Creating the Density Dashboard

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Mike Mattinson

Master of Science, Data Analytics, WGU.edu

D211 Advanced Data Acquisition

Task 1 – Tableau Dashboard Using SQL data

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CREATING THE DENSITY DASHBOARD

For this task, I will demonstrate each step in creating the final Tableau dashboard. The data comes from a PostgreSQL database combined with two (2) external text files. I will show you how to setup the PostgreSQL database, then how to create the Tableau dashboard including all of the SQL, Tableau worksheets, data sources and required calculations.

1. The density dashboard will look like this when completed:

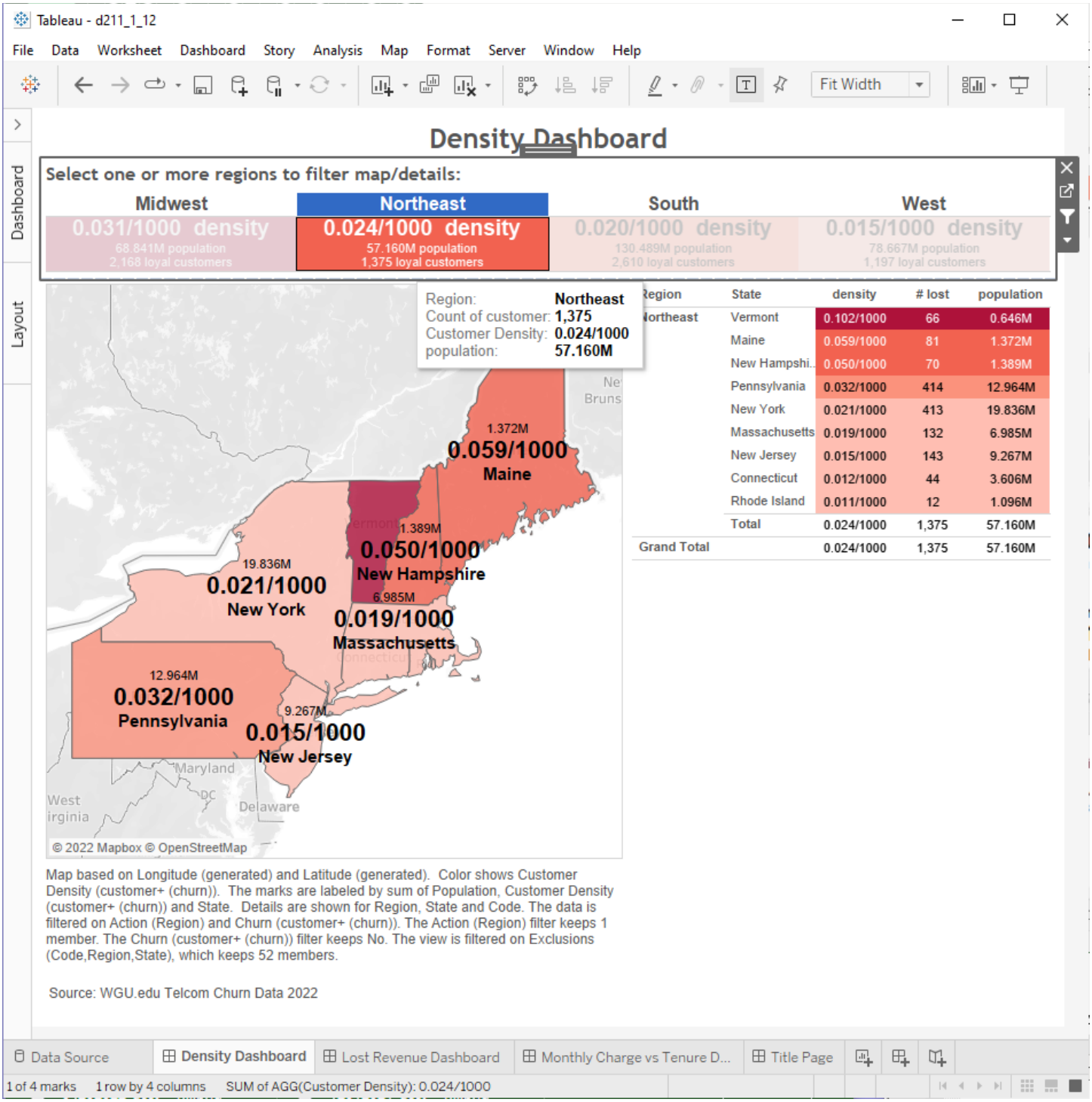

Figure 1 Final Density Dashboard

THE DASHBOARD IS MADE UP OF FOUR (4) SHEETS AND ONE (1) PARAMETER

CREATE THE POSTGRESQL DATABASE

2. Assuming PostgreSQL is installed locally (or you have access to the server), login to the database using pgAdmin. It should look like something like this:

Figure 2 pgAdmin

3. First step is to create the database. Right click on Database(s) and select “Create” then “Database”. Name the database, for this example the database will be named “d211_churn”. Then click Save. Here is what is looks like:

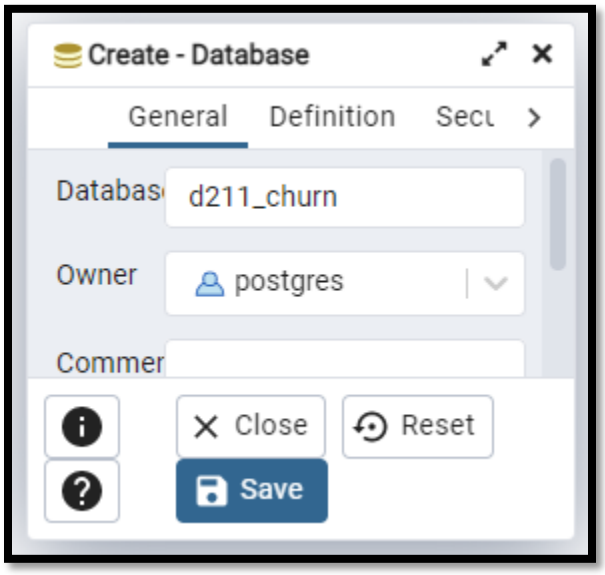

Figure 3 pgAdmin Create Database

4. Once the database is created, I will use the following SQL scripts to create the required tables. Right click on the new database and select “Query Tool”, cut and paste the following SQL script into the Query Tool and click Run.

```
-- Table: public.payment
-- DROP TABLE public.payment;
CREATE TABLE public.payment
(
    payment_id integer NOT NULL,
    payment_type text ,
    CONSTRAINT payment_pkey PRIMARY KEY (payment_id)
);


-- Table: public.location
-- DROP TABLE public.location;
CREATE TABLE public.location
(
    location_id integer NOT NULL,
    zip integer,
    city varchar(30),
    state varchar(2),
    county varchar(30),
    CONSTRAINT location_pkey PRIMARY KEY (location_id)
);

-- Table: public.job
-- DROP TABLE public.job;
CREATE TABLE public.job
(
    job_id integer NOT NULL,
    job_title varchar(60),
    CONSTRAINT job_pkey PRIMARY KEY (job_id)
);

-- Table: public.contract
-- DROP TABLE public.contract;
CREATE TABLE public.contract
(
    contract_id integer NOT NULL,
    duration VARCHAR(30),
    CONSTRAINT contract_pkey PRIMARY KEY (contract_id)
);

-- Table: public.customer
```

```
-- DROP TABLE public.customer;
CREATE TABLE public.customer
(
    customer_id text NOT NULL,
    lat numeric,
    lng numeric,
    population integer,
    children integer,
    age integer,
    income numeric,
    marital text ,
    churn text ,
    gender text ,
    tenure numeric,
    monthly_charge numeric,
    bandwidth_gp_year numeric,
    outage_sec_week numeric,
    email integer,
    contacts integer,
    yearly_equip_faiure integer,
    techie text,
    port_modem text ,
    tablet text ,
    job_id integer,
    payment_id integer,
    contract_id integer,
    location_id integer,
    CONSTRAINT customer_pkey PRIMARY KEY (customer_id),
    CONSTRAINT customer_contract_id_fkey FOREIGN KEY (contract_id)
        REFERENCES public.contract (contract_id) MATCH SIMPLE
        ON UPDATE NO ACTION
        ON DELETE NO ACTION
        NOT VALID,
    CONSTRAINT customer_job_id_fkey FOREIGN KEY (job_id)
        REFERENCES public.job (job_id) MATCH SIMPLE
        ON UPDATE NO ACTION
        ON DELETE NO ACTION
        NOT VALID,
    CONSTRAINT customer_location_id_fkey FOREIGN KEY (location_id)
        REFERENCES public.location (location_id) MATCH SIMPLE
        ON UPDATE NO ACTION
        ON DELETE NO ACTION
        NOT VALID,
    CONSTRAINT customer_payment_id_fkey FOREIGN KEY (payment_id)
        REFERENCES public.payment (payment_id) MATCH SIMPLE
        ON UPDATE NO ACTION
        ON DELETE NO ACTION
        NOT VALID
);
```

5. Import contract.csv data into contract table. Right-click on desired table, select “Import/Export”, then you should see the following dialog. Click “Import” and click Header “Yes”, then browse to the contract.csv file. If everything goes well, you will see the green success message.

