

RETAIL GRAVITY MODEL ASSIGNMENT

Module 7 – Assignment Instructions

Market Analysis – Determining the trade (or market) Area







Albert E. Myles, an Economist and Extension Professor Department of Agricultural Economics at Mississippi State University, teaches that an important first step in any market analysis is to define a business's, organization's, or a town's trade area. A trade area is determined by the destination's **ability to attract customers** given impeding or enhancing factors. Knowing the boundaries of the trade area helps defines the number of potential customers that may patronage a given location.

What is a Trade Area?

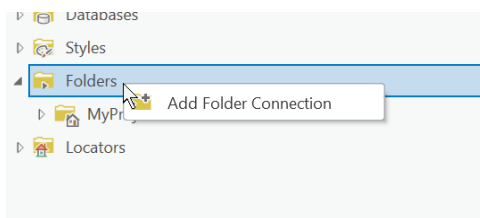
The farthest distance consumers are willing to travel to purchase retail goods and services. The size of a retail trade area depends on the variety of goods and services offered in the community and its proximity to competing retail markets. Trade area analysis provides the foundation for:

- understanding the geographic extent and characteristics of store patronage,
- assessing performance spatially,
- performing competitive analysis,
- evaluating market penetration and market gap analysis, and
- target marketing (Segal)

First be sure to login to the ArcGIS 2020 -2021 lab. This is where you can access ArcGIS Pro. Once you have logged in, download the Gravity zipped file into your workspace and extract the contents. Everything you will need to complete this assignment will be present. Here is a screenshot of the contents you should have.

<input type="checkbox"/> Name	Date modified	Type	Size
 Data	9/9/2020 9:18 AM	File folder	
 Scripts	9/9/2020 9:18 AM	File folder	
 Templates	9/9/2020 9:18 AM	File folder	
<input type="checkbox"/>  ToData	9/9/2020 9:18 AM	File folder	
 GravityModeling.tbx	9/9/2020 9:18 AM	TBX File	155 KB
 illustration	9/9/2020 9:18 AM	PNG File	178 KB

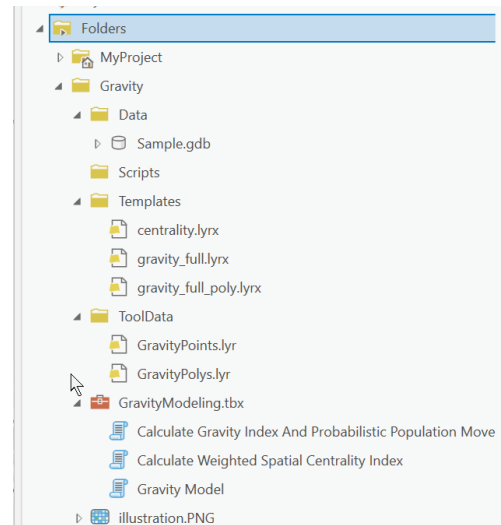
Open ArcGIS Pro and start a new project. You may also need to access the folder location of the data. Open the Catalog Pane under the View tab on the top ribbon. Right click the Folders icon in the Catalog window. Navigate to the folder containing the Gravity data.



The result should look something like the following. Please open the folders within the Data to get an understanding of what the Gravity data contains.

This exercise is one that looks at the location of existing grocery stores in an area of Boston. In this assignment you will:

- Create an existing trade area for several competitive stores,
- Add a new store and rerun the primary trade for each store.
- Create a view of the primary and secondary trade areas for the new store (the one you added)



Primary trade area for each store

Next, click and bring the Study Area polygon file on the map. This is the area where the Market Analysis will be performed. Symbolize this polygon as a hollow area with a red boundary.

Now add the census block layer on to the map. Again, symbolize this layer as hollow areas with a bluish boundary. (These census blocks were clipped (using the study area) from a layer found on the ESRI living Atlas.)

