Community Health Maps Lab Series

Lab 6 – Data Visualization with Carto

Objective – Understand how to upload and style data with Carto to create an online visualization of your data

This course is a collaborative effort between the National Library of Medicine, the Center for Public Service Communications, and Bird’s Eye View

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1 Introduction
You have learned how to collect field data, conduct analyses, and make maps in QGIS Desktop. In this final exercise, you will learn how to use Carto to map your data. Carto is an online cloud based platform for storing and visualizing spatial data. You can sign up for a free account, which gives you 50Mb of storage space. This goes farther than you might think. The data for this lab will consume only slightly more than 2Mb. You can then style your data, choose from an assortment of basemaps and share a dynamic map with colleagues.

2 Objective: Understand the how to use Carto to create an online visualization of your data
In this lab exercise,
Task 1 – Getting Started
Task 2 – Upload Your Data
Task 3 – Style Your Data
Task 4 – Create and Share Your Visualization

3 How Best to Use Video Walk Through with this Lab
To aid in your completion of this lab, each lab task has an associated video that demonstrates how to complete the task. The intent of these videos is to help you move forward if you become stuck on a step in a task, or if you wish to see every step required to complete the tasks.

We recommend that you do not watch the videos before you attempt the tasks. The reasoning for this is that while you are learning the software and searching for buttons, menus, and other feature, you will better remember where these items are and, perhaps, discover other features along the way if you discover them on your own. With that being said, please use the videos in the way that will best facilitate your learning and successful completion of this lab.

Task 1 Getting Started
In this task, you will learn how to set up a free account on Carto. Then you will get oriented to the basic layout of Carto.

1) Open a web browser and navigate to the Carto site http://Carto.com/

2) Login with your username and password.
3) You will be presented with your introductory Dashboard. It has a welcome message. You won’t upload any data quite yet, first you will get oriented.

NOTE: During the fall of 2016 this site was rebranded from CartoDB to Carto. That switch included a migration from the CartoDB Editor interface, to the new Carto Builder interface. Here we will be using the Builder interface. If you are familiar with the older Editor interface this video discusses how to migrate from CartoEditor to Carto Builder.

4) In the top left corner is your user name / Maps with a drop down arrow. Clicking the arrow allows you to navigate to Your datasets along with any locked maps or locked datasets. Since you have just signed up, you have no maps or datasets.
5) Switch to your Datasets.
6) Below the Carto logo are links that allow you to **Search** for maps and data by names or tags. Next to that is a link to your **Datasets** (you likely don’t have any yet) and a link to maps you have **Liked**. Since you have not created a map yet, you also do not have any ‘liked’ maps. Next to that is a link to the Carto **Data Library**. Since you have no datasets of your own yet, Carto defaults to this view. Here you can search for publicly available datasets.

![](image)

7) In the upper right corner is a link to **Guides** and **Documentation**, which take you to the Carto documentation and other learning resources. The **Notifications** icon (a bell) displays any notifications about your account or the Carto dashboard.

![](image)

8) Your avatar (to the right of the Notifications icon) allows you to access your account settings.
9) The icons below that on the right, allow you to sort maps by date, number of visits, number of likes, and to create a **New Dataset**.

![](image)

**Task 2 Upload Your Data**

**Task 2 Video Walkthrough**

Now that you have started your account, you will upload some data. Uploading data into Carto is easy. Here you will upload some data you have used in previous labs. It was collected using Fulcrum in Baltimore City and represents dialysis clinics. This is the raw data downloaded from Fulcrum as a spreadsheet.

1) Open Windows Explorer or Mac Finder and navigate to the data folder for this lab. Open the **Balt_Dialysis_Centers.xls** spreadsheet. This was data collected
using Fulcrum and downloaded as an XLS file. After reviewing the data close the spreadsheet.

NOTE: You geocoded this same dialysis center data by street address in Lab 3 Task 3. There you learned how to map it in QGIS via address. In this scenario, the same data was collected with Fulcrum, and downloaded as an Excel spreadsheet. It is useful to know how to work with data in different formats.

