



# Linking Tabular Data to Geospatial Data

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## Introduction

This tutorial gives an example to help students understand GIS technology allows people to connect data with geography. GIS can relate unrelated information by using location as the key index variable.

Sometimes people don't fully understand their data until they see how it relates to other things in a geographic context. And GIS can help people understand what belongs where.

Through this tutorial, student can get familiar with how to link tabular data to geospatial data by using ArcGIS Online. Instructors can add more exercises based on students' need.

## Download Data

Geospatial Data is the data about a object that has a geographic component.

The [Big Ten Academic Alliance Geoportal](#) connects users to digital geospatial resources, including GIS datasets, web services, and digitized historical maps from multiple data clearinghouses and library catalogs. The site is solely a search tool and does not host any data.

Visit the Project [Documentation](#) page to find out more about our project's history, committees, working groups, conference presentations, and journal articles.

The following steps show how to find geospatial data from BTAA geoportal and tabular data from U.S. Census:

1. Search the keywords "county boundary of Wisconsin" through BTAA geoportal
2. Open the first result "County Boundaries, Wisconsin 2015"
3. Click the "Original Shapefile" button to download the data. Save as "WI\_Counties\_2015.zip"

This polygon feature class represents boundaries of the 72 counties in Wisconsin. The data is derived from 1:24,000-scale sources. This feature class was last updated in June 2015.

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## County Boundaries, Wisconsin 2015

**Creator:** Wisconsin Department of Natural Resources

**Description:** This polygon feature class represents boundaries of the 72 counties in Wisconsin. The data is derived from 1:24,000-scale sources. This feature class was last updated in June 2015; refer to the Data Lineage section of the ArcGIS metadata for information about the nature of the update. For more information, contact the WI DNR Bureau of Technology Services.

**Place:** [Wisconsin](#)

**Subjects:** [Location](#), [Boundaries](#), and [Society](#)

**Type:** [Dataset](#)

**Temporal Coverage:** 2015


**Contributed by:** [Wisconsin](#)

### Related Items

**Collection**

[State of Wisconsin Open Data](#)

**Location**



**Links**

[Visit Source](#)

[Metadata](#)

[Cite](#)

**Downloads**

[Original Shapefile](#)

\ **Figure 01.** Polygon Feature Class for Wisconsin County Boundaries

1. Open U.S. Census website (<https://www.census.gov/en.html>) and search the keywords "wisconsin counties by population"
2. Open the first result "County Population Totals: 2010-2019" and click Wisconsin to download the table.

## Tables

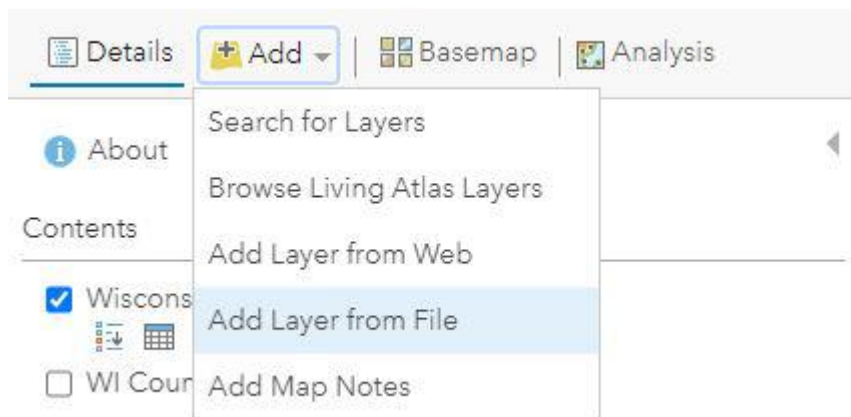
### Annual Estimates of the Resident Population for Counties: April 1, 2010 to July 1, 2019

United States	Kansas	North Carolina
Alabama	Kentucky	North Dakota
Alaska	Louisiana	Ohio
Arizona	Maine	Oklahoma
Arkansas	Maryland	Oregon
California	Massachusetts	Pennsylvania
Colorado	Michigan	Rhode Island
Connecticut	Minnesota	South Carolina
Delaware	Mississippi	South Dakota
District of Columbia	Missouri	Tennessee
Florida	Montana	Texas
Georgia	Nebraska	Utah
Hawaii	Nevada	Vermont
Idaho	New Hampshire	Virginia
Illinois	New Jersey	Washington
Indiana	New Mexico	West Virginia
Iowa	New York	Wisconsin
		Wyoming