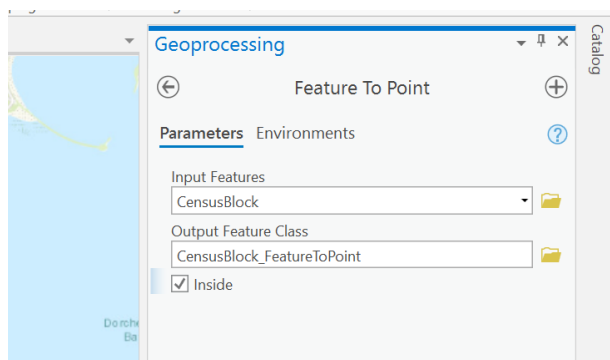
Finally, add the current locations layer onto the map and symbolize using a larger green dot.

You should have something that looks like the following:

As the size of a retail store increases, the probability increases that a consumer will patron a retail location. Similarly, the likelihood customers will frequent that store decreases when distance increases (because it's in the denominator).

While the existing stores (Destinations) are already point features, the Census Blocks (Origins) are still represented as polygons. These polygons need to be converted to points. This is an easy process by utilizing the Feature to Point tool.

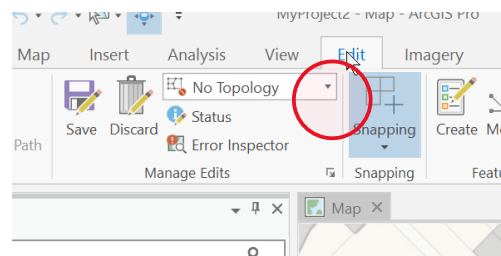
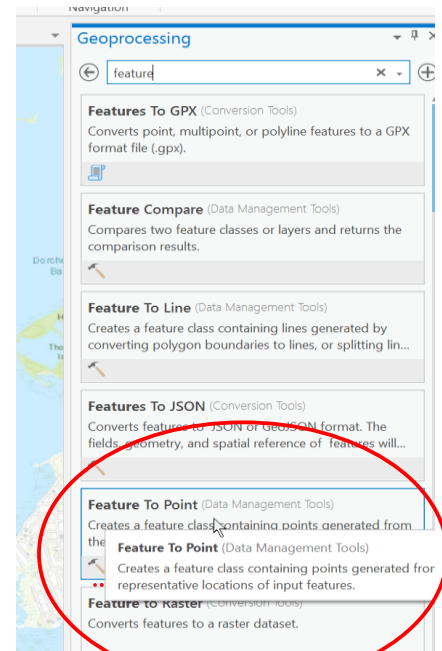
This tool can be found in the general toolbox. A search can be performed to find the tool. Using the tool is also simple.



INSIDE Specifies whether to use representative centers of input features or locations contained by input features as the output point locations.