2) Make sure that in Carto you have clicked the drop down arrow the right of your user name and select **Your Datasets**.

![Carto Datasets](image)

3) Again, this takes you to your **Datasets** page.
4) Carto accepts data in many formats and shown in the following figure.

```
<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.CSV, .TAB</td>
<td>Comma-separated values and Tab delimited file</td>
</tr>
<tr>
<td>.SHP</td>
<td>ESRI shapefiles</td>
</tr>
<tr>
<td>.KML, .KMZ</td>
<td>Google Earth format</td>
</tr>
<tr>
<td>.XLS, .XLSX</td>
<td>Excel Spreadsheet</td>
</tr>
<tr>
<td>.GEOJSON</td>
<td>GeoJSON</td>
</tr>
<tr>
<td>.GPX</td>
<td>GPS eXchange Format</td>
</tr>
<tr>
<td>.OSM, .BZ2</td>
<td>Open Street Map dump</td>
</tr>
<tr>
<td>.ODS</td>
<td>OpenDocument Spreadsheet</td>
</tr>
</tbody>
</table>
```

NOTE: Data can be uploaded via the following options:
- Upload a local file or import directly from a public URL
- Sync using Google Drive, DropBox, Box or Twitter.
- Create an empty table

The most common method is uploading local files. This will be how you upload your field data to Carto.
5) Click the green **NEW DATASET** button.

6) Since your data is a local Excel spreadsheet, you will use the default **Data file** option. From there click the blue **BROWSE** button. Navigate to the *Lab6/Data* folder and select the *Balt_Dialysis_Centers.xls* spreadsheet. Click **Open**.

7) Click the blue **CONNECT DATASET** button.

8) While it imports you will see the following progress bar in the lower left corner.
NOTE: What you just did was actually the hard way! You can also simply drag and drop files like this from Windows Explorer or Mac Finder to your browser window with Carto/Datasets open and they will be uploaded to your account!

9) Once the import process is complete, the spreadsheet will appear in your browser.

10) Let us get oriented. In the upper right you can click the red Private button to set the permissions for the dataset.

11) Along the upper right are buttons for adding rows and columns to the table and exporting the dataset.
12) In the lower left is a switch that allows you to enable an SQL editor. If you know SQL this allows you to filter the data with queries.

13) To see the data on a map click the **Create Map** button. This opens the data in the Carto Builder interface. A map will be created with the same name as the data layer. This will now be listed under maps on your Dashboard.

14) The points generated from the spreadsheet are opened in the Carto Builder interface. They are small orange points on a light gray basemap.

15) You can navigate in the map using the Zoom and Pan tools to zoom into Baltimore and your data points.

16) The image below outlines the components of the Carto Builder Layers panel. After uploaded a few more layers you will learn to work with this panel.
Information on how to map Excel data and sync it from a DropBox account can be found here:
http://docs.Carto.com/tutorials/excel_data_sync.html

Adding Shapefiles

1) Now you will add several shapefiles to the map.
2) Open the Lab 6/Data folder in Windows Explorer or Mac Finder. Notice the spreadsheet you have already uploaded to Carto. Also notice that there are three zip files. Each of these contains a shapefile. If you are going to upload a shapefile it is best to zip the component files of that shapefile into a zip file of the same name. The entire shapefile needs to be included: .shp, .dbf, .shx and .prj minimally. (7-Zip is a great free compression software you can use to do this http://www.7-zip.org/). Carto will unpack them.

3) Click the ADD data button to begin the process of adding a new layer to your map.
4) This opens the **Add a new layer** window. If you have other layers in your account, they will be listed here. To add a new layer to your account and this map click the green **CONNECT DATASET** link.

5) Click the blue **BROWSE** button, navigate to your Lab 6/Data folder and select the **Balt_City_bndry.zip** file and click **Open**.