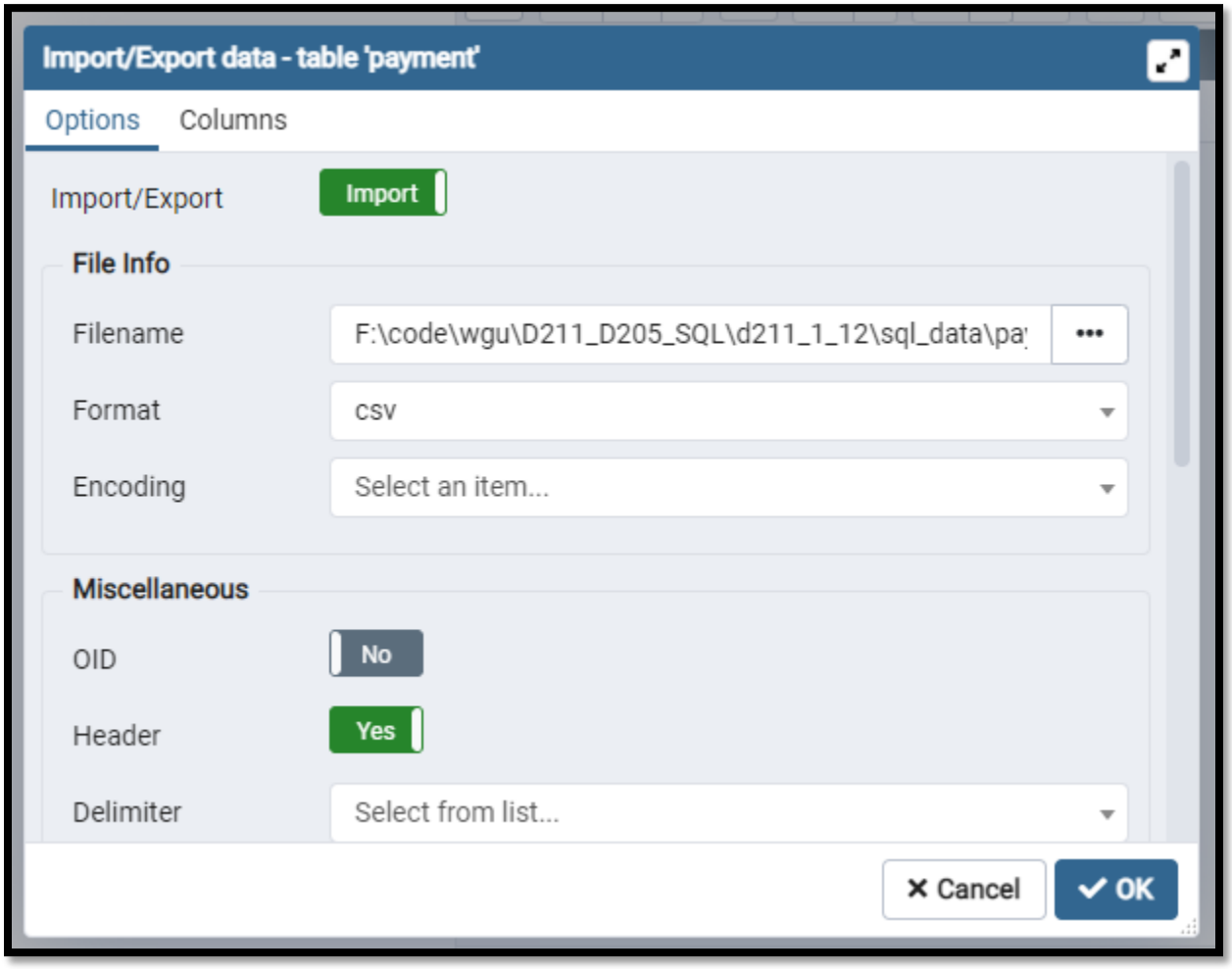

Figure 4 pgAdmin Import .CSV file

6. Import job.csv data into job table.

7. Import location.csv data into location table.

8. Import payment.csv data into payment table.

9. Lastly, import customer.csv data into customer table.

CREATE NEW TABLEAU FILE

10. Open Tableau and click File, New

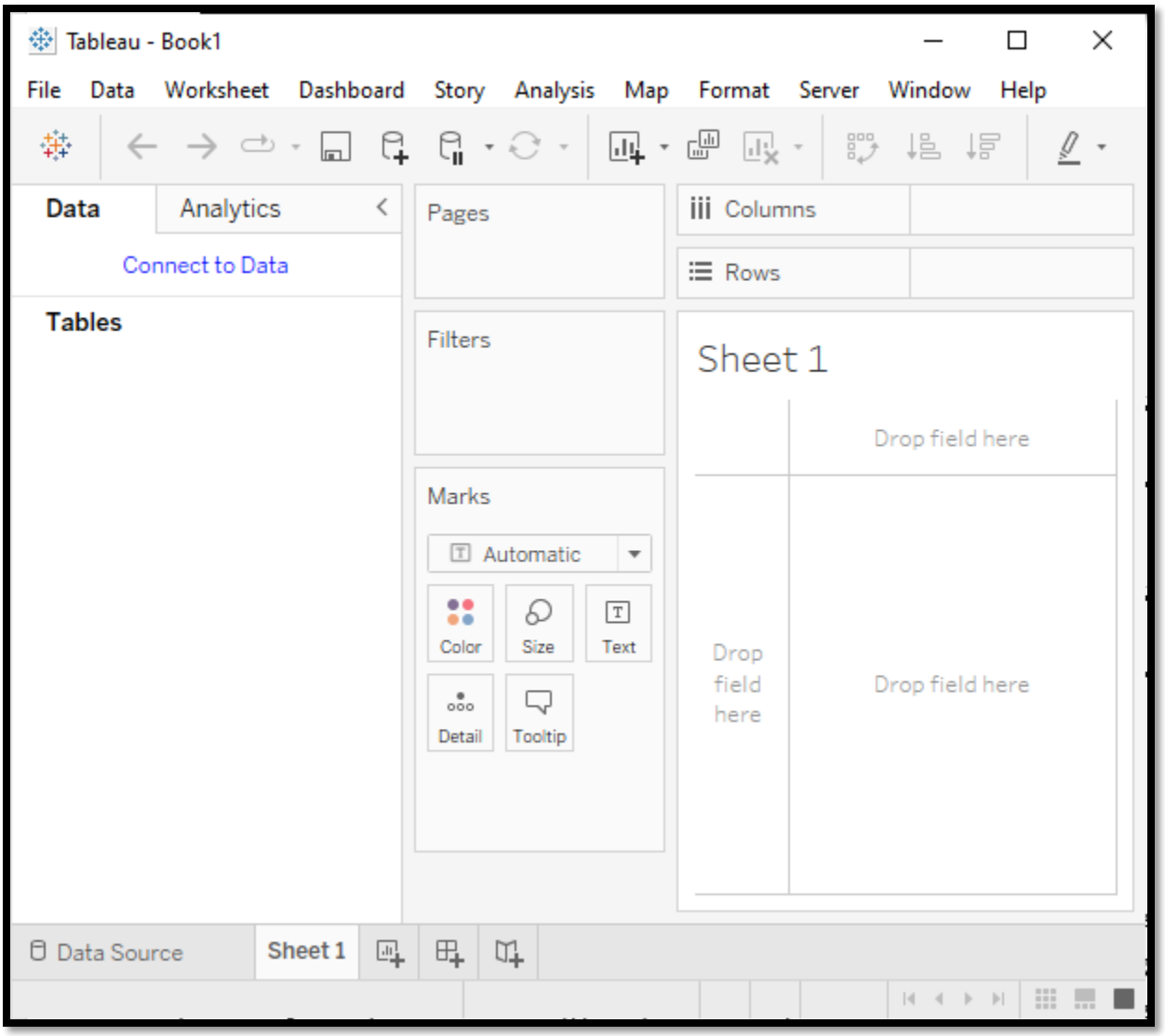

Figure 5 Create New Tableau File

CREATE POSTGRESQL DATA SOURCE

11. Select **Data > New Data Connection**.

12. Select "**To a Server – PostgreSQL**", you should see the following dialog, enter database name, and username/password. Then click "Sign-In"

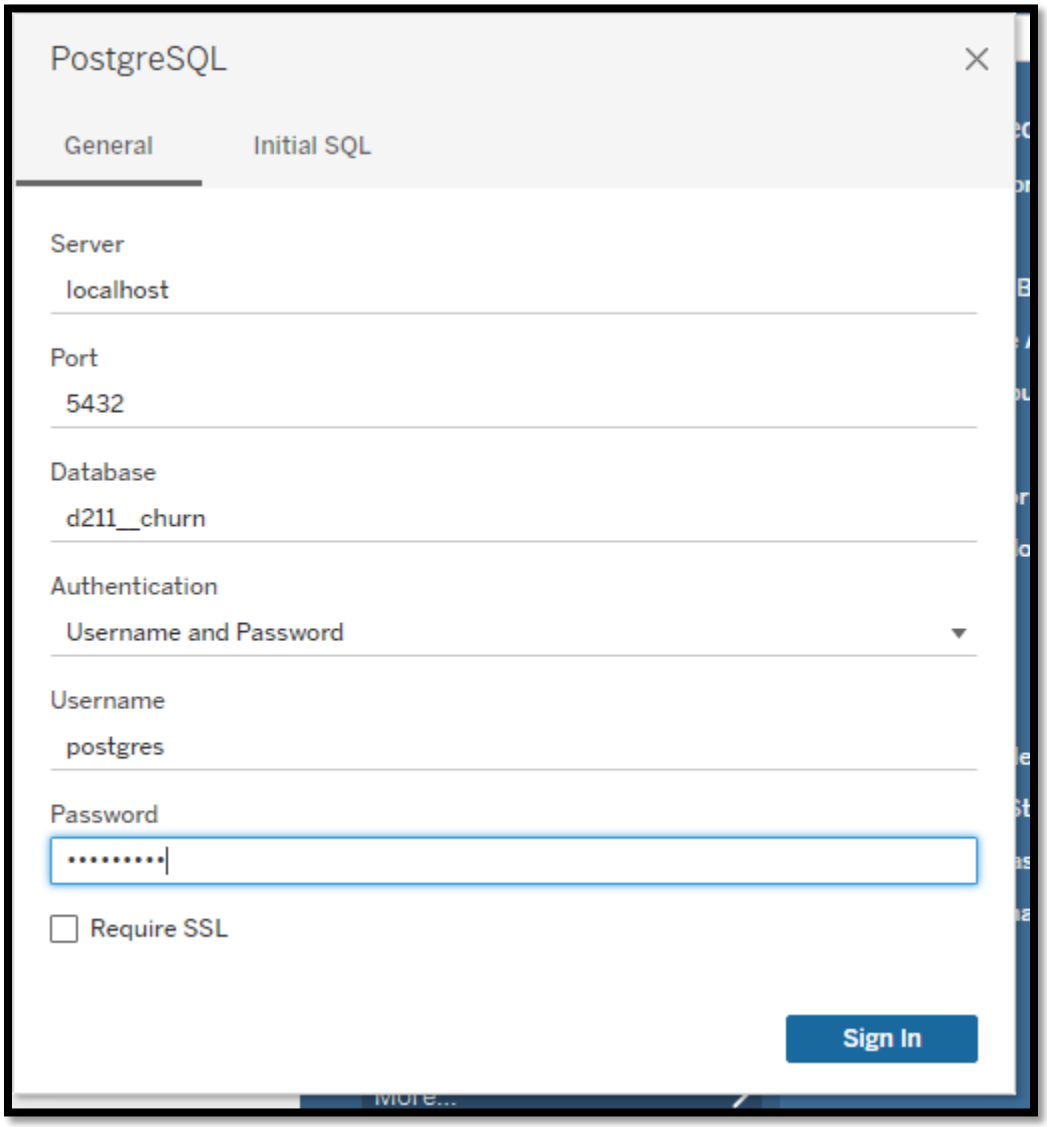

Figure 6 Connect to PostgreSQL Data

CREATE NEW DATA SOURCE

13. You should see the following, you see the "d211_churn" connection that you just made. Now click on the database icon next to d211_churn (this is the same as "Data > New Data Source") and select "To a File" then "Text File"