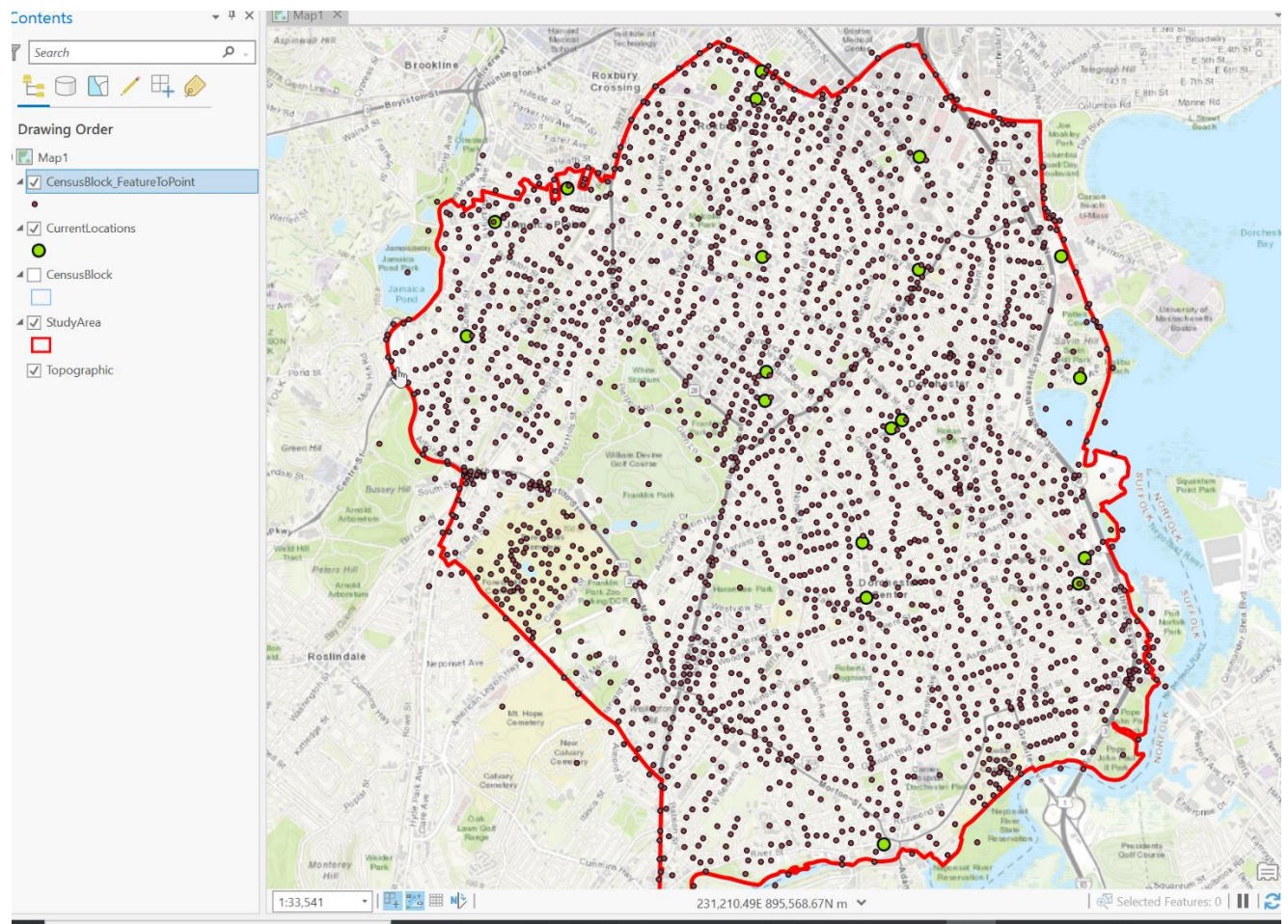
Unchecked—Uses the representative center of an input feature as its output point location. This is the default. This location may not always be contained by the input feature.

Checked—Uses a location contained by an input feature as its output point location.



Save your project your lastname and Module 7

Here is what you should have at this point. The census blocks have been converted to points. All the data from the census blocks have been carried over to the points.

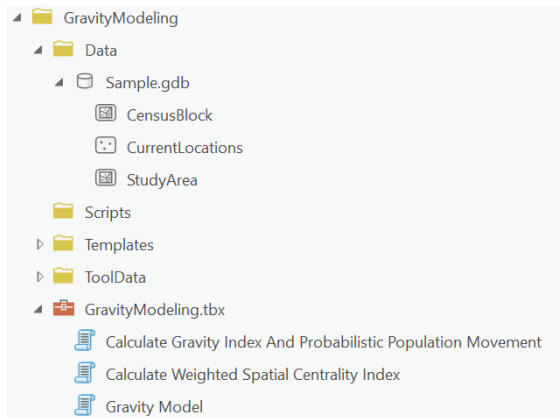


Running the Huff Gravity Model -

This model calculates the probabilistic attraction an origin will feel towards a destination based on the distance between that origin and destination and the attractiveness (i.e. mass, utility) of the destination.

In measuring the attraction between an origin and a destination, the probability of an origin being attracted to a destination is directly proportional to the attractiveness of the destination (the higher the attractiveness, mass, or utility, the more the origin is attracted to the destination) and inversely proportional to the distance between the origin and destination (the further the destination is from the origin, the less attractive is that destination)

From this point you are ready to run the gravity model. Go to the catalog and the work area where you unzipped the Gravity file at the beginning of this exercise.



