

Trade Area Creation and Sales Mapping in ArcGIS Online



Tutorial Overview

In this tutorial, you will learn how to display sales data and create trade areas at the Canadian census dissemination area (DA) level of geography. A trade area is the maximum distance a consumer is prepared to travel to obtain a good or service. For some companies that provide online goods or service purchases, their trade area could potentially be global in reach. These trade areas can help companies understand the demographic and psychographic characteristics of their customers and tailor their product selection in each store to those consumers.

The two main types of trade areas are overlapping and non-overlapping. Overlapping trade areas are trade areas that are generated regardless of other stores in the area. Non-overlapping trade areas are areas in which one store is dominant and has no competition for the goods or services it provides. For this tutorial, you will focus on creating non-overlapping trade areas.

The sales data that have been provided for this tutorial were created for the 2016 Census DA. The DA polygon layer was created and maintained by Statistics Canada along with a geographic breakdown of the associated census data (household counts, age, income, etc.) by DA. Because of this, many companies will transform their sales data to the DA level to ensure that any analysis that involves demographics and sales data is as accurate as possible. This is also why the trade areas that will be created in this tutorial will align with the DA polygon layer.

This tutorial is used in the **GIS in Retail** lesson which is part of the [Career Path Series](https://bit.ly/3iozTIQ) - <https://bit.ly/3iozTIQ>.

Note: Canadian Tire is the case study for this tutorial. The sales data were simulated specifically for this tutorial and are not reflective of actual Canadian Tire sales.

You will gain ArcGIS Online skills in this tutorial by using the following [analysis tools](https://bit.ly/2TNpJSo) - <https://bit.ly/2TNpJSo>:

1. Create Drive-Time Areas
2. Find Centroids
3. Join Features
4. Dissolve Boundaries

If you do not have ArcGIS Online accounts for yourself or your students, you can request them here: k12.esri.ca. Student accounts can be requested only by an adult (age 18 and over).

Part A: Exploring CTR Locations and Sales Data

First, you will explore a small set of actual Canadian Tire Retail (CTR) locations (**CTR Locations**), as well as their simulated sales data by DA (**DA_Sales_Polygon**). The CTR locations file has a **Store_Numb** column, which represents the unique identifier for each store.



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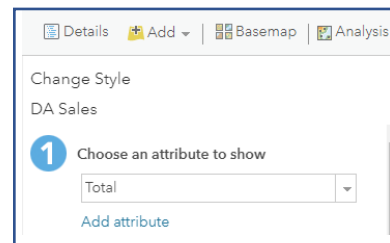
This sales data by DA consists of several fields. The **DAUID** field is the unique identifying number for each of the DA. Each of the fields labelled **CTR** followed by a four-digit store number (**0xxx**) represent the sales data for that store by DA. The **Total** column represents the total of **all store sales in one year for each DA**.

1. Click on <https://bit.ly/3ibl453> or type the url into a browser.
2. Sign into ArcGIS Online.
3. Save the map. Add your initials to the title: "Sales Mapping Activity 1- Initials"