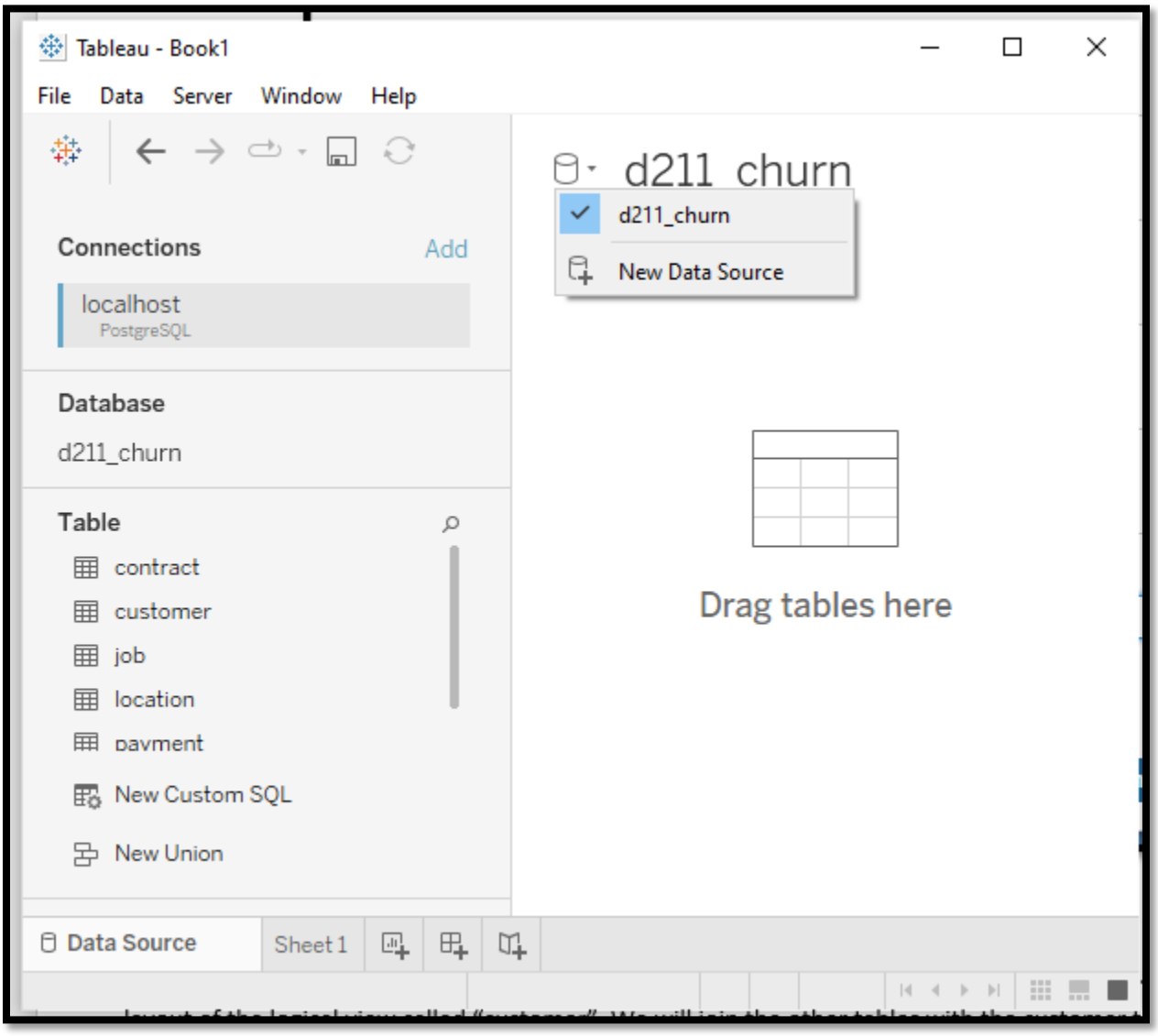

Figure 7 Create Tableau Data Sources

14. Browse to the folder containing the external data files, select states.csv file to make the initial connection. Click “Open”

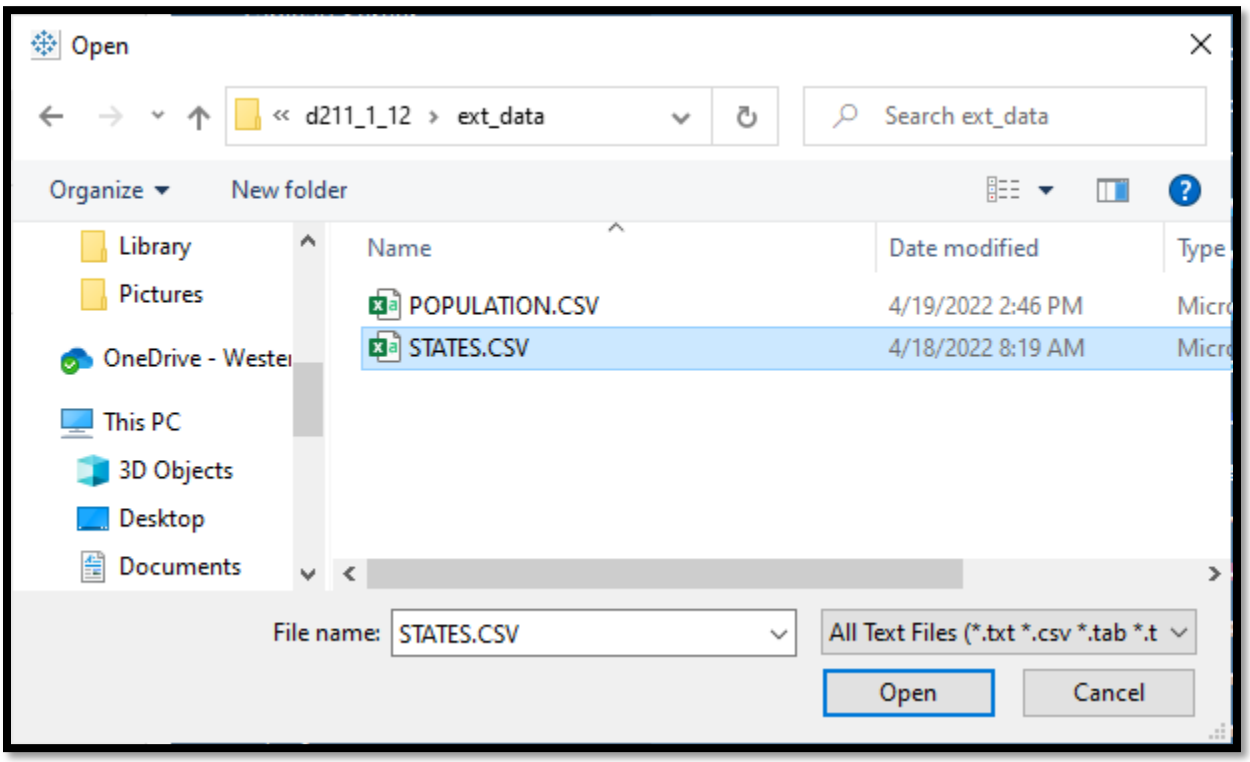

Figure 8 Tableau New Text File Data Source

15. Now you have both data source connections, here is what is looks like:

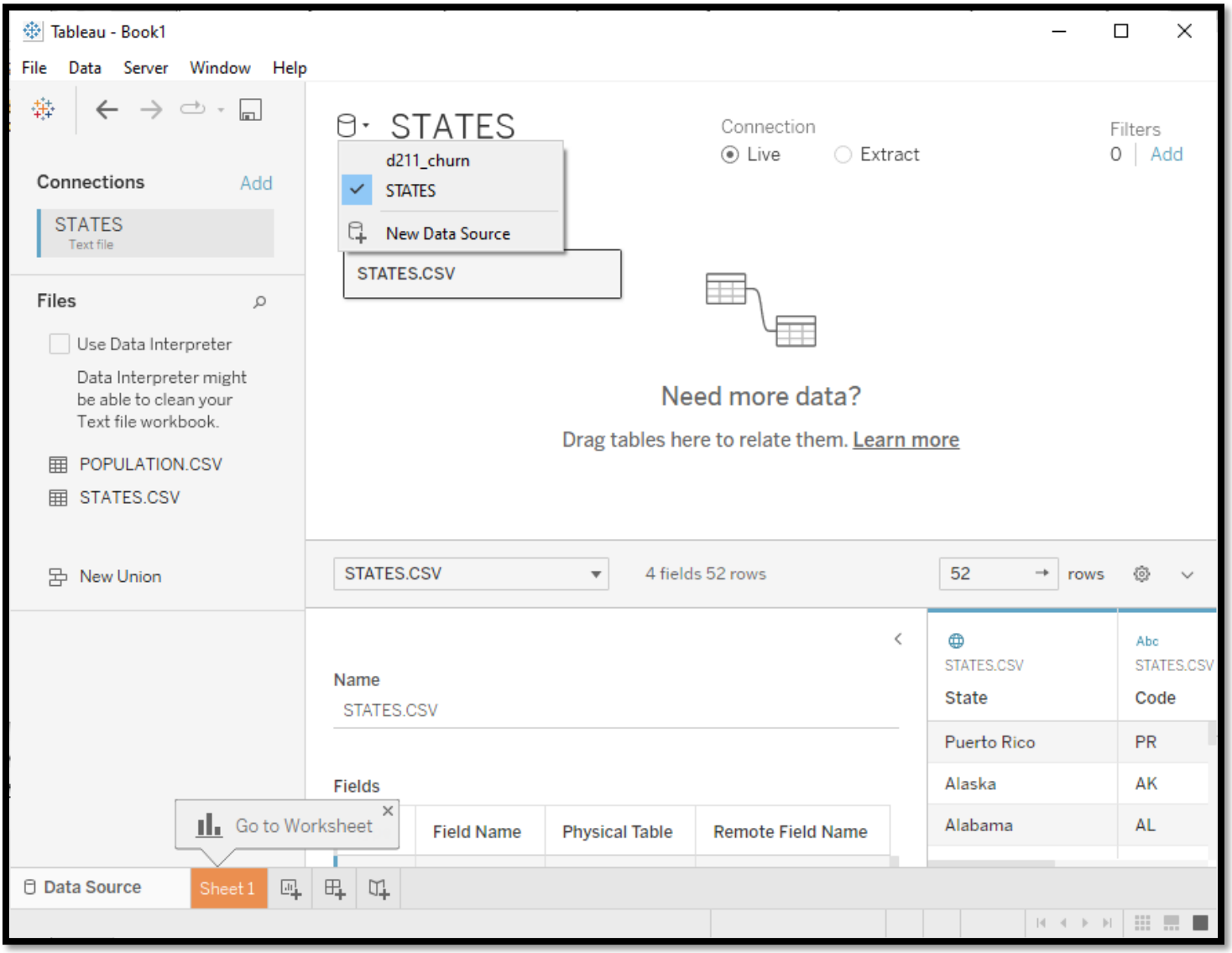

Figure 9 Tableau Data Sources

CREATE LOGICAL VIEWS AND RELATIONSHIPS

16. Select the "**d211_churn**" data source, then drag the "**customer**" table to the right side.

17. Double-click on "**customer**" table to create a union. By double-clicking table, you are altering the physical layout of the logical view called "customer". We will join the other tables with the customer table to create the overall logical view of the customer data.

18. Drag "**location**" table to the right of the "**customer**" table. Tableau will attempt to find a common attribute to link. Here is what it should look like:

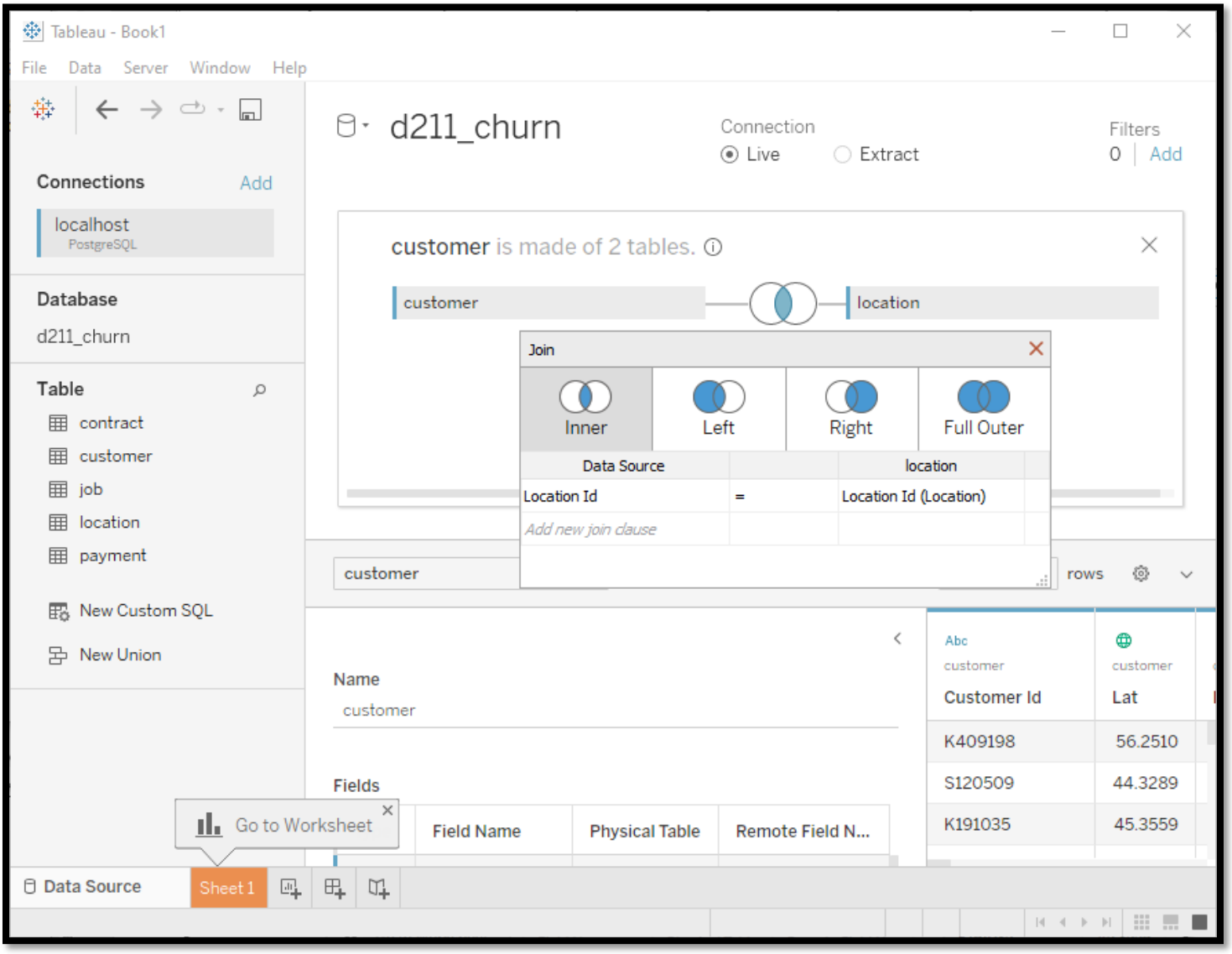

Figure 10 Tableau Customer-Location Join

CREATE BLENDED DATA SOURCE

19. Select the "**states**" data source, the "States" data is already there, double-click to create a relationship join with "**population**" data. Instead of joining churn and states data sources, we have created two separate data sources, this is known as blending data. "**Churn & location**" are joined, and "**states & population**" are joined, but the two are not joined.

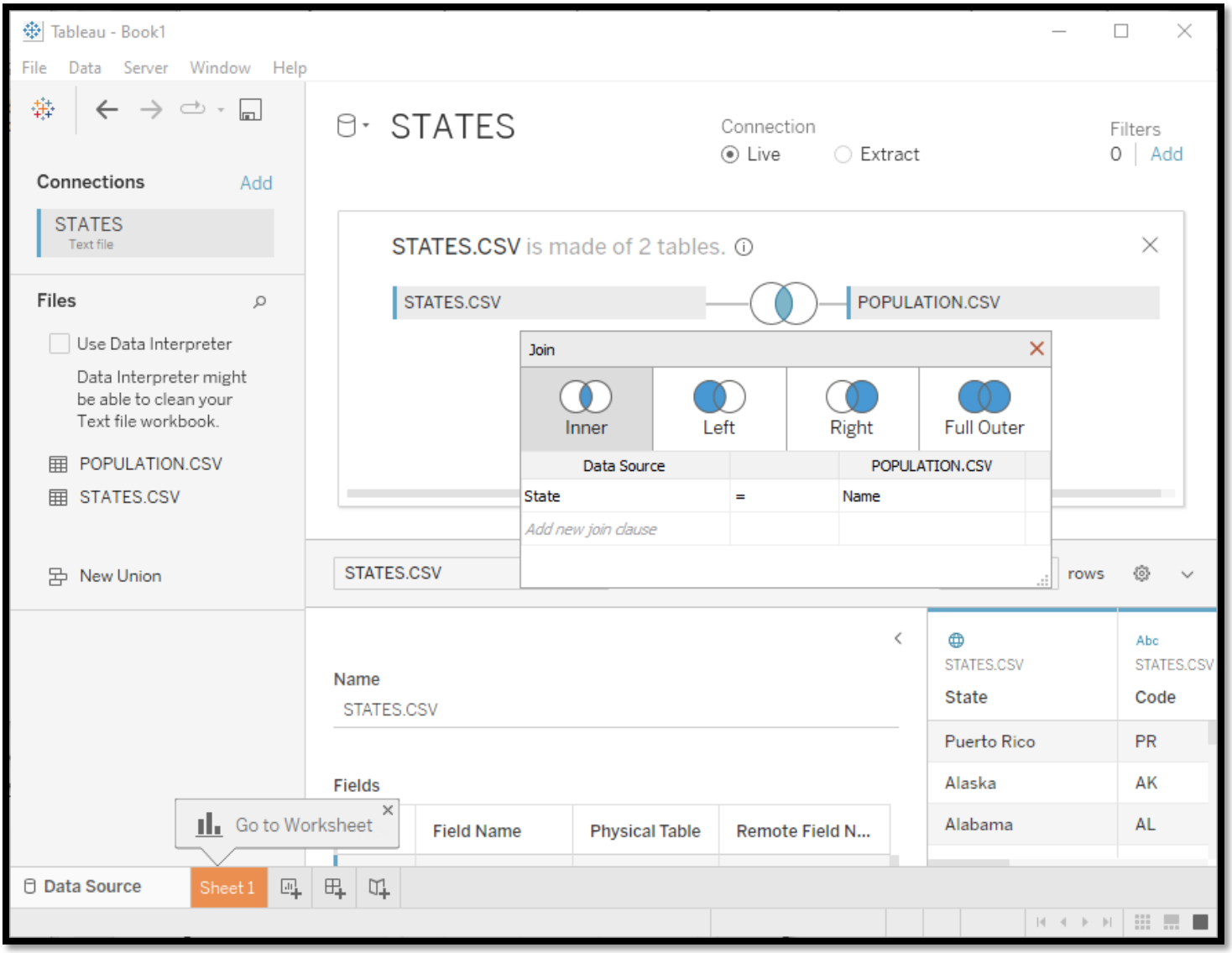

Figure 11 Tableau Stats-Population Join

CREATE THE "REGION, STATE" COLLECTION

20. The "**Region, State**" collection is made up of **Region** and **State** data. Currently, Tableau doesn't know the **Region's** geographic role, so right-click on **Region** and select "**Geographic Role**" then, "**Create from…"** then "**State**". This will define the region based on the states as defined in the States data. Here is what it looks like, notice that there is now a "Globe" icon next to Region, and the "**Region, State**" collection has two sub-elements, the region and the state:

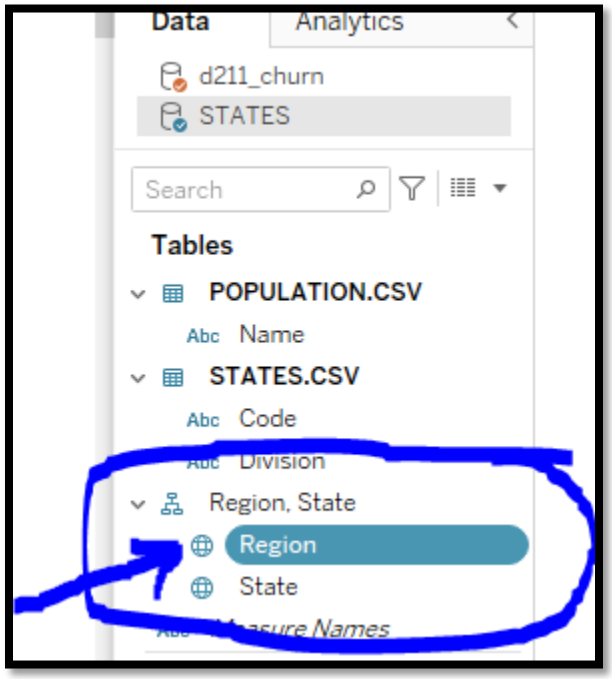

Figure 12 Tableau Region, State Geographic Role

When we drag and drop any part of the "Region, State" collection, Tableau will know to treat the data as geographic. We will see this is a few minutes when we create the "density map" worksheet.

CREATE CALCULATED FIELDS

21. **Customer Density**. For the Density Dashboard we need to calculate the density as a function of # of customers and total population. When completed, the calculation is as follows:

Figure 13 Tableau Customer Density Calculated Field

22. Create a new worksheet called "**density details**"

23. The calculation uses data from two different data sources, so we have to "link" the primary source with the secondary source. Select the "States" data and drag "population to the view. You will see the States data has a blue check indicating it is the primary source for this worksheet.

24. Click on **Data, Edit Blend Relationship** to bring up the following dialog:

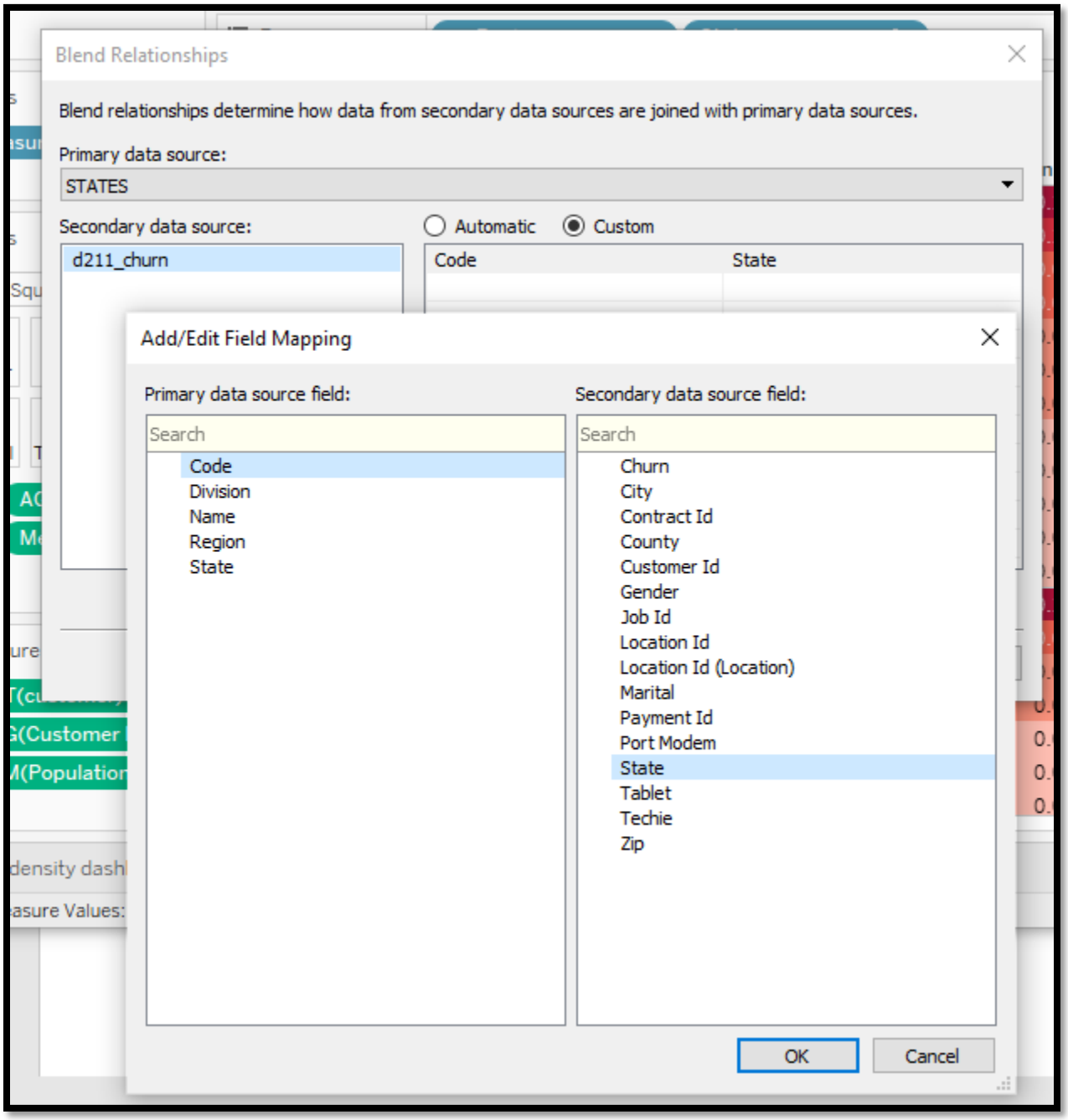

Figure 14 Tableau Edit Blend Relationship

25. The default field mapping is incorrect, select Custom, then use "**Code**" from primary data and "**State**" from secondary data, then click OK, OK to finish creating the blended relationship for this worksheet. Once the tables are "blended", you will see a "link" icon on the secondary data source indicating the field that is linking the two tables. If the link icon is red, it is good, if grey, the link is bad and you have to click the link icon to activate the link. Here is what you are looking for:

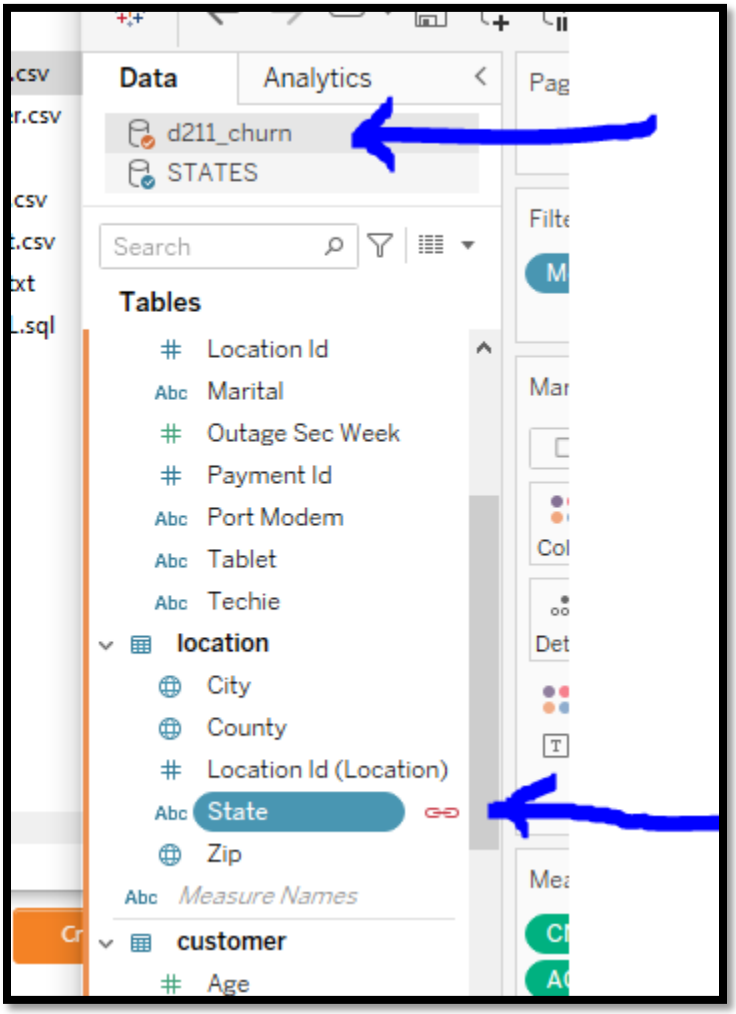

Figure 15 Tableau Link to Secondary Data

26. With the two data sources connected, go back to the States data and create new calculated field. Enter the following into the field, name the field "**Customer Density**", then click OK. It is now ready to be used in the worksheet

```
count([d211_churn].[Customer Id])/sum([Population])*1000
```

CREATE THE "DENSITY DETAILS" WORKSHEET

The **density details** worksheet should look like this when completed:

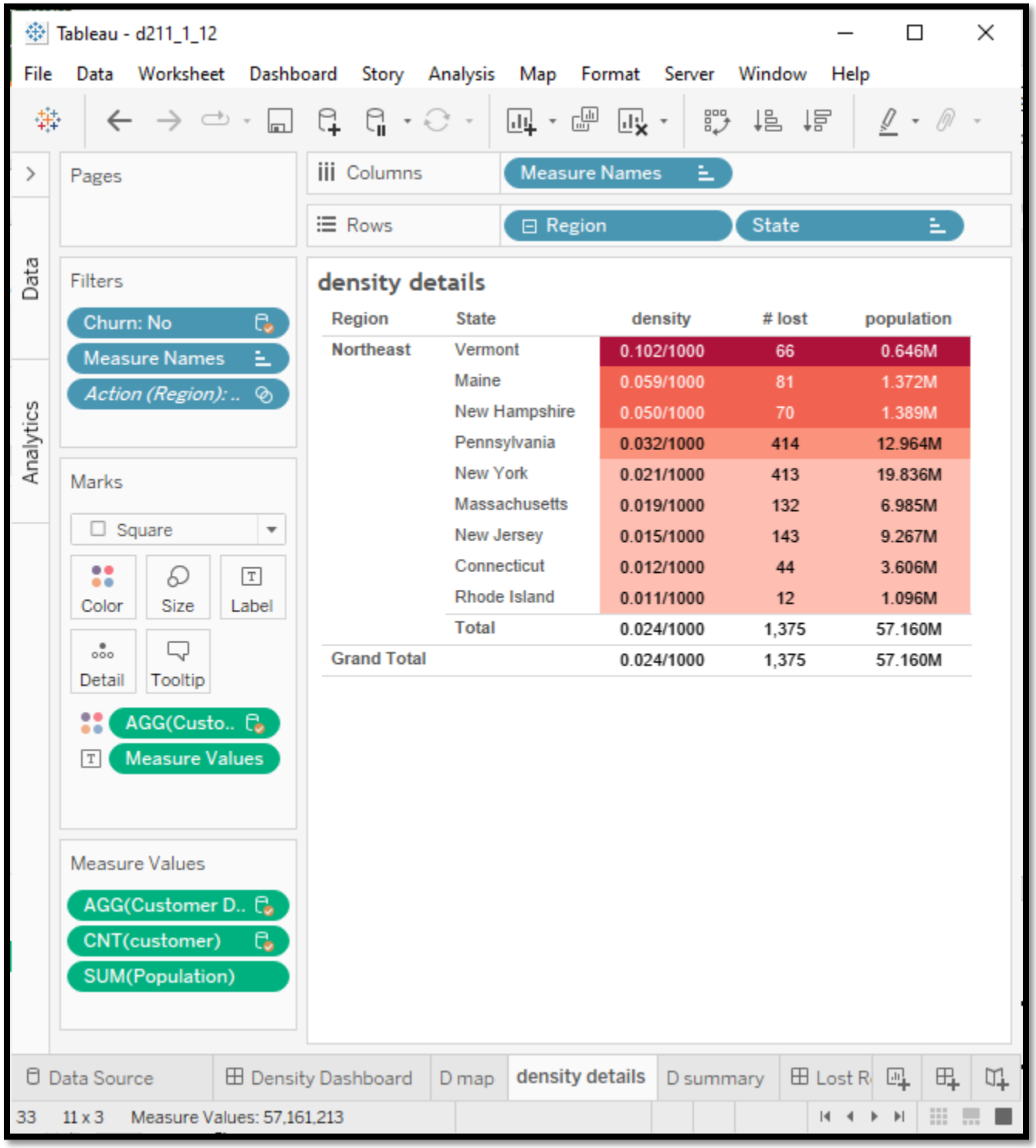

Figure 16 Final Density Details Worksheet

27. Drag the "**Region, State**" collection to the **Rows**

28. We want this worksheet to be a "**Text Table**", so double-click the new "**Customer Density**" measure (from the States data) which will create the first column of the text table.

29. Double-click the "**Population**" measure (from the States data) which will create the second column.

30. Double-click the "**customer (count)**" measure (from the d211_churn data) which will create the third column.

31. We only want "Loyal Customers", so drag the "churn" dimension (from the d211_churn data) to the Filters pane. Double-click and select "No" only. Loyal customers are indicated with Churn="No".

32. If everything is going well, it should look something like this:

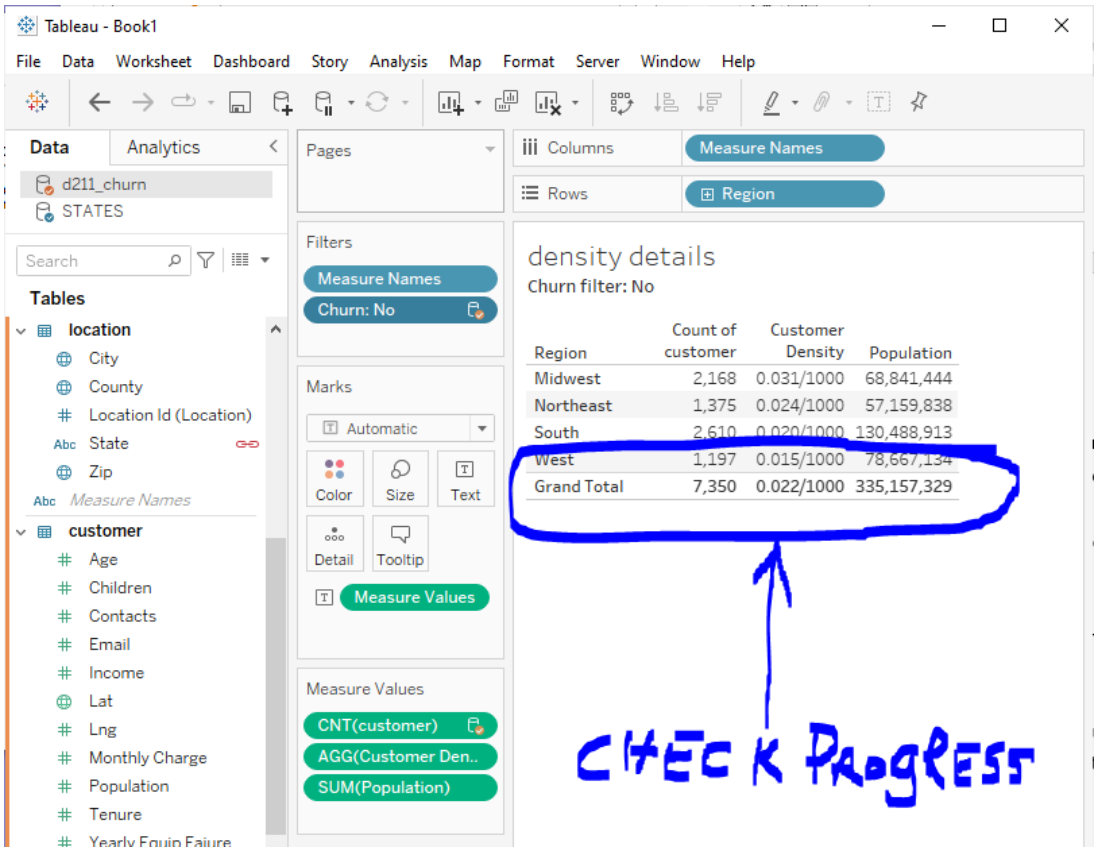

Figure 17 Density Details: Create Text Table

Check your work: (1) there should be 7,350 loyal customers and (2) 335 million total population. Also, (3) the customer density for all combined regions should be (7350/335157329*1000 = 0.02193 = 0.022/1000). How are you doing?