Go into the toolbox and click on the Gravity tool. Fill in the prompts as shown below run the tool. The results may take a few minutes, but should look like the following (colors may be a bit different on yours)

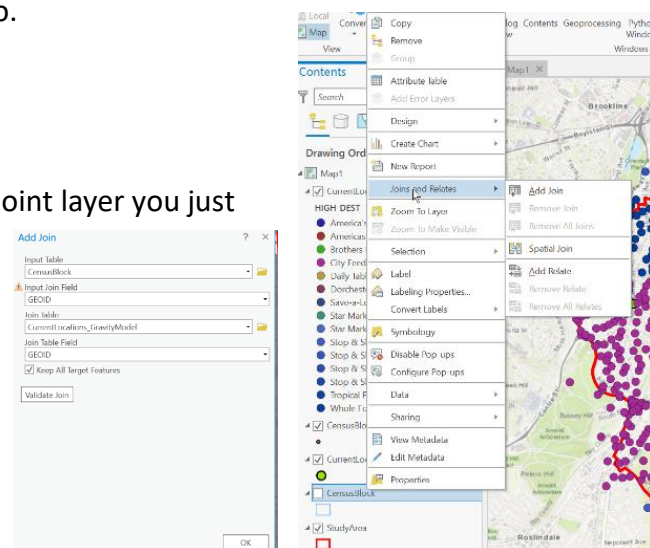
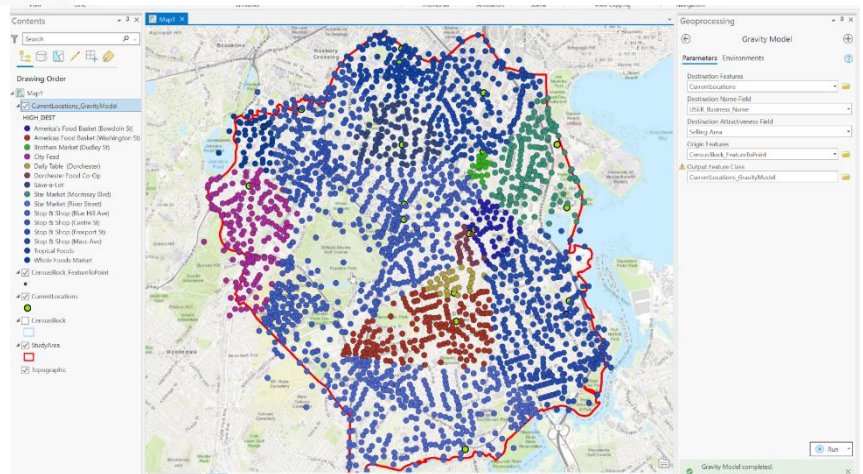
Remember, the Huff Gravity model incorporates distance and floor size of the destination to calculate the store's weight. *"People will travel farther to a store that is larger in size"*.

The points in the map above are symbolized on the store name. Each color represents a store in the study area. If you look at the attribute table, you should notice at the very left side end a **column named "High_Dest"**. This attribute indicates that for that Census Block (point) the named store has the highest destination percentage. It is a bit confusing looking at the results of the gravity model with points. To make the data easier to view, we can move back to using the CensusBlock polygons by joining the two.

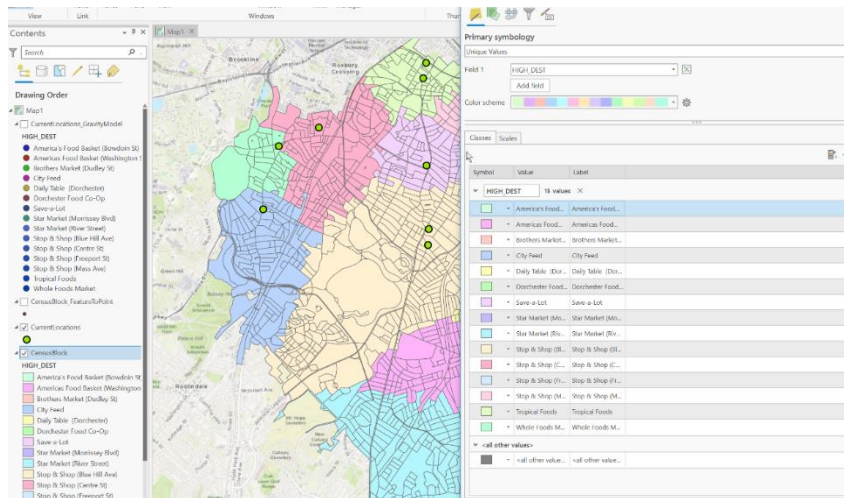
Please save your project.

Join the Census Block polygon layer to the point layer you just created.