\ **Figure 02.** Annual Estimates of the Resident Population for Counties in Wisconsin: April 1, 2010 to July 1, 2019 (CO-EST2019-ANNRES-55), U.S. Census Bureau, Population Division, March 2020

## Prepare Data

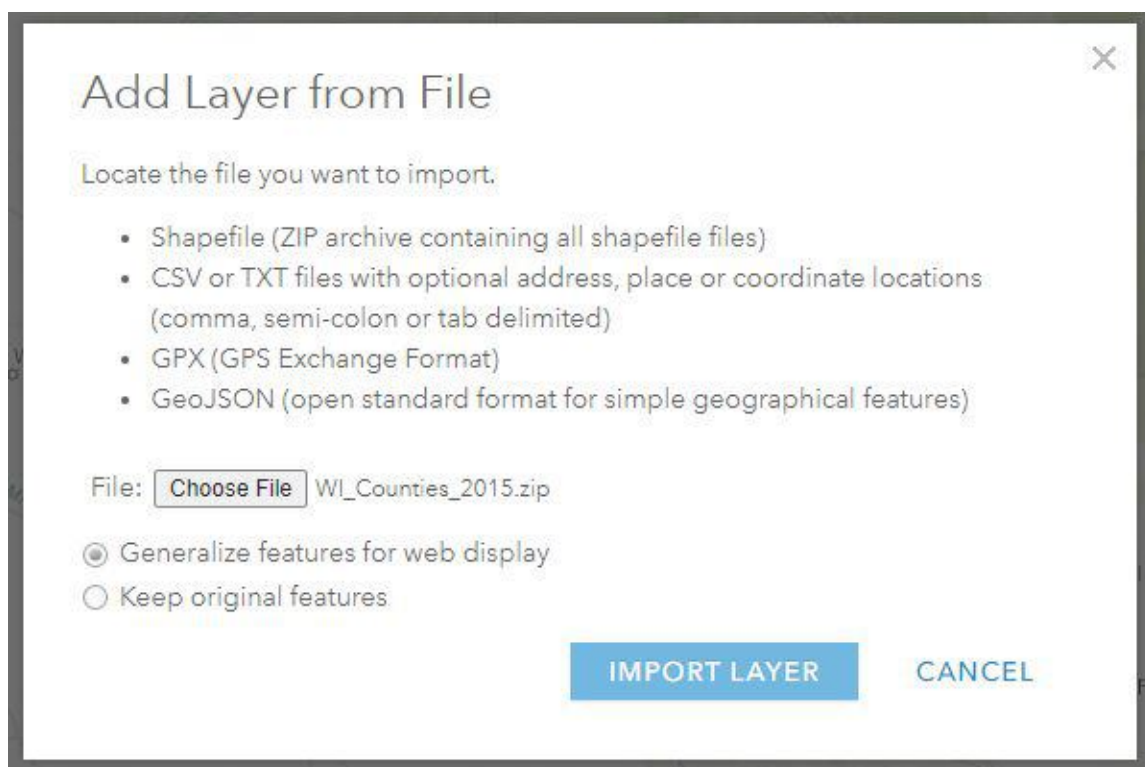
1. Log into ArcGIS Online and create Web Map



