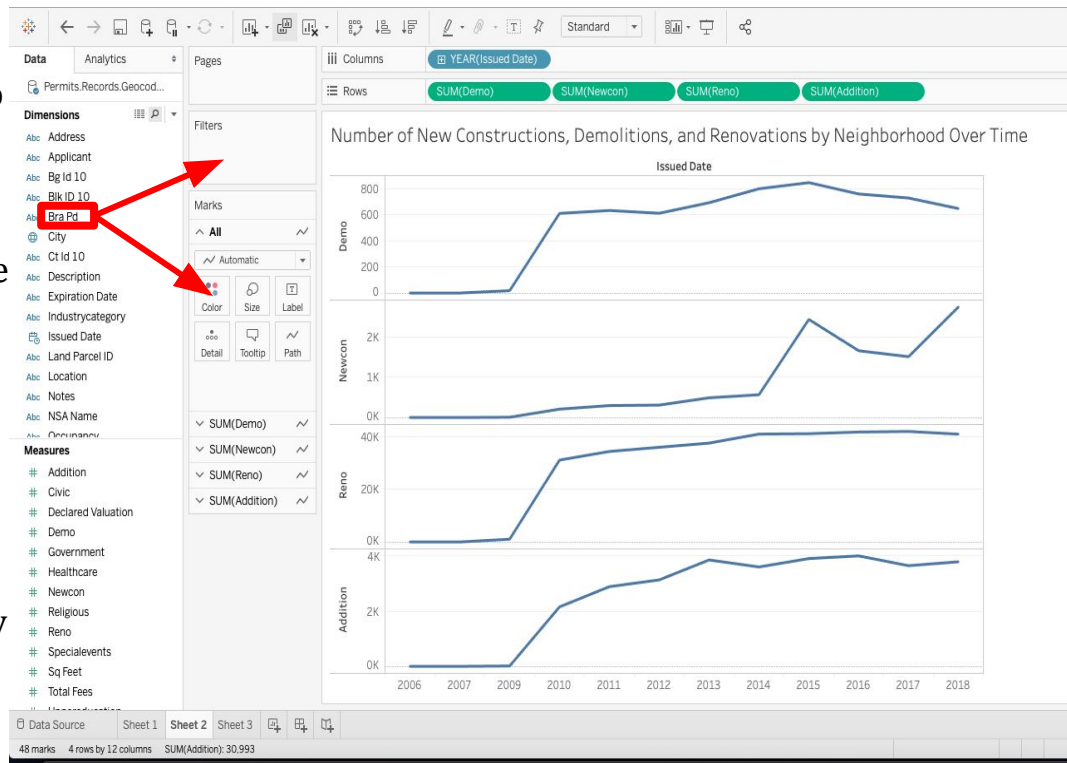
Graphs with Tableau: Drag & Drop

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

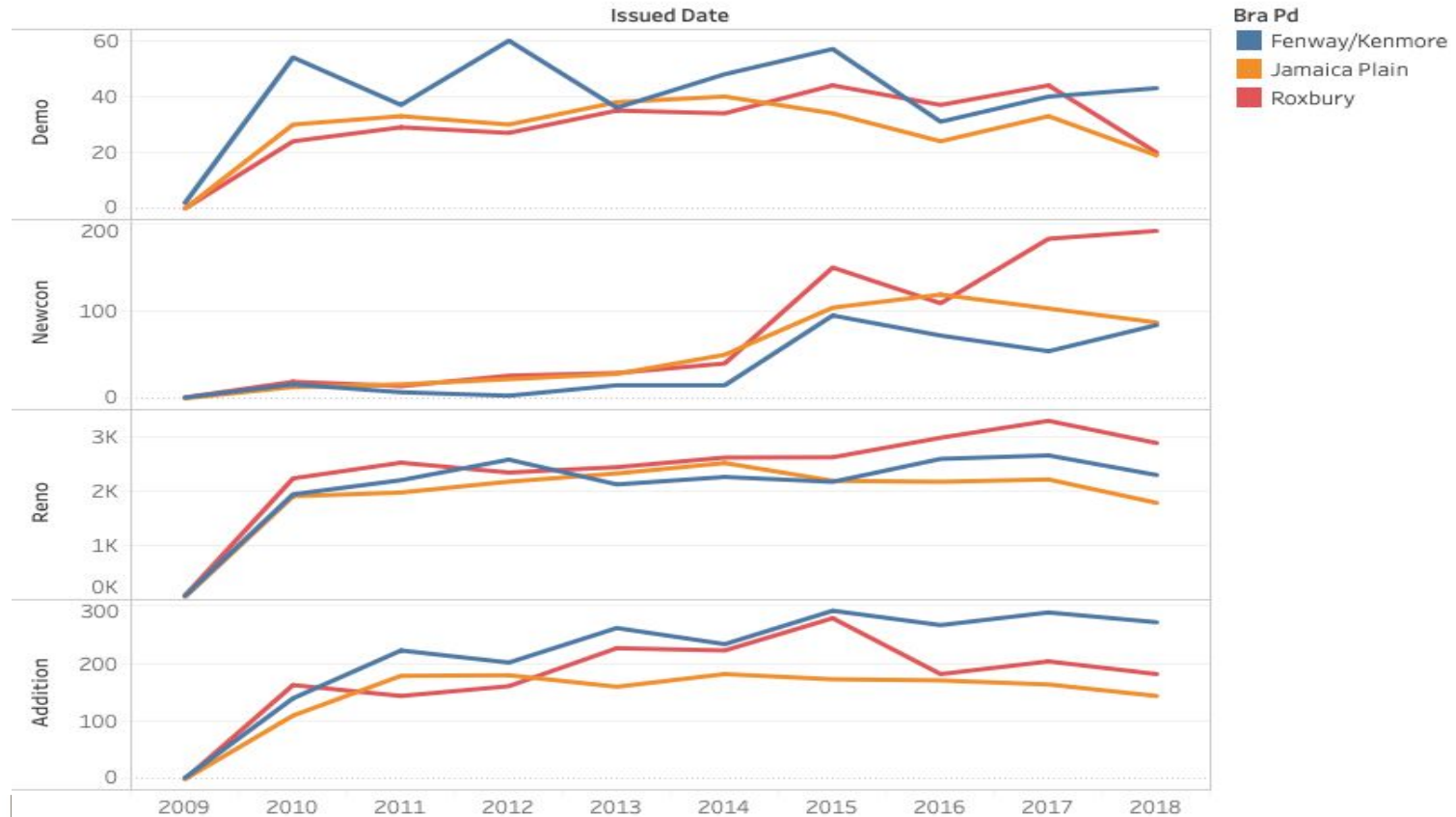
Next, we drag and drop our “Bra pd” measure onto both the filter box and the colors in the marks box to the left of our new graph. Filter your neighborhoods to include only Fenway/Kenmore, Jamaica Plain and Roxbury.

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

We can then export the same way.



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.

any point during the presentation!