6) Click the green **ADD LAYER** button.

7) The balt_city_bndry layer is added to your map in Carto Builder. Don’t worry about the layer styling yet. You will do that in Task 3.
8) Repeat steps 3-7 to add the *food deserts* and the *neighborhood diabetes* to your map in Carto Builder. The layers have different colored icons next to them with alphabetical designations (A, B, C, D..). The small eye icons ✂️ to the right of the layer names are layer visibility toggles. Clicking on that icon turns a layer on and off. The vertical ellipsis icons ⚙️ open layer specific menus that allow to do things like rename the layer.
9) All your changes are automatically saved so there is no need to save anything yourself.

**Task 3 Style Your Data**

**Task 3 Video Walkthrough**

Now that you have all the data uploaded into Carto and a map created you will work on styling the data layers. You can also change the basemap, zoom level, and add info windows.

1) To begin you will rename your map. Click the three vertical dots \( \Rightarrow \) to the right of the map name and choose **Rename**.
2) Name the map *Baltimore City Diabetes.*

3) To change the settings for an individual layer you can click on the colored icon to the left of the layer name in the Layers panel.

4) Click on the `balt_city_bndry` layer name

5) This opens the layer which includes options to Style the layer and format layer pop ups. The available options are shown below. The layer opens on the **DATA** tab which gives details about the layer geometry (polygon) and the number of features (1) along with any attributes.
6) Now click the **STYLE** tab.

![Layer Name](image1.png) ![Layer option tabs](image2.png) ![Polygon fill color](image3.png) ![Polygon outline](image4.png) ![Blending options](image5.png) ![Labeling options](image6.png)

7) You will make the city boundary hollow with an outline.

8) Click on the colored bar next to **FILL**. Set the A to 0. This value allows you to control the transparency of a layer from 0 (opaque) to 1 (transparent). makes the layer fill transparent. Click outside the box to dismiss.

![Polygon fill color selector](image7.png)

9) Click on the bar next to **STROKE**. Drag the color selector to make the outline black and set A to 1 making it completely opaque. Click outside the box to dismiss.
10) Now you will rename the layer. Click the vertical ellipsis icon right of the layer, choose **Rename** and name the layer *City boundary*.

11) Note the buttons that appear in the lower left corner of the map when you have a dataset open.

12) Clicking on the **+** icon will open the tabular view of the dataset. At that point the **○** icon becomes active which switches you back to the map view. The **++** puts your dataset into edit mode.

13) Click the ← arrow to the left of the layer name to go back to the Layers panel.

14) Ideally the city boundary layer should be above the other polygon layers so that it draws above them on the map. Just like QGIS, Carto lets you control the drawing order of the layers.

15) Hovering over a layer activates it. At that point, a small double ellipsis icon appears to the left of the layer. You can click on this and drag the activated layer up or down in the layer list.

16) Drag the city boundary layer above the fast food and neighborhood diabetes layers.

17) Using this same technique, organize your layers in the following order:

- Positron Labels (top)
- Balt_dialysis_centers
- City boundary
- Faccess_baltcity_fooddesert
- Neighborhood_diabetes
- Positron basemap (bottom)

18) Next you will style the Neighborhood Diabetes layer.
19) Open the layer and click on STYLE.
20) Click on **FILL** and choose **BY VALUE**.
   a. Choose `baltcity_d` as the column. You can use the search or scroll up and down to find that column in the list. If you recall you joined this data to the neighborhoods in Lab 3 Task 2.
   b. Keep the default **5 buckets**. This is the number of classes the data will be broken into.
   c. Keep **Quantiles** as the classification technique.
   d. Choose a yellow to dark orange color ramp.

21) Rename the layer *Diabetes Morbidity by Neighborhood*.
22) Click the ← arrow to return to the Layers panel. Your map should now resemble the figure below.
23) Now you will style the *food deserts* layer.
   a. Use a **FILL** of a light navy blue.
b. Give it a STROKE color of a dark blue with an A of 1.

c. For the BLENDING setting use multiply. Blending modes help when you have two overlapping layers. You can experiment with different blending modes here. There are several to choose from.

d. Before heading back to the Layers panel rename this layer Food Deserts.