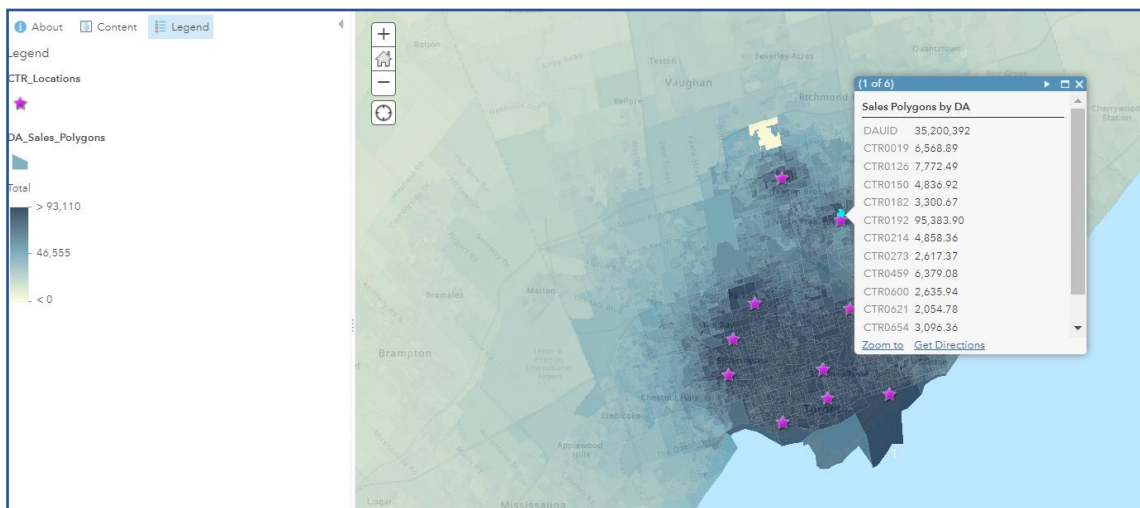
You should see 2 layers of data on your map. One represents the Canadian Tire Retail locations and the other is a polygon layer that includes sales data for each CTR store.

Change the symbology to show the total sales data for each DA.

4. Click on **Content** to view the data layers. Hover over the **DA Sales Polygon** and select **Change Style**. This will open a new window.
5. Under **Choose an attribute to show**, select **Total** in the dropdown menu
6. Click **Done**.
7. Click on **Legend**.



Now that you have added the data, explore the map by clicking on different polygons to view the sales data. The pop-up will display the DAUID, as well as sales for each of the CTR stores. If you click on one of the purple stars that represent the CTR locations, a pop-up will appear that will show you the store number of that location.



8. **Save** your map.

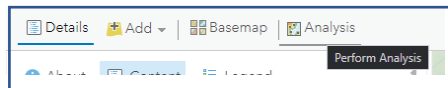


Part B: Creating Drive Times

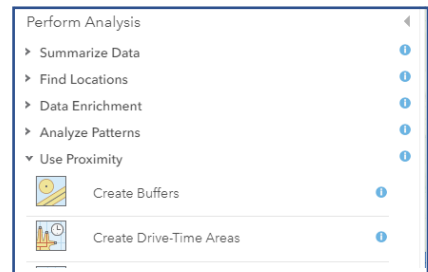
Now that the sales data are displayed, you can create trade areas using drive times for each of the stores. Using ArcGIS Online's analysis tools, you will create drive times around each of the stores as the basis for the trade areas. As stated above, your end goal is to have trade areas at the DA level of geography so that various analyses can be performed on them using sales and demographic data. To accomplish this, you will utilize drive time areas to associate each DA with a store. Drive time is the area in which a person could drive from a DA to a CTR store based on a given maximum time.

This part of the tutorial will focus on the creation of the drive time areas around each of the stores.

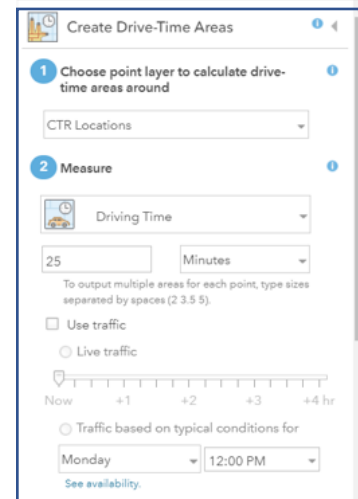
1. Click on the **Analysis** tab



2. Under the **Use Proximity** category, click on the **Create Drive-Time Areas** tool.
3. Under the **Choose point layer to calculate drive areas around**, select **CTR Locations**.