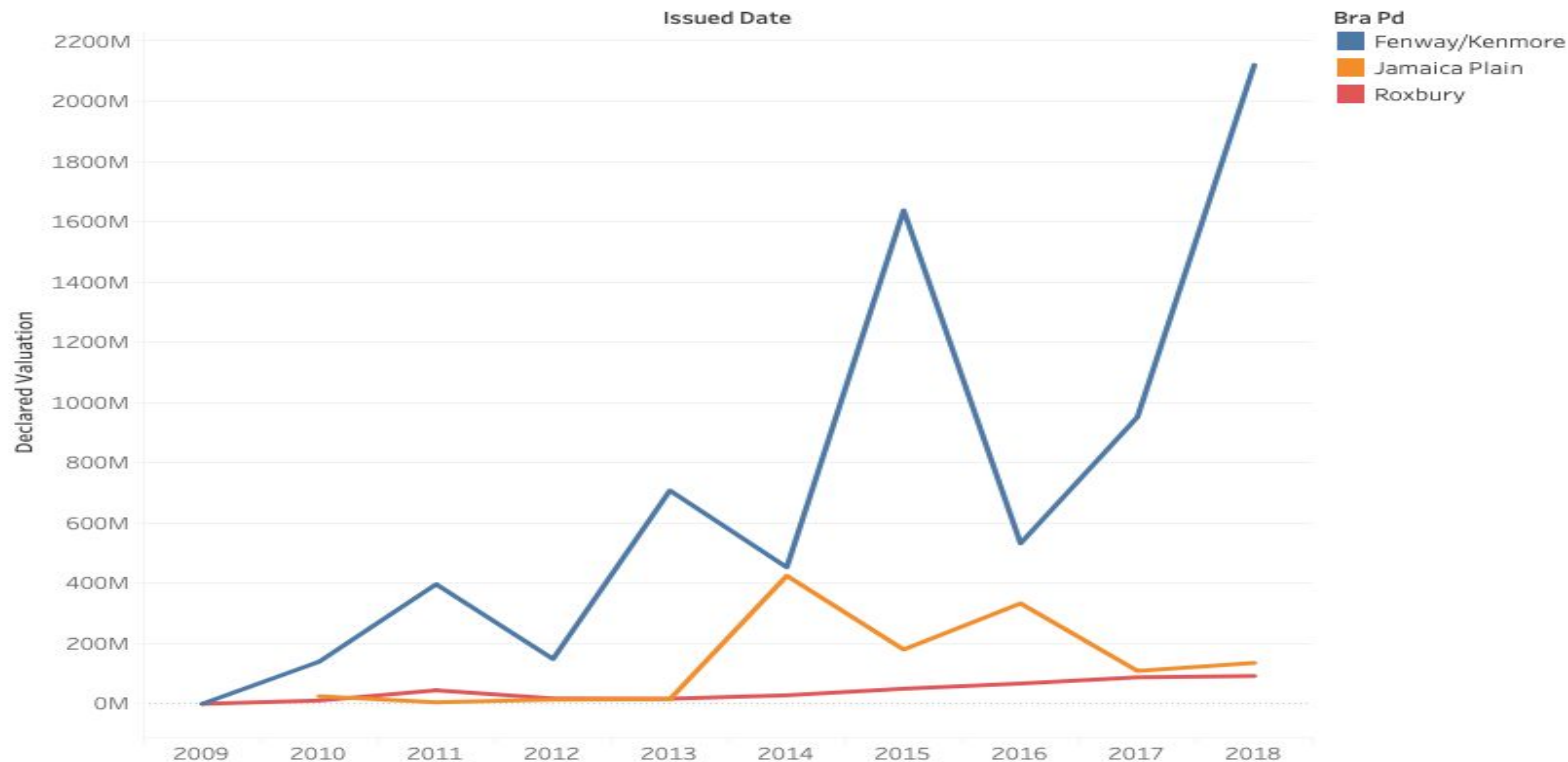
Example Research Questions

- 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

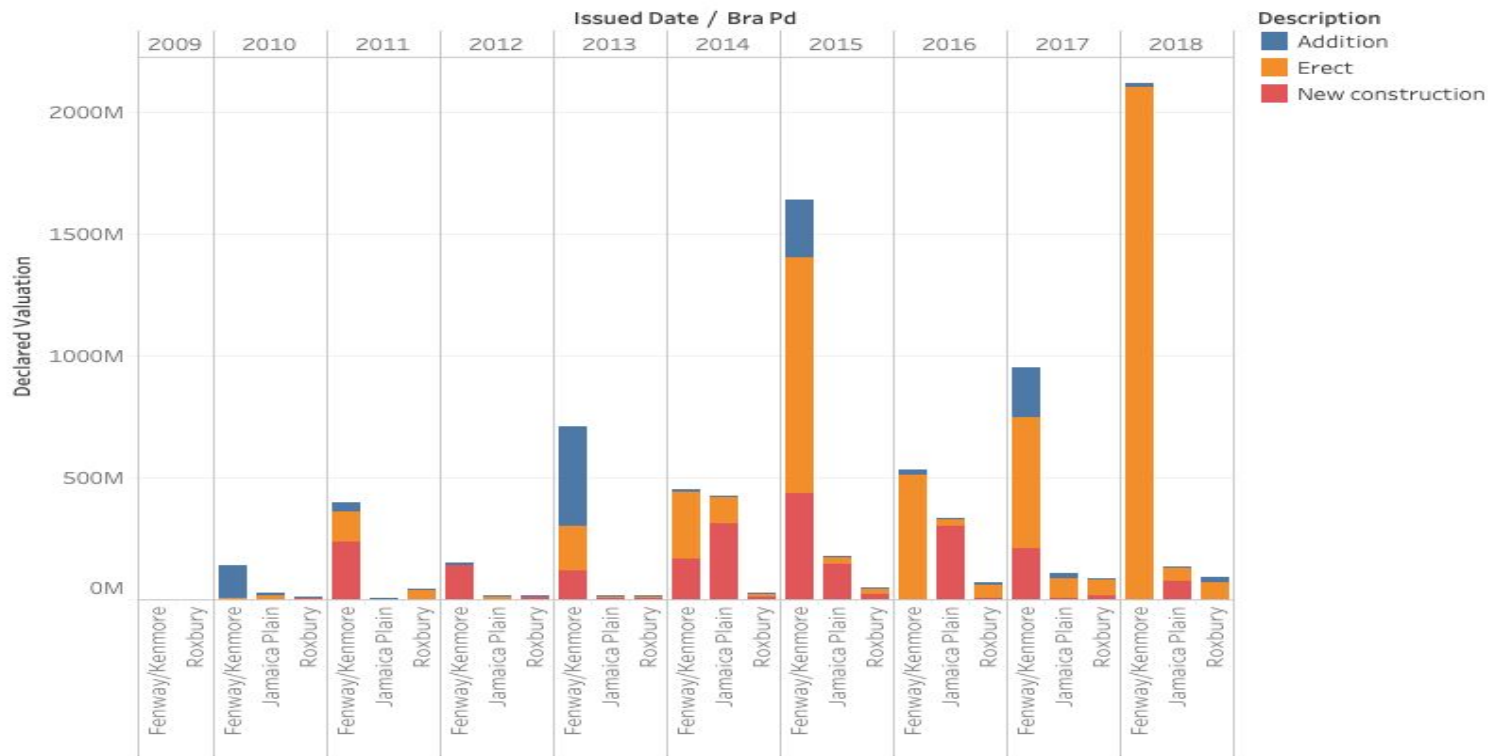


The trend of sum of Declared Valuation for Issued Date Year. Color shows details about Bra Pd. The data is filtered on Worktype, which keeps ADDITION, ERECT and NEWCON. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

by point
!