24) Finally you will style the dialysis centers as follows:

a. FILL ➔ bright green

b. The number to the left of the FILL color is the size for the points. Click on this value and set it to 12.

c. Set the size of the STROKE to 1.5

25) Rename the layer Dialysis Centers.

26) Click the ← to return to the Layers panel.

27) The map you made in QGIS has been remade online in Carto!
28) The legend for the Diabetes morbidity needs some editing. Click the Diabetes morbidity layer and select the LEGEND tab.
   a. Edit the Left label to read 116 (remove the decimal places, since you cannot have a portion of a person).
   b. Edit the Right label to read 2,933
29) The legend now allows the map reader to know what the data represent.

![Image of legend]

**Information Windows**

1) Click on the *Dialysis centers* layer.
2) Click on **POP-UP**.
3) Here you can enable and configure pop up windows that will open either when the user clicks on a dialysis center or hovers over it.
4) At the top of the POP-UP section, there are settings for whether the pop-up opens when the user clicks on a feature or simply hovers over it with their mouse. Leave this as **CLICK**.

![Table of POP-UP settings]

5) In the **Styles** section there are styles to choose from. By default, the style is set to **NONE**. Select the first white style.
6) In the **Show items** section the attribute columns are listed. Toggle on the *name* and *contact ph* columns. This enables the data in these two columns to appear in pop-ups.

![Image of show items settings]
7) Put your cursor in the box right of name. Edit the text to read Name. This is the label for the data that will appear in the pop-up.
8) Put your cursor in the box right of contact_ph. Replace the text with a space.
9) Click on a dialysis clinic. You will see a pop up window with the name and phone number!

![Image of pop-up window with name and phone number]

**Changing Basemaps**

You can also choose from different basemaps. Click on the Positrom basemap. Using Source and Style you can change the basemap to many different types.

![Image of basemap options]
Task 4 Create and Share Your Visualization

Task 4 Video Walkthrough

Now that you have uploaded your data and styled your map you will share your visualization.

1) You can control several map parameters by clicking on the **Options** button on the left most blue bar.

![Options button](image)

2) This open up the **Map Options** window.

![Map Options window](image)

3) Click the **Layer selector** option. This will allow users to toggle map layers on and off.

4) When done click the **Edit map** button 🖊️.
Publishing Your Map

1) You can publish your map and make it available via a hyper link or code that allows you to embed the map into a webpage.

2) To start click the **SHARE** button at the bottom of the Layers panel.

3) By default, your new map has been set to PRIVATE. This means only you can see it.

4) By publishing your map you will make it publically discoverable.

5) Click the blue **PUBLISH** button.

6) The map is still set as PRIVATE. Click the red Private button to expose the permissions options.

7) You need to choose an option other than private to get the link or Embed it.

8) You can choose from:
   a. Public
   b. Only accessible with link
   c. Password
   d. Private

9) For this lab choose **Public**.

10) Now you are offered both the link and the HTML code to embed the live map into a web page.
11) Use the Copy button in the Get the link option to copy the link, and click the DONE button to close the Publish your map window.

12) Paste the link in a new browser window to see the result. Note that there is a Layer Selector widget since you enabled that option.

13) You have created a dynamic online map of your data!
5 Conclusion

In this lab, you learned the basics of using Carto. You learned how to upload data, style it and share your visualization. There is a lot more you can do with Carto, especially if you want to learn the map layer styling language CartoCSS. Carto has a lot of good documentation including:

- Carto Guides: https://carto.com/learn/guides
- Carto Webinars: https://carto.com/webinars/
- Carto Case Studies and White Papers: https://carto.com/resources/
- Carto Blog: https://carto.com/blog
- Carto Pricing: https://carto.com/pricing/