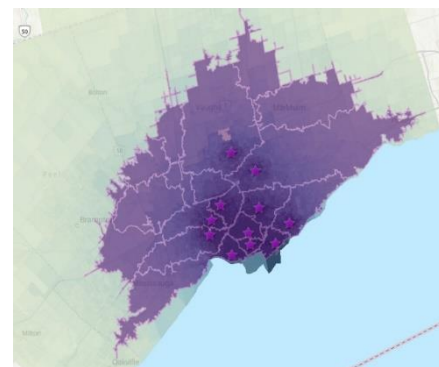


4. For **Measure**, select the **Drive Time** option in the drop down.
5. Type **25** and select **Minutes** as the assumed maximum time that a consumer would be prepared to drive to purchase an item at a CTR location. Leave the "Use Traffic" box unchecked.
6. **Travel direction** will remain as **Towards Facility**.
7. For **Areas from different points**, click on the **Split** Option. This will ensure the drive time areas do not overlap with each other.
8. Add your initials to the **Result layer name**.
9. Uncheck the **"Use current map extent"** box.



Note: "Save result in" will be the name of your school subscription unless you create a folder for this tutorial - <https://bit.ly/2VidehN>.

10. Click **Run Analysis**.
11. **Save** your map.

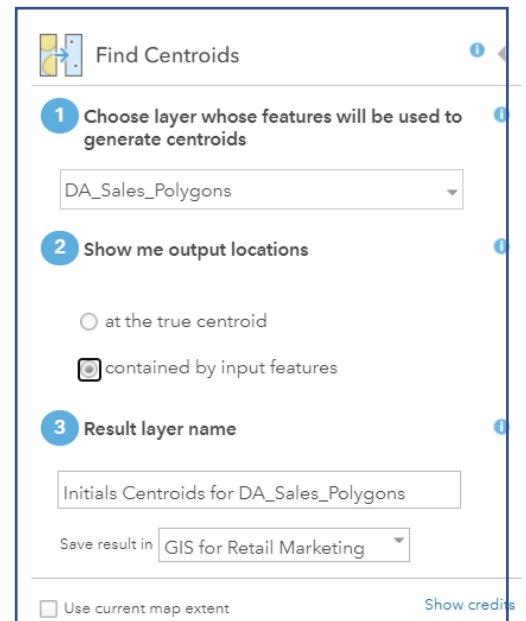
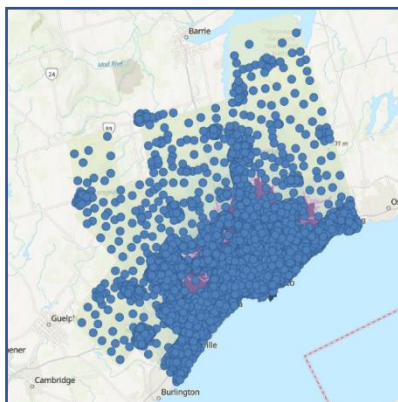
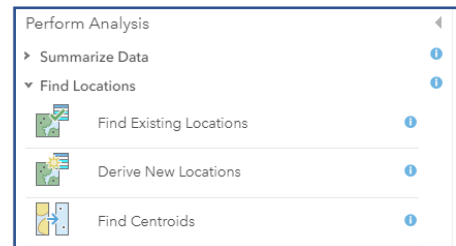
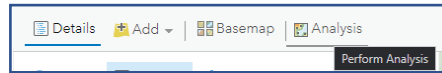


Part C: Creating Centroids

Now that the drive time areas have been created, you can transform them into trade areas at the DA level. To do this, you have to create a join to connect the DA sales layer (**DA Sales Polygon**) to the newly created drive time areas (**Travel from CTR Locations (25 Minutes)**). First, you want to ensure that the centre point of each DA is used to determine which drive time area each DA is assigned to.

Use the following steps to create a layer that has each DA represented by its centre point (centroid) rather than as a polygon.

1. Click on the **Analysis** tab
2. Under the **Find Locations** category, click on the **Find Centroids** tool.
3. For **Choose layer whose features will be used to generate centroids**, select the **DA Sales Polygon**.
4. Under the **Show me output locations**, select **contained by input features**.
5. Add your initials to the **Result layer name**.
6. Uncheck the **Use current map extent** box.
7. Click **RUN ANALYSIS**.