FINALIZE COLORS AND LAYOUTS FOR THE "DENSITY DETAILS" WORKSHEET

We want to add color to the worksheet and maybe clean up some of the heading labels and fonts.

33. Change the default properties of the "Customer Density" measure.

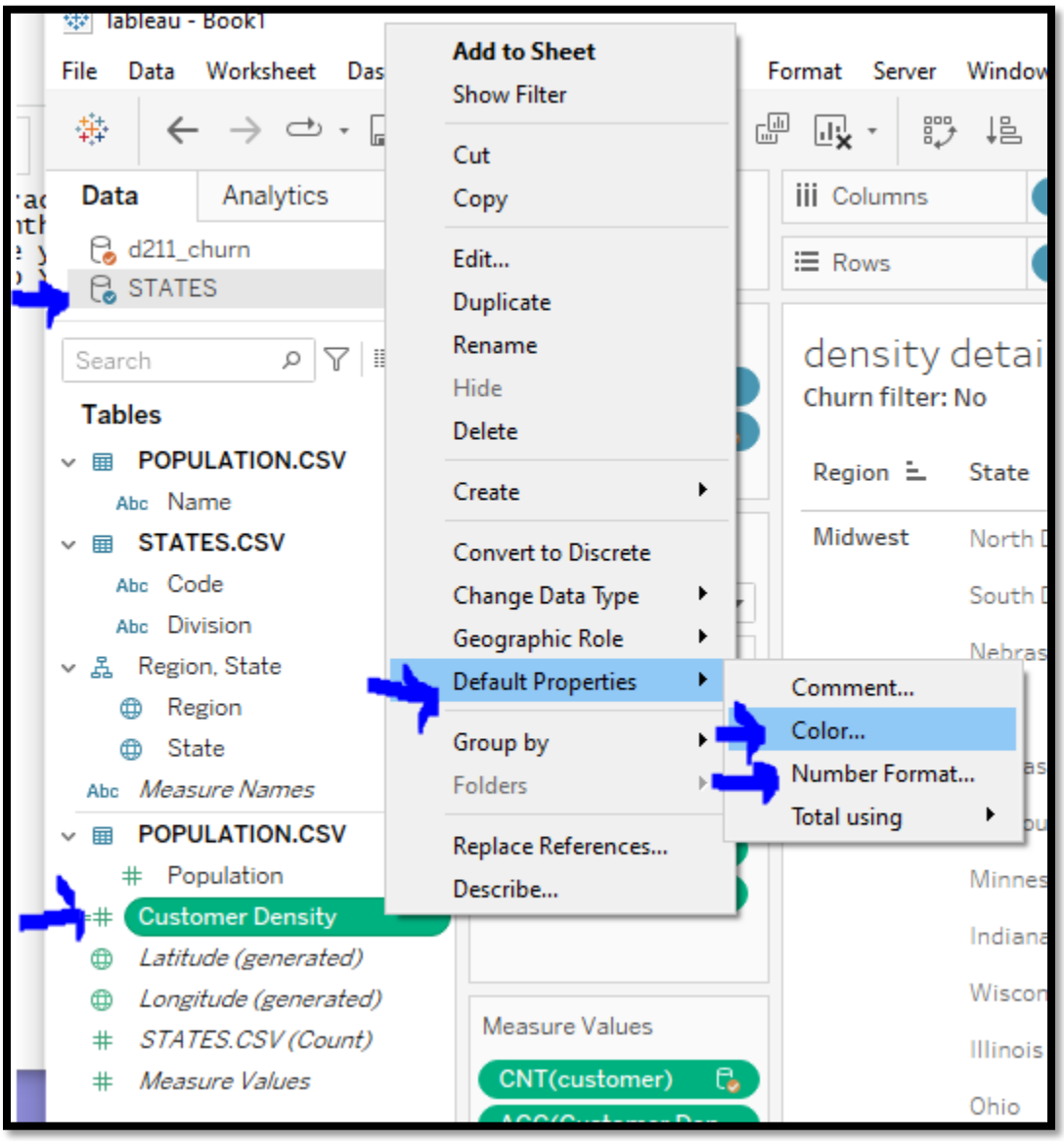

Figure 18 Customer Density Default Properties

34. **Default Properties > Number Format….** Select Number (Custom), set 3 decimal places and add "/1000" to the Suffix.

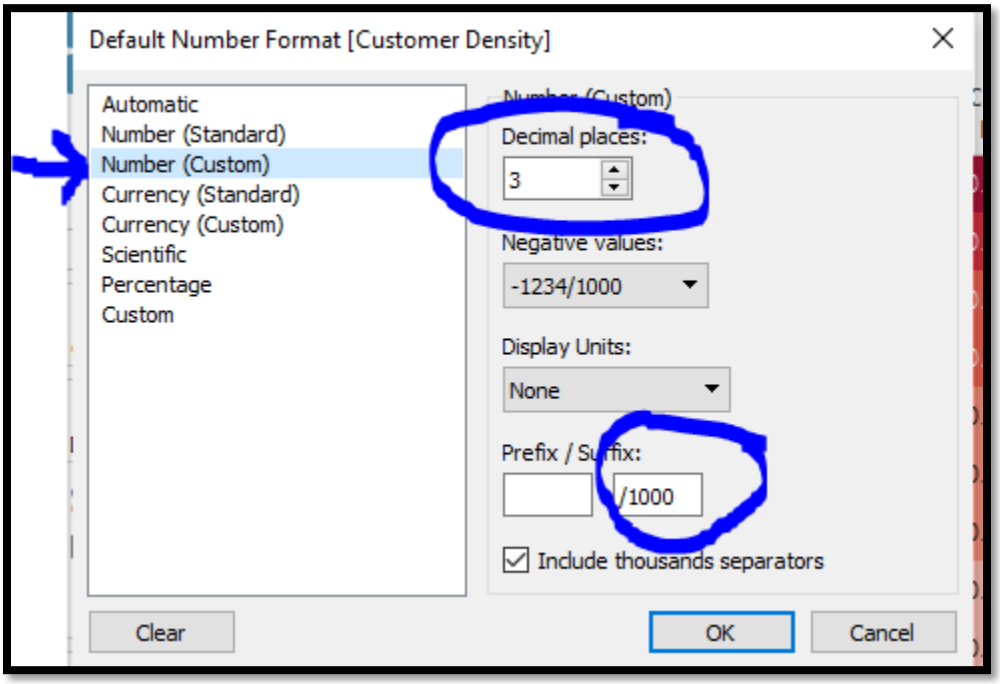

Figure 19 Customer Density - Default Number Format

35. **Default Properties > Color**. Select Red, check "Stepped Color" and choose 5 steps.

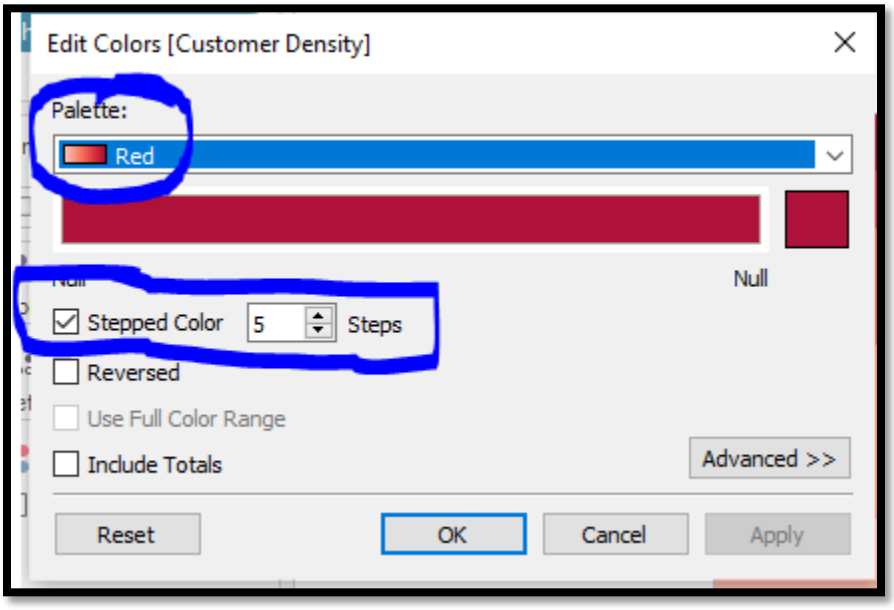

Figure 20 Customer Density - Default Color

36. Change the Mark type to "Square" which will fill in each row. Looking better…

37. Center the table values. Select one of the cells, then right-click, format, then alignment, then Default > Pane, then select "**Center**" For some reason, I always have trouble finding this one…

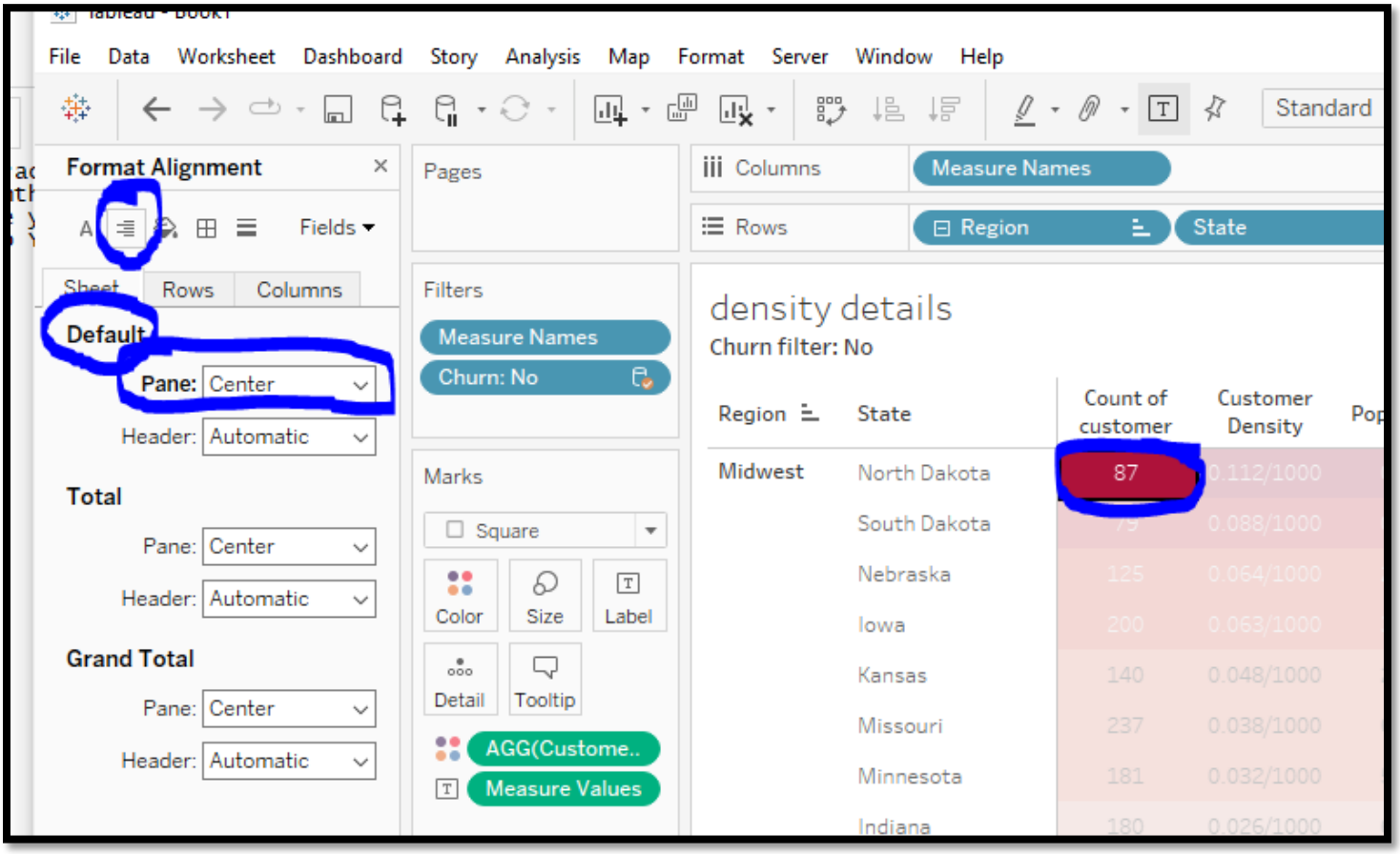

Figure 21 Centering Text Table Cells

38. Increase row height of labels and data

39. Add Column and Sub-Totals from Analysis. Drag Totals over to view, then select “Subtotals”, then repeat to add “Column Grand Totals”