\ **Figure 03.** Adding a

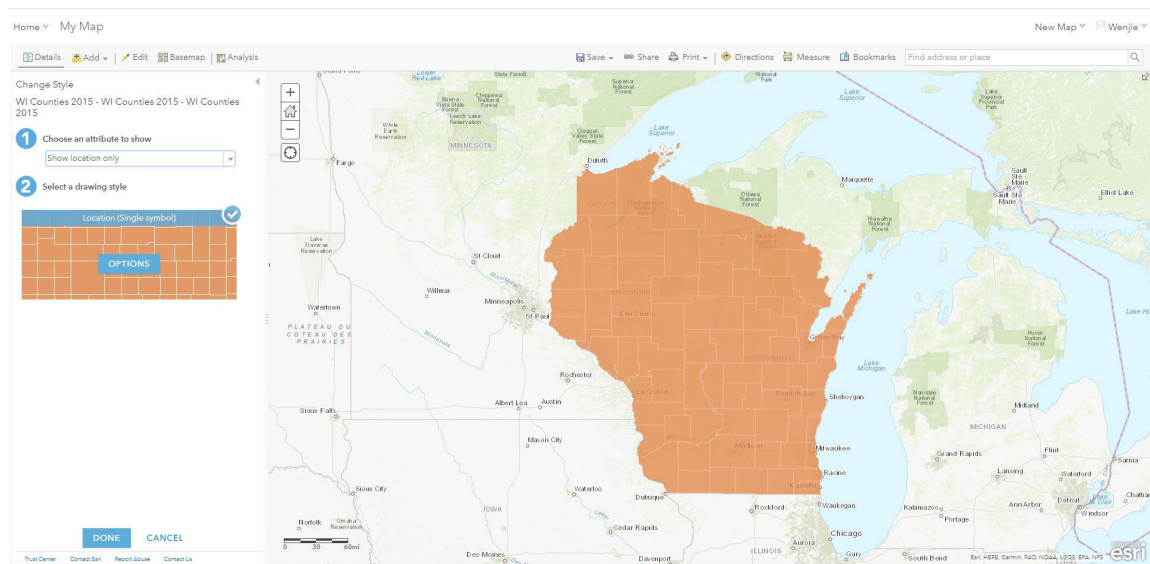
Layer in ArcGIS Online

1. Add WI\_Counties\_2015.zip as a new layer from File



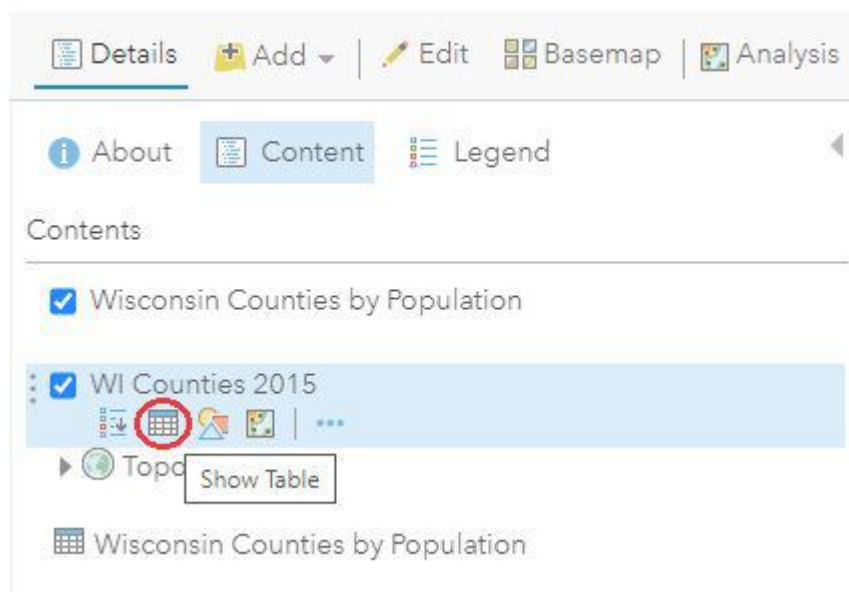
\ **Figure 04.** Choosing a File in ArcGIS Online

1. Choose an attribute to show. Here we use “show location only”



\ **Figure 05.** Choosing an Attribute to Show in ArcGIS Online

1. Click “show table” button to open attribute table and get to know what information was included in the geospatial dataset.



\ **Figure 06.** Show Table

in ArcGIS Online

Home My Map New Map Wenjie

Details Add Edit Basemap Analysis Save Share Print Directions Measure Bookmarks Find address or place

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- WI Counties 2015
  - Join Features to WI Counties 2015
  - Topographic
  - Wisconsin Counties by Population

WI Counties 2015 (Features: 72, Selected: 0)