12. **Save your map.**

Part D: Different Types of Joins

Now that the DA centroid layer (**Centroids to DA Sales Polygon**) has been created, you will associate the drive time areas (**Travel from CTR Locations 25 Minutes**) to the **DA Sales Polygon**.

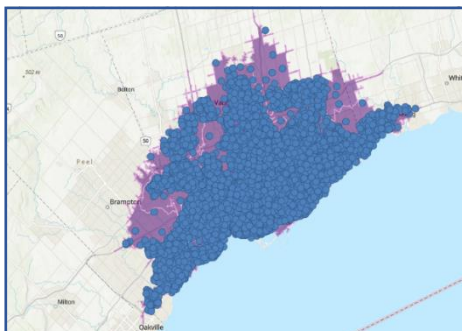
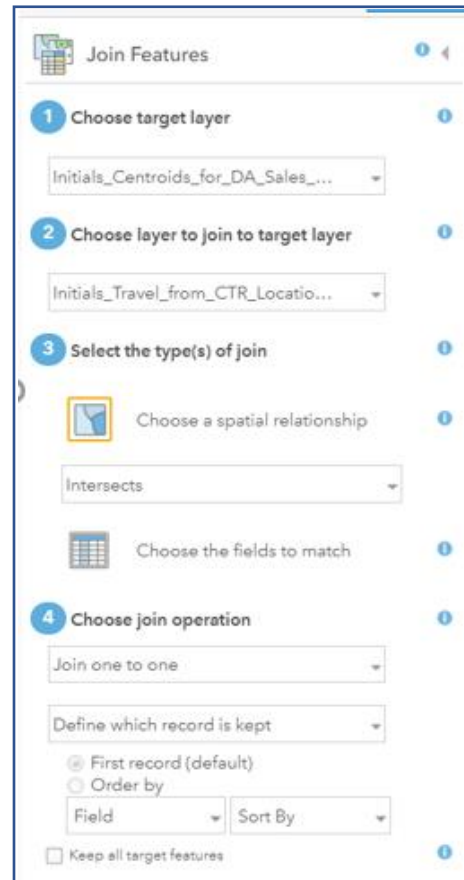
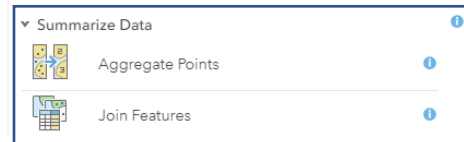
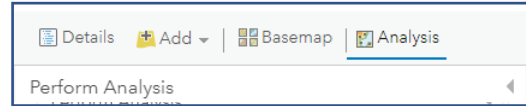


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First, you will create a *spatial join* between the **Centroids_to_DAs_Sales_Polygon** layer to the **Travel from CTR Locations 25 Minutes**. A *spatial join* is when two files are joined based on their common location.

Then, you will create an *attribute join* between the file that will be created in the first part and the **DA Sales Polygon**. An *attribute join* is when two files are joined based on a unique identifier (a common field or attribute) that exists in both datasets that are being joined. In database terms this is called the primary key.

1. Click on the **Analysis** tab.
2. Under the **Summarize Data** category, click on the **Join Features** tool.
3. For **Choose target layer**, select the **Centroids for DA Sales Polygon** layer (it may be labelled differently).
4. Under the **Choose layer to join to target layer**, select the **Travel from CTR Locations 25 Minutes** areas.
5. For **Select the type(s) of join**, select **Choose a spatial relationship**. Leave as **Intersects**.
6. All settings under **Choose join operation** will remain the same.
7. Add your initials to the **Result layer name**.
8. Uncheck the **Use current map extent** box.
9. Click **RUN ANALYSIS**.



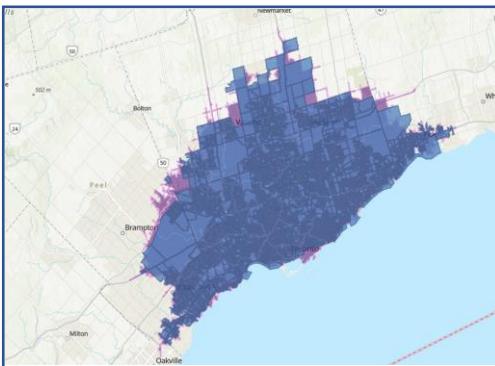
10. **Save** your map.