Join the two layers on the common name of GEOID



When the two layers are joined, turn off the point file and turn on the polygon file. Symbolize the layer with unique colors using the High_Dest column. Should look something like the following:



The map to the left illustrates the primary trade area for each store.

Please save your project.

Now, add a new store, by adding a point using the address of - 259 Bowdoin St, Dorchester, MA, 02122. (this is address picked at random for this assignment)

To do this, on ArcGIS Pro, find the binoculars. Click on the icon, then click on the search option. Place the address above into the search field. The result should identify the Dollar Tree Store on Bowdoin Street.

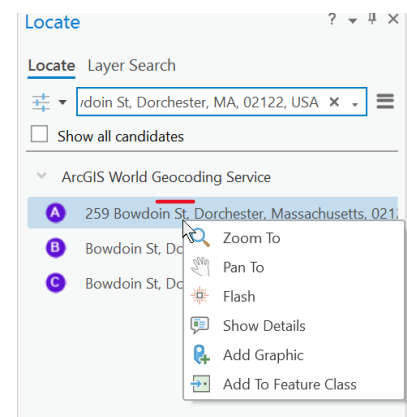
In the results list, right click on the result and choose Add to Feature Class and selected create a new feature Class. Please rename this new layer using your name.

Name of new store - ore - *yourname* Merchandise Mart

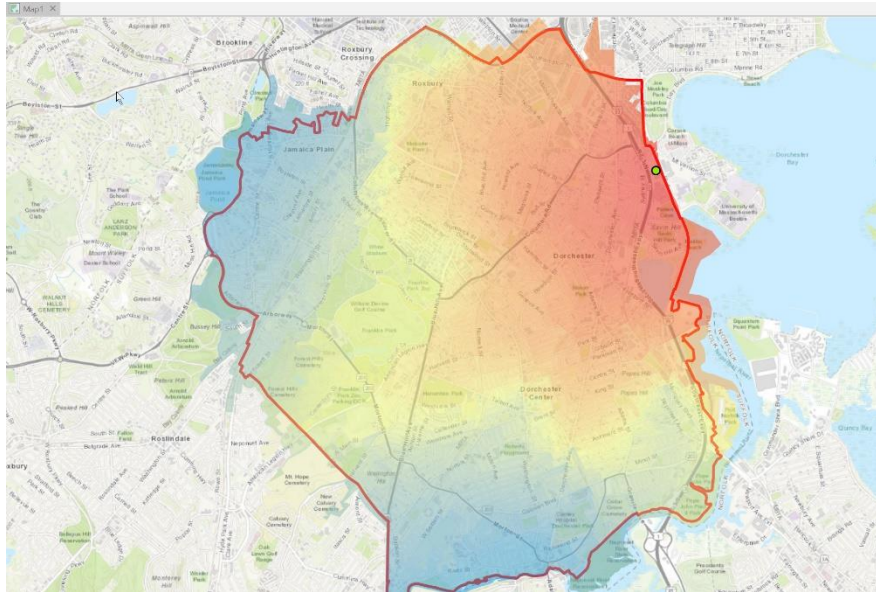
Also provide the selling floor square footage you want into the attribute table. **Don't forget to save you edits.**

Run the gravity model again with the new store (follow the same steps as from above).

Finally, select one of the stores, or the one you added. Right click on the Census Block polygon layer in the table of contents. Symbolize this layer using "Unique Value". In the field 1, select from the drop down the store you would like to use. Next, select a continuous coloring scheme. Find the gear icon next to the field input box. Click on the gear icon and click Apply to Outline. Then close the symbology windows.



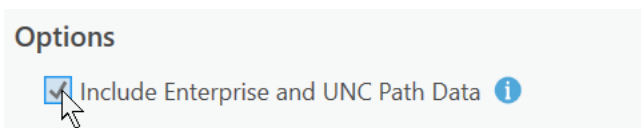
Should look something like this.



Please save your project again. Then, as we did in a previous assignment, please share this project as a Map Package. In other words, the deliverable will be the map project along with the data used and created.

Here is a video that may help. [Map Package](#) or you can google for more in for about sharing a map package in ArcGIS Pro.

Make sure the box to include enterprise and UNC Path Data is checked



The file that is created will be the deliverable for this assignment. Please include your name in the name of the file.