DNR_REGION	DNR_CNTY_C	COUNTY_NAM	COUNTY_FIP	v3_layers
South Central Region	30	Kenosha	59	10
South Central Region	33	Lafayette	65	4
South Central Region	54	Rock	105	9
South Central Region	65	Walworth	127	9
South Central Region	23	Green	45	13
South Central Region	52	Racine	101	9
South Central Region	28	Jefferson	55	8
South Central Region	68	Waukesha	133	6
South Central Region	25	Iowa	49	4
South Central Region	41	Milwaukee	79	9
South Central Region	22	Grant	43	4
South Central Region	13	Dane	25	8
West Central Region	12	Crawford	23	3
South Central Region	53	Richland	103	6
South Central Region	67	Washington	131	9
South Central Region	46	Ozaukee	89	9
South Central Region	14	Dodge	27	8
South Central Region	57	Sauk	111	10
South Central Region	11	Columbia	21	7
West Central Region	63	Vernon	123	8
South Central Region	60	Sheboygan	117	8
North Central Region	20	Fond du Lac	39	8
North Central Region	39	Marquette	77	4
North Central Region	24	Green Lake	47	4
West Central Region	32	La Crosse	63	11
West Central Region	42	Monroe	81	9

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Figure 07. Attribute Table in ArcGIS Online

1. Create a new excel file and name it as "Wisconsin Counties by Population.csv". Copy and paste the county name column and population in 2019 column from U.S. Census spreadsheet into this new excel file. We need to use county name as the common field to link those two tables. Therefore, the name of counties in both table should be the same. Notice: paste the values only and revise the name of counties by using replace tool.

Table from U.S. Census

	A	B	C	D	E	F	G	H	I	J	K	L	M
2	Annual Estimates of the Resident Population for Counties in Wisconsin: April 1, 2010 to July 1, 2019												
3	Geographic Area	April 1, 2010		Population Estimate (as of July 1)									
4		Census	Estimates Base	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
5	Wisconsin	5,686,986	5,687,285	5,690,475	5,705,288	5,719,960	5,736,754	5,751,525	5,760,940	5,772,628	5,790,186	5,807,406	5,822,434
6	Adams County, Wisconsin	20,875	20,867	20,878	20,769	20,417	20,413	20,125	20,028	19,982	19,900	20,341	20,220
7	Ashland County, Wisconsin	16,157	16,157	16,143	16,029	15,838	15,970	15,995	15,804	15,633	15,501	15,587	15,562
8	Barron County, Wisconsin	45,870	45,873	45,814	45,890	45,777	45,581	45,349	45,367	45,242	45,141	45,150	45,244
9	Bayfield County, Wisconsin	15,014	15,008	15,000	15,059	15,057	15,113	14,973	14,976	14,923	15,006	15,026	15,036
10	Brown County, Wisconsin	248,007	248,003	248,476	250,481	252,682	254,211	256,202	257,856	259,514	261,762	263,165	264,542

New spreadsheet

	A	B
1	County	Population
2	Adams	20220
3	Ashland	15562
4	Barron	45244
5	Bayfield	15036
6	Brown	264542
7	Buffalo	13031
8	Burnett	15414