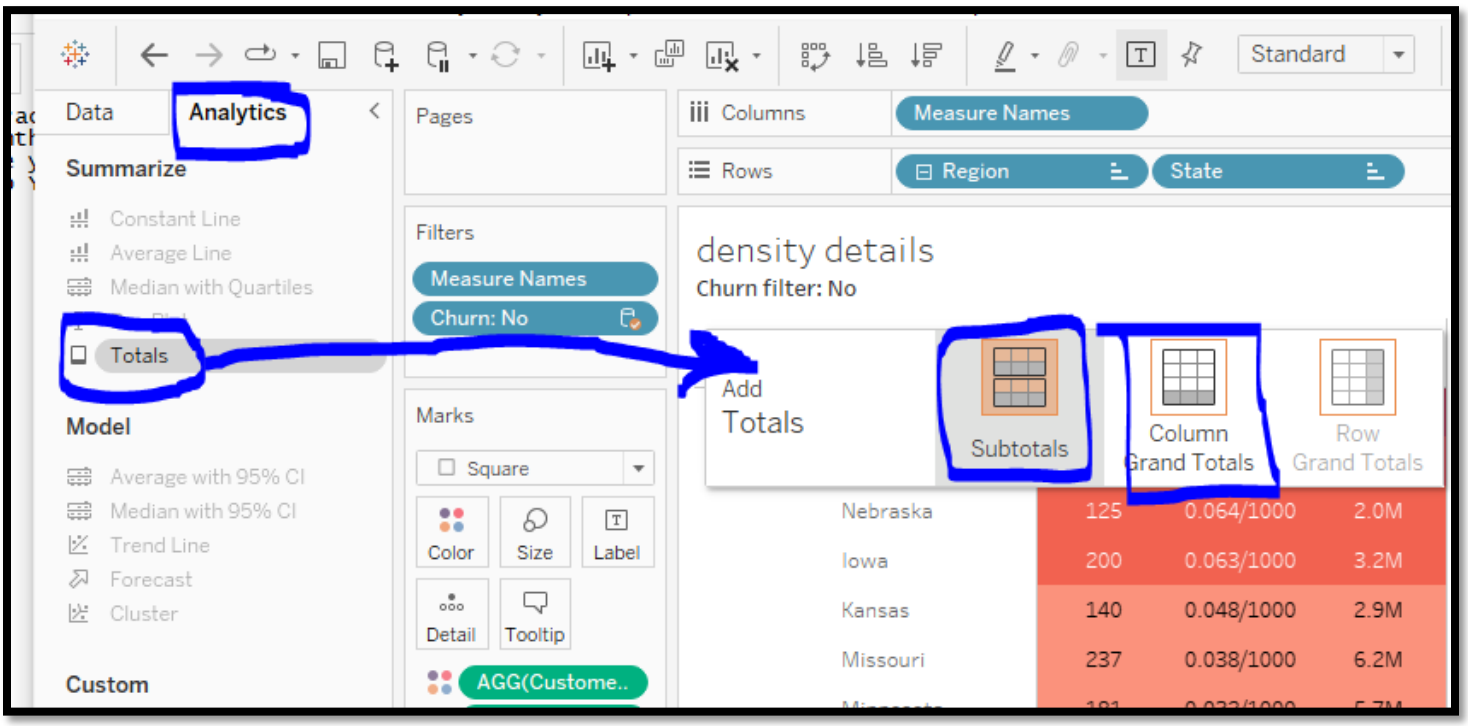

Figure 22 Add Analytic Totals

CREATE "DENSITY MAP" WORKSHEET

Here is what the final density map worksheet will look like:

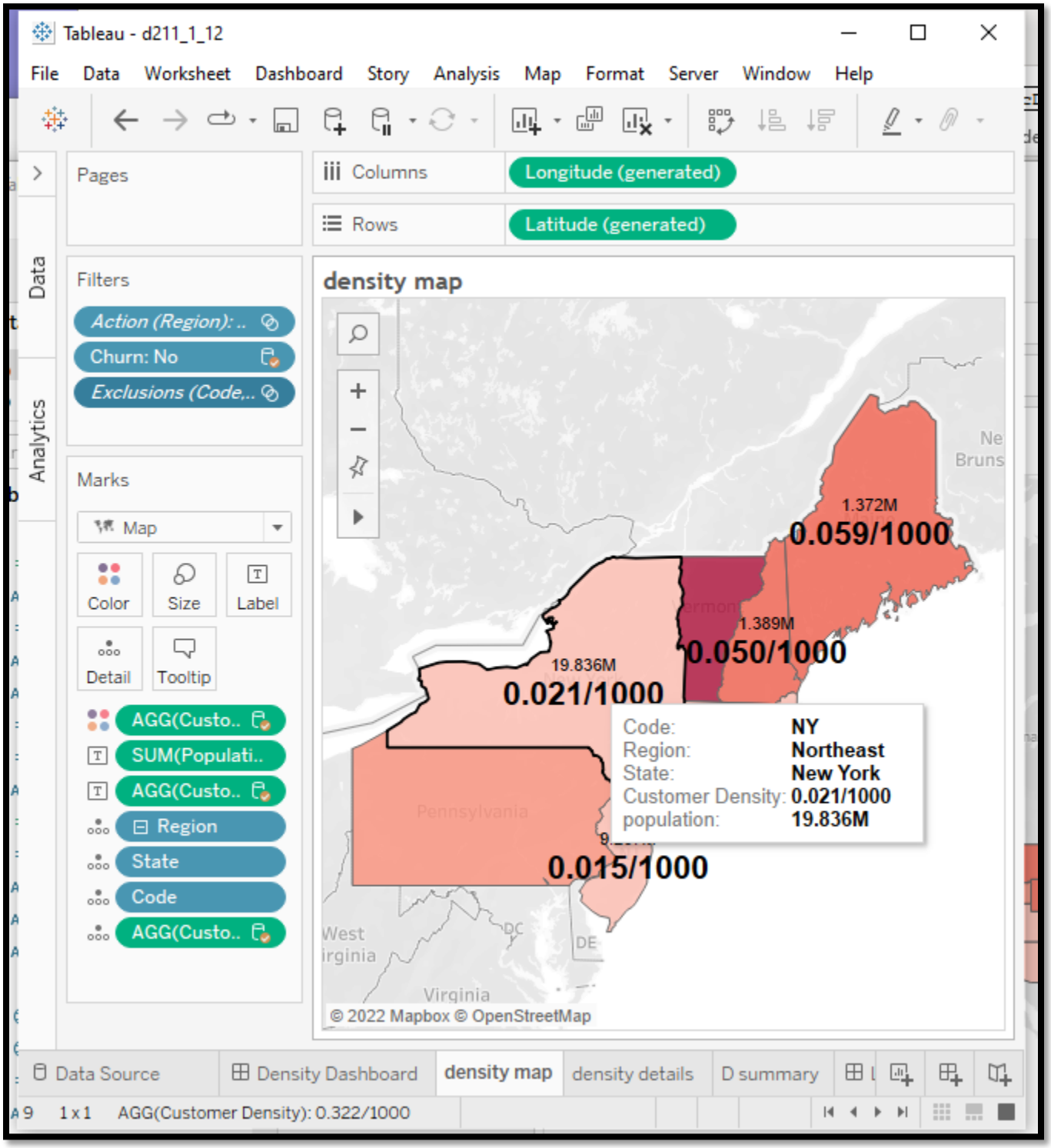

Figure 23 Final Density Map Worksheet

40. Create new worksheet named "density map"

41. Drag “Region, State” collection to right side main visualization area. Then select “Map” for the mark type. You should see a map of the United States with four (4) regions outlined

42. Drag “Customer Density” to Mark Colors

43. There will be a blending error, click OK, then go to the “d211_churn” data and click the blending link to “use State as linking field”.

44. We only want “Loyal Customers”, so drag the “churn” dimension (from the d211_churn data) to the Filters pane. Double-click and select “No” only. Loyal customers are indicated with Churn=”No”.

Add elements to **Details**:

45. Drag “**Code**” (from d211_churn data) to Detail mark.

46. Drag “**customer (Count)**” (from d211_churn data) to Detail mark.

47. Drag “**State**” (from STATES data) to Detail mark.

48. Drag “**population**” (from STATES data) to Detail mark.

Add elements to **Label**:

49. Drag “**Customer Density**” (from d211_churn data) to Label mark.

50. Drag “**State**” (from STATES data) to Label mark.

51. Drag “**population**” (from STATES data) to Label mark.

52. Experiment with the map view. Click the “+” sign next to “Region”. Notice how the view changes to outline the “States”, click again and the view goes back to “Region”. This is how the “Region, State” collection works. Click again so the individual states are outlined.