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

Declared Property Valuations by Neighborhood and Permit Type

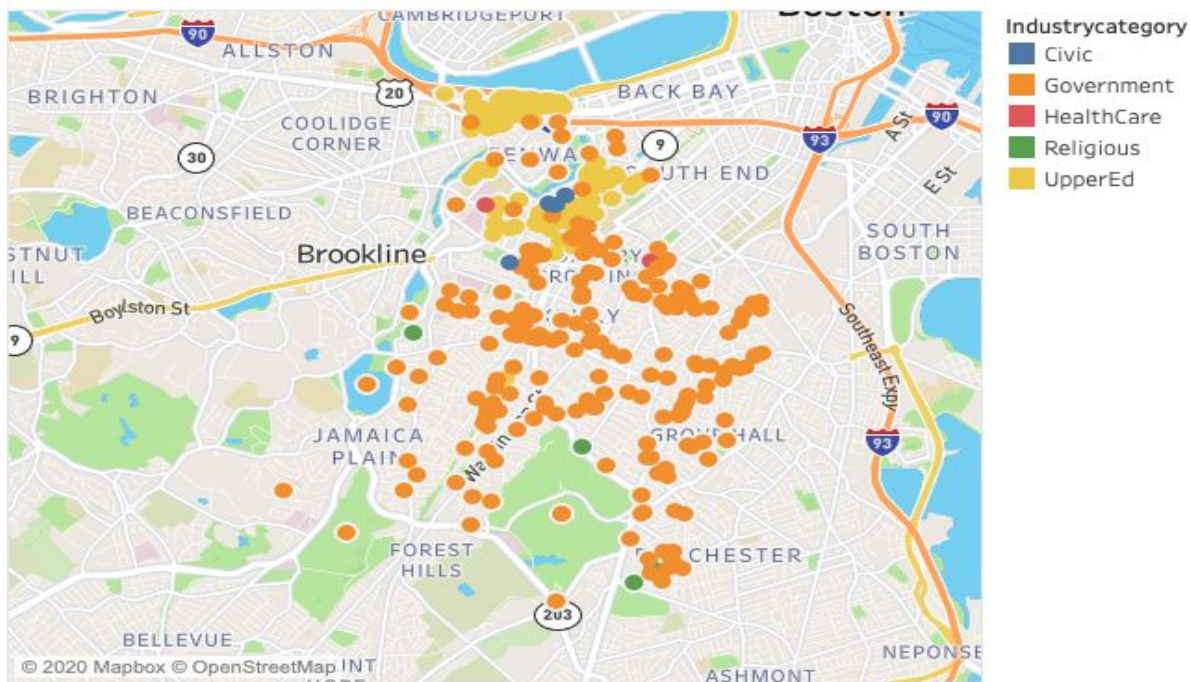


Sum of Declared Valuation for each Bra Pd broken down by Issued Date Year. Color shows details about Description. The data is filtered on Worktype, which keeps ADDITION, ERECT and NEWCON. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

any point
on!

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.

Questions at any point presentation!

Your Turn!

Using the construction permit dataset:

- Think of a research question or use one of the examples.
- Create the visualization in Tableau.
- Experiment with different filters and basemaps.



Collaboration with Tableau

Tableau does have a “Tableau Server/Online” service, but our academic licenses do not have access. What can we do instead? Options:

- Compress data & workbook as .zip and email.
- Create a shared google drive folder and upload
- Use other cloud/sharing services like Onedrive, Azure, or GitHub

Be sure to pay attention to version control!



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.



SAIL

- Login to SAIL
- Click the + at the bottom of their title and add a “Moment”
- Fill out all the information.
 - Take a few minutes to reflect on what you learned today, what you all did, and how you may use it in the future.
- When you click “Next,” it will ask you to connect to a “Learning Opportunity”
- Connect it to both the course “**POLS 4701**” and the module “**POLS 4701: Digital Proficiency Module**”



Thank you!

If you have any questions, contact us at:

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Slides, handouts, and data available at

<http://bit.ly/diti-spring2020-bormann>

Schedule an appointment with us! <http://bit.ly/diti-office-hours>



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*Feel free to ask questions at any point
during the presentation!*