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Once the spatial join is complete, you can create the attribute join based on the primary key field in both attribute tables, namely the census DA code, or DAUID (dissemination unique identifier).

11. Repeat steps 1 and 2 from the previous page to open the *Join Features* window.
12. For **Choose target layer**, select **DA Sales Polygon**.
13. Under the **Choose layer to join to target layer**, select **Join_Features_to_Centroids_for_DAs_Sales_Polygon**.
14. For **Select the type(s) of join**, select **Fields to match**.
15. Both the **Target field** and **Join field** should be set to **DAUID**.
16. All settings under **Choose join operation** will remain the same.
17. Add your initials to the **Result layer name**.
18. Uncheck the **Use current map extent** box.
19. Click **RUN ANALYSIS**.



20. **Save** your map.

Join Features

- 1 Choose target layer**
DA_Sales_Polygons
- 2 Choose layer to join to target layer**
InitialsJoin_Features_to_Initials_...
- 3 Select the type(s) of join**
Choose a spatial relationship
Choose the fields to match
DAUID = DAUID
Target field = Join field
- 4 Choose join operation**
Join one to one
Define which record is kept
 First record (default)
 Order by
Field Sort By
 Keep all target features
- 5 Result layer name**
Initials|Join_Features_to_DA_Sales_Polygon
Save result in GIS for Retail Market
 Use current map extent
 Create results as hosted feature layer view

RUN ANALYSIS

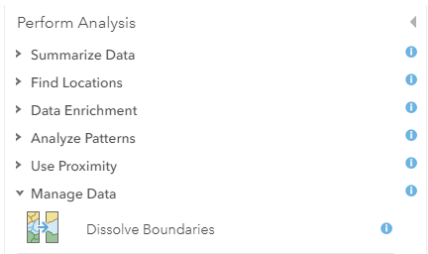
Part E: Dissolving DA boundaries

The final step is to “Dissolve” or amalgamate our newly assigned DAs (**Join_Features_to_DA_Sales_Polygon**) into trade areas for each store. Using the ArcGIS Online analysis Dissolve tool you will dissolve DAs with the same value into larger trade areas for each store rather than by DA boundary.

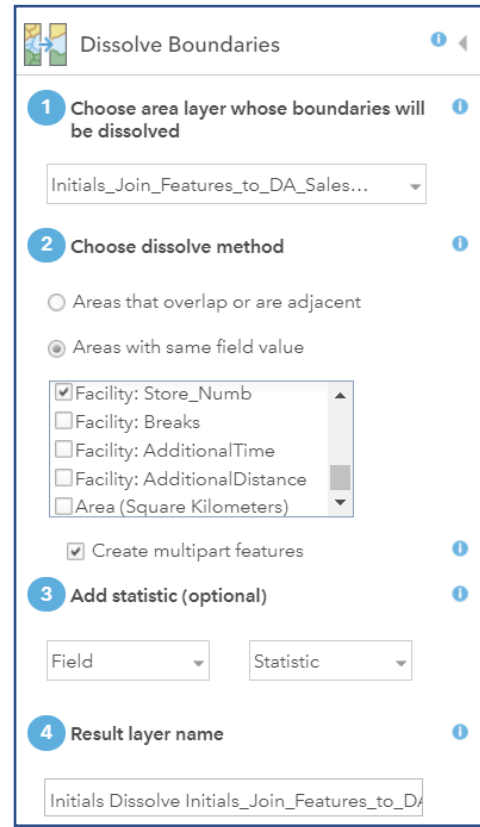


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1. Click on the **Analysis** tab.
2. Under the **Manage Data** category, click on the **Dissolve Boundaries** tool.