Attribute table of geospatial data

COUNTY_NAM
Adams
Ashland
Barron
Bayfield
Brown
Buffalo
Burnett

Figure 08. Shared Attribute Between Two Tables

1. Add the "Wisconsin Counties by Population.csv" as a new layer and choose "None, add as table"

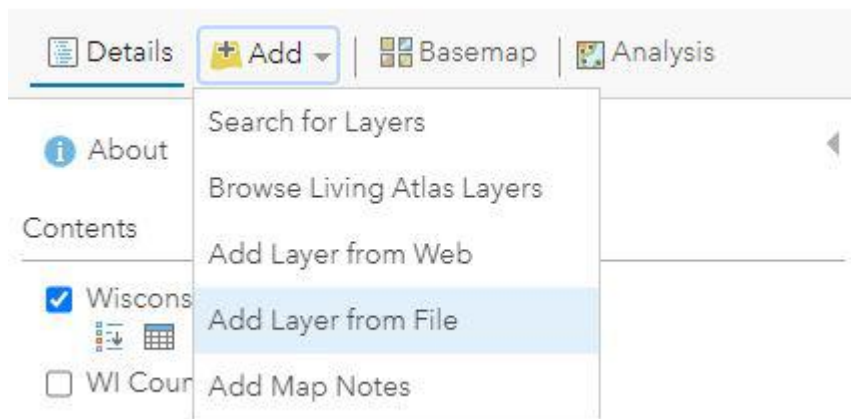


Figure 09. Add Layer

from File

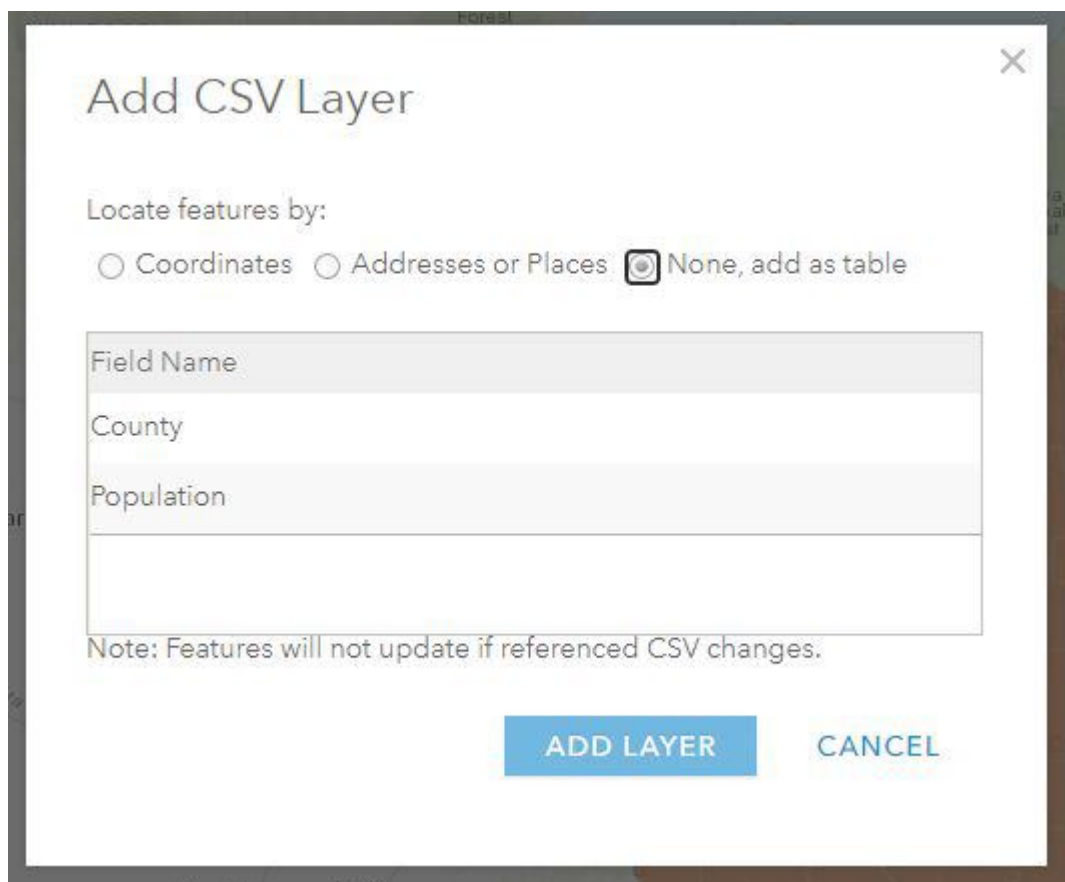


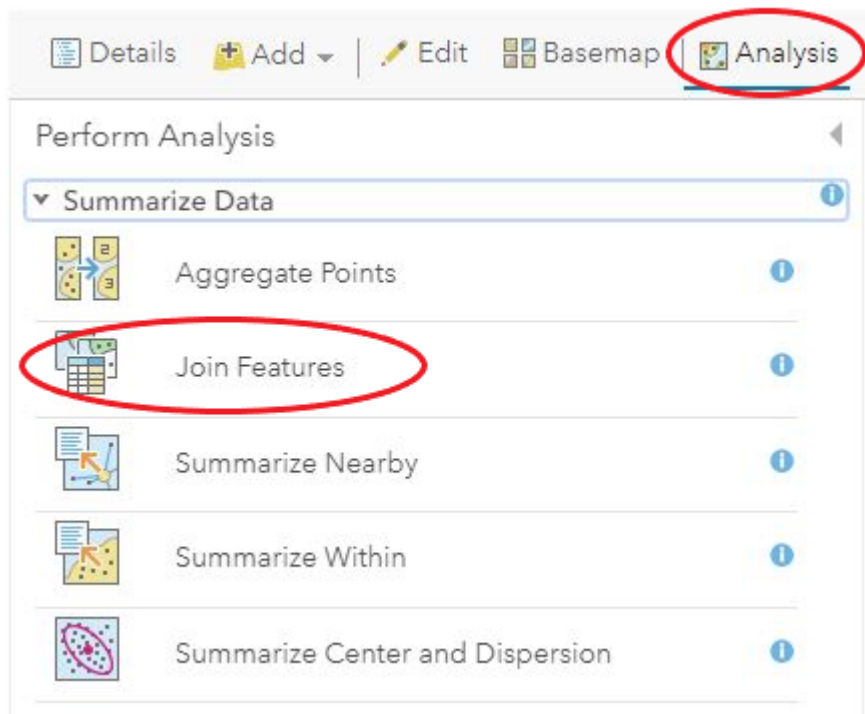
Figure 10. Add CSV

## Data Process

The following steps show how to link tabular data to the geospatial data:

1. Click Analysis and choose Join Features






\ **Figure 11.** Joining

Features

1. Choose WI\_Counties\_2015 as the “Target Layer” and Wisconsin Counties by Population as the “Layer to Join to the Target Layer”.
