Tutorial: How to Generate Travel Times Using ArcGIS Online

For this tutorial, you will be finding the rural travel time (mode of travel: car) from every census tract centroid in Imperial County to each hospital in Imperial County using the GeoJSON file of Imperial County.

A centroid is the center point of a shape. A GeoJSON file is a format for encoding geographic data structures and features.

To obtain the GeoJSON file for Imperial County, follow this tutorial separately (replace information with Imperial County information): https://nbviewer.jupyter.org/github/pysal/access/blob/master/notebooks/How%20to%20Read%2C%20Filter%2C%20and%20Convert%20Shapefiles%20to%20.geojson.ipynb

If you don't want to use the GeoJSON file, you can also use the Imperial County shapefile. However, it will not be as in-depth as a GeoJSON file; shapefiles provide the shape for larger geographic areas but do not include census designated locations and all census tracts in an area.

Screenshots of the tutorial to follow along can be found here.

What you'll need:

1. ArcGIS Online
    - UCR Students and Faculty have access to use ArcGIS Online; sign in with enterprise login
2. Data (download before tutorial)
    - Imperial County GeoJSON file
    - Imperial County Hospitals (with coordinates)

Step 1: Log in to ArcGIS Online using the UCR enterprise login and create a new map

Step 2: Click on "add content to map" and select "add layer from file

Step 3: Choose and import ic_tracts.geojson file

Step 4: Once imported, make sure for the "Change Style" section, you select "Show location only" for the attribute to show.

Step 5: Change the drawing style, which should show "Location (Single symbol)," by clicking on OPTIONS. Click on "Symbols" and set "FILL" to 100% transparency. Click on "OUTLINE" and select black for the color. Set transparency to 0% and then click "OK." Click "OK" and "DONE" to save it.

Step 6: On the sidebar, under "ic tracts," click on the symbol that looks like a square with dots in it; this is the "Perform Analysis" function. Click on "Find Locations" and then click on "Find Centroids." Make sure the layer chosen is "ic_tracts." For the section that says "Show me output locations," click on "contained by input feature." For the result layer name, change it so it says "ic_centroids." Make sure that the checkbox that says "Use current map extent" is UNCHECKED. Click on "Run Analysis."

Step 7: Once you've generated the centroids for each census tract, you can adjust their appearance so they're less noticeable. Click on the symbol on the sidebar under ic centroids that has the circle, square and triangle. Click on OPTIONS for "Location (Single symbol)." Click on "Symbols" next to the dot and then change the appearance. For this example, the dot will be black and the symbol size will be 5 px. Click "OK," "OK", and "DONE" to save your work.

Step 8: Click on "add content to map" and select "add layer from file

Step 9: Choose and import ic_hospital_coordinates.csv file

Step 4: Once imported, make sure for the "Change Style" section, you select "Show location only" for the attribute to show.

Step 5: Change the drawing style, which should show "Location (Single symbol)," by clicking on OPTIONS. Click on "Symbols" and click on the "Shapes" dropdown menu under "SHAPE." Select "Public Safety" and select the circle hospital symbol. Adjust the size so it's 12 px. Click "OK," "OK", and "DONE" to save your work.

Step 6: On the sidebar, under ic centroids, click on the symbol that looks like a square with dots in it; this is the "Perform Analysis" function. Click on "Use Proximity" and click "Find Nearest." Make sure the staring location is "ic_centroids" and the nearest location is "ic_hospital_coordinates." For the measure, since Imperial County is a rural location and we want to find the travel times from each centroid to each hospital in the county, select "Rural Driving Time" under the "Measure" section. For this example, we will select the box next to "Use traffic" and will select "Traffic based on typical conditions for Monday at 12:00 PM." These setting can be changed and altered depending on how

you'd like. From there, make sure the boxes next to "limit the number of nearest locations" and "limit the search range" are not selected. For this example, we want to find all of the travel times for all of the regions; these settings can be changed depending on what you're looking for. Rename the result layer name to "travel_times" and make sure the box next to "Use current map extent" is UNCHECKED. Click "RUN ANALYSIS." It will take some time for it to run the analysis.

Step 7: Once you find the travel times, you will be presented with two new laters: "travel times" and "travel times - connecting lines." Uncheck the "travel times" layer on the sidebar. Additionally, drag the "ic hospital coordinates" layer to the top. Click on the circle, square and triangle symbol under "travel times - connecting lines;" make sure the attribute is "show location only" and select options for the "location (single symbol)" drawing style option. From there, click on "Symbols" next to the line and change the color to green and change the line width to 3 px. Click "OK," "OK", and "DONE" to save your work.

Step 8. Under "travel times - connecting lines," click on the table symbol. When you do this, a table will pop up at the bottom of your screen and it will include the minimum travel time in minutes, as well as the travel distance. These values are the time and distance it takes to go from one census tract centroid to each of the hospitals in Imperial County. If you scroll to the right, there will be a section that states "ic_centroids: ID" and "ic_centroids: GEO_ID." These values identify the census tract location and name. To export this data, click on the "Perform Analysis" symbol. Select "Manage Data" and then select "Extract Data." Select "travel times - connecting lines" for the layer to extract. For the study area, select "same as travel times - connecting lines." Make sure the data output is a CSV; change the file name to "travel_times_data" and make sure "Use current map extent" is unchecked. Click "Run Analysis." Once you do, you'll get a message that states that the data is being extracted and will be available in "My Content." Click "OK" and if you haven't already, be sure to save and rename your map according to what you want. From there, click on the top left corner that says "Home" and click on "Content." From there, you will see a file titled "travel_times_data." Click on it and then click "download" to download your data. When you click on the downloaded CSV file, you will have all of your data on a spreadsheet so you can use it to analyze.