53. The final map worksheet should look something like this:

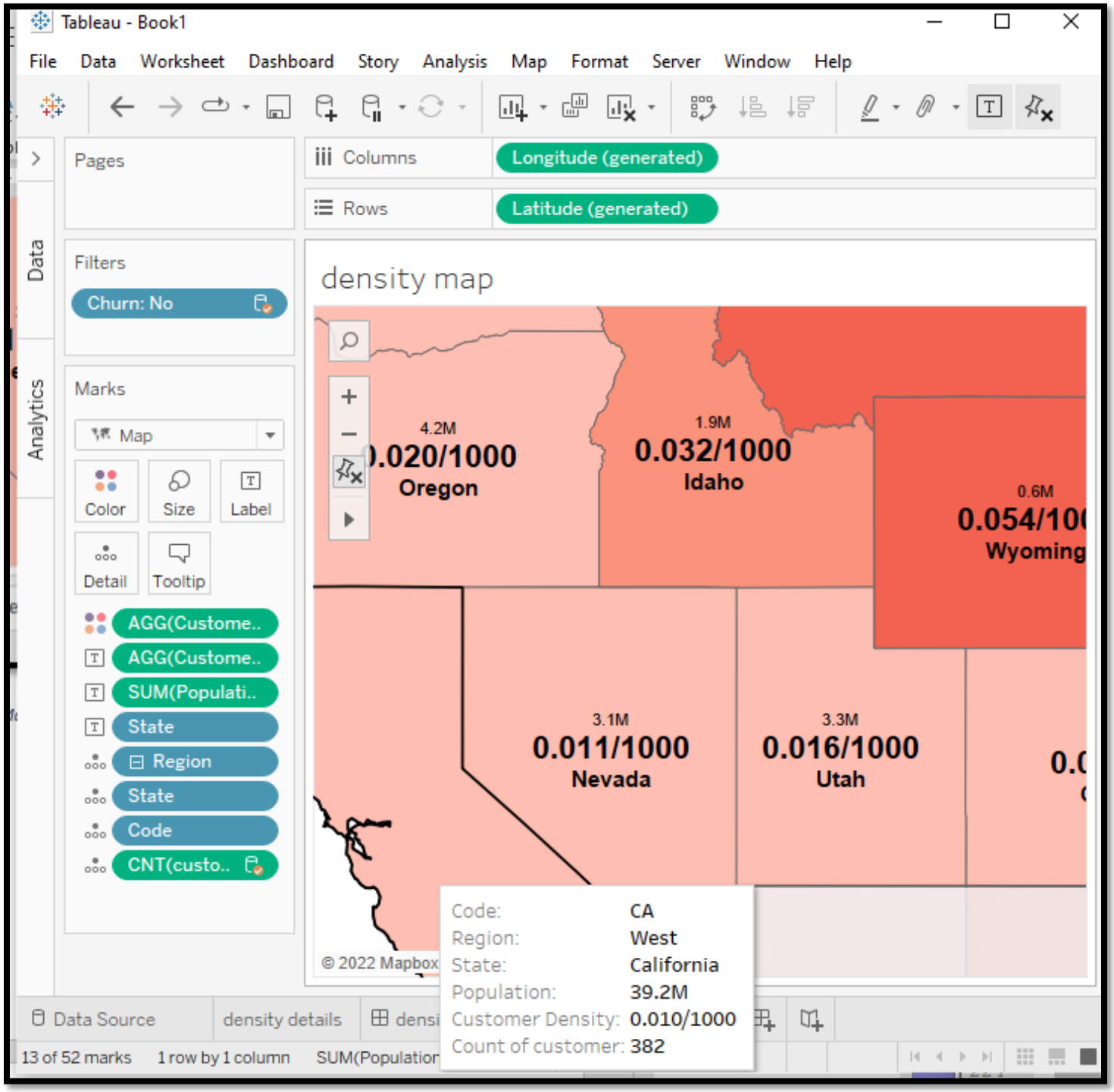

Figure 24 Final Density Map Worksheet

CREATE "DENSITY SUMMARY" WORKSHEET

Here is what the density summary worksheet will look like when completed:

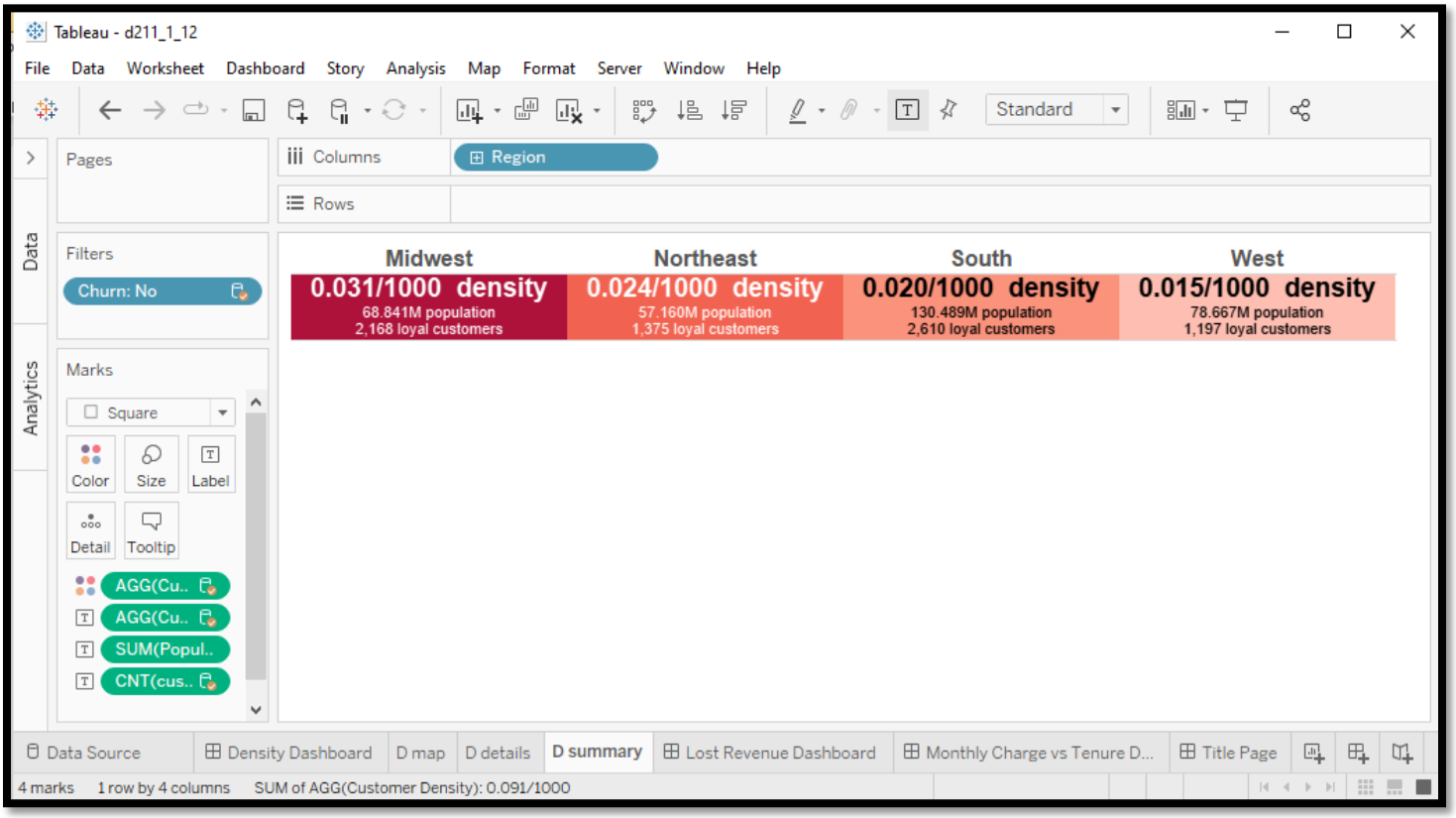

Figure 25 Final Density Summary Worksheet

54. Create new sheet named "density summary"

55. Drag "**Region**" to Columns

56. Double-click "**Customer Density**". Click OK to branding error. Activate "States as linking field"

57. Drag "**Population**" to label and format as desired

58. Drag "**customer (Count)**" to label and format as desired

59. Drag "**Customer Density**" to color, change mark type to "**Square**"

60. Drag "**Churn**" to filter, then select only "No" for loyal customers

CREATE "DENSITY DASHBOARD" – BRINGING IT ALL TOGETHER

The final density dashboard will contain all the sheets we have created so far, and should look something like this:

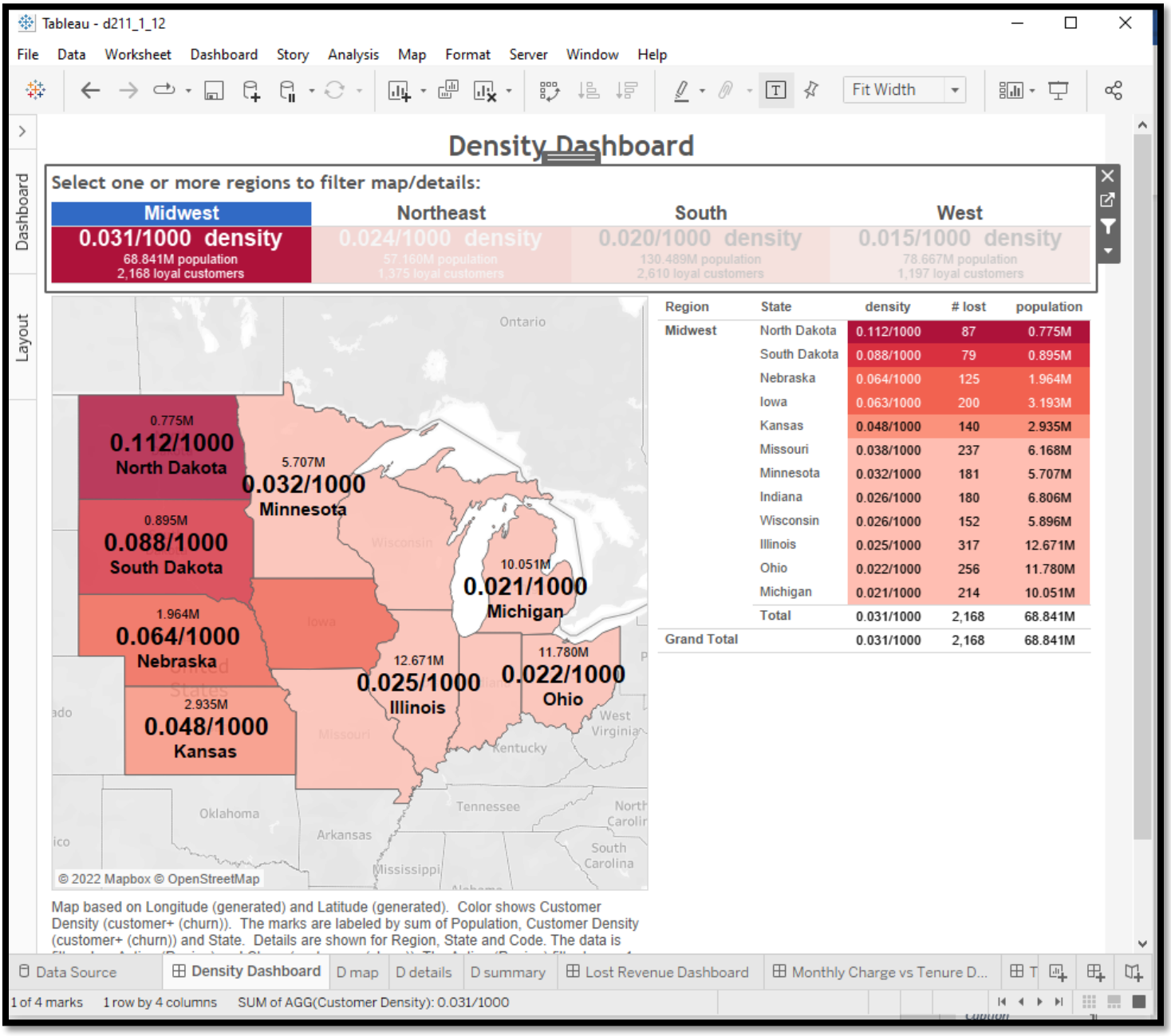

Figure 26 Final Density Dashboard

61. Create new dashboard named "**Customer Density Dashboard**"

62. Drag and arrange the sheets to form the dashboard, experiment with various layouts

63. Remove or update titles

64. Resize major areas of the dashboard

65. **Setup action filter on the top “density summary”.** Experiment with other action filters, but in the end, only one (1) action filter is used based on the “density summary”. When you click on a region in the “density summary”, the map and details will filter on the selected region(s).

66. Make final adjustments to fonts, alignments, layouts to either the dashboard or the individual sheets.

67. Preview final dashboard

68. Save your work