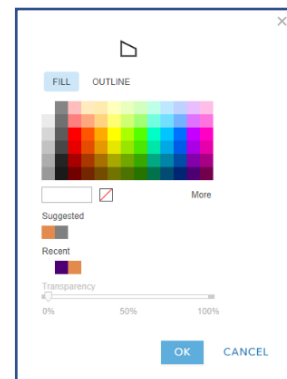


3. For **Choose area layer whose boundaries will be dissolved**, select **Join_Features_to_DA_Sales_Polygon**
4. Under **Choose dissolve method**, check, select **Areas with same field value** and, of the **Facility: Store_Numb** check box from the list
5. *Add your initials to the **Result layer name**.*
6. Uncheck the **Use current map extent** box.
7. Click **RUN ANALYSIS**.



Change the symbology to display the newly dissolved store catchment or trade area boundaries.

8. Navigate to the **Change Style** tile under the **Dissolve_Join_Features_DA_Sales_Polygon**.
9. Under **Choose an attribute to show**, click on the **OPTIONS** button.
10. Click on the box beside **Symbols**.
1. Set the **FILL** to no colour (Box below colours with a slash in it) and set the **OUTLINE** colour to a **light yellow**.
2. Click **OK**.
3. At the bottom of the **Change Style** box, click **OK** and **Done**.



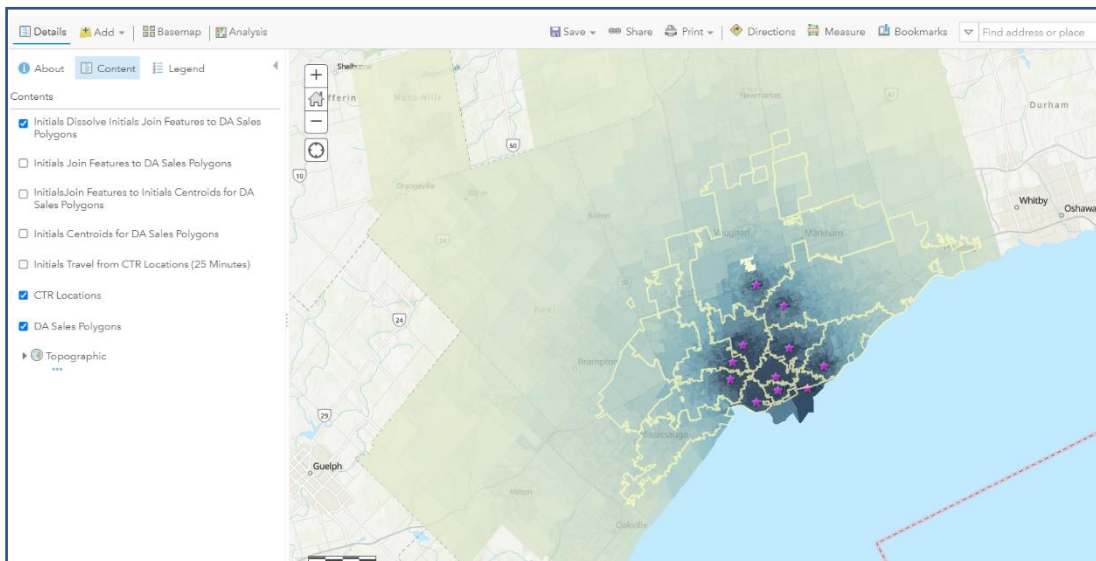
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4. Turn off (uncheck boxes next to name) all layers except the **DA Sales Polygon**, **CTR Locations**, and **Dissolve_Join_Features_DA_Sales_Polygon** layers.
5. **Save** your map.

Now that you have completed the tutorial, you will have a map that shows you the CTR store locations, trade areas (the yellow polygons) based on a maximum 25-minute drive time, the original DA boundaries, and the total store sales by the original DAs (represented by the coloured polygons).

Note the decline in sales revenue with increasing distance from each store. This is called Distance Decay – the idea that the farther away you are from goods or services, the less likely you are to make use of it.

Zoom into the map to identify by visual inspection potential locations for new stores along the intermediate boundaries between various trade areas for adjacent stores.



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