2. Choose the “COUNTY\_Nam” and “County” as the fields to match.
3. Choose a one-to-one join operation and name the result layer as Wisconsin Counties by Population.



# Join Features


1 Choose target layer

WI\_Counties\_2015


2 Choose layer to join to target layer

Wisconsin Counties by Population

3 Select the type(s) of join



Choose a spatial relationship



Choose the fields to match

COUNTY\_... = County

Target field = Join field

4 Choose join operation

Join one to one

Define which record is kept

☒ First record (default)
 ☐ Order by
 

Field

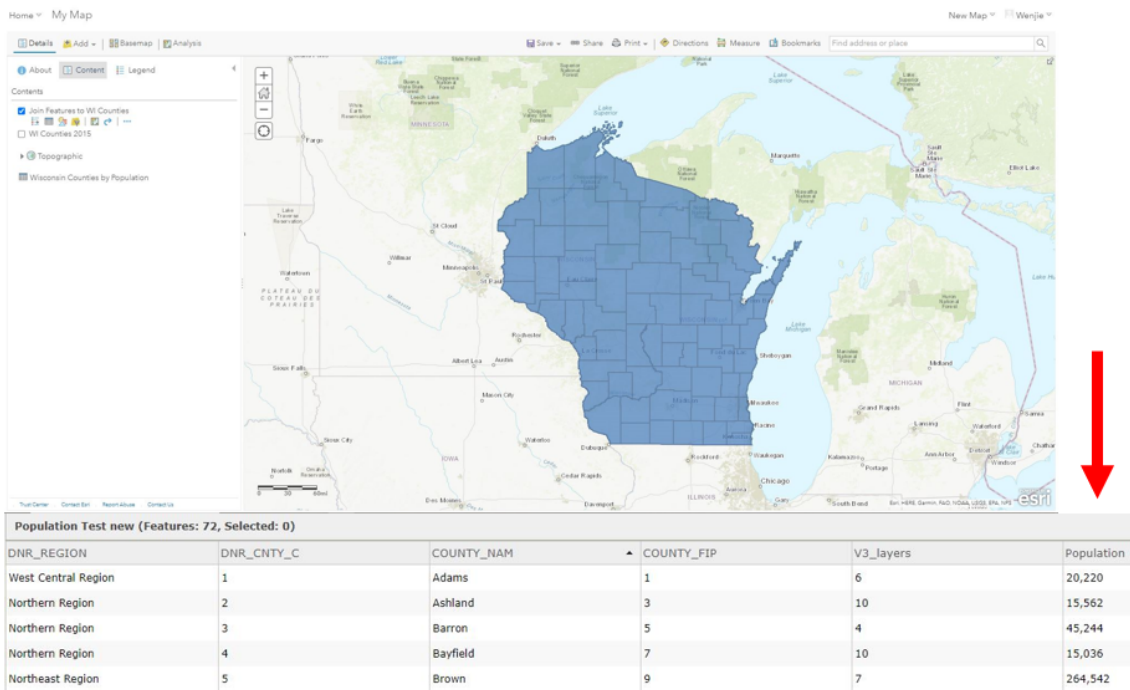
Sort By

☒ Keep all target features

\ **Figure 12.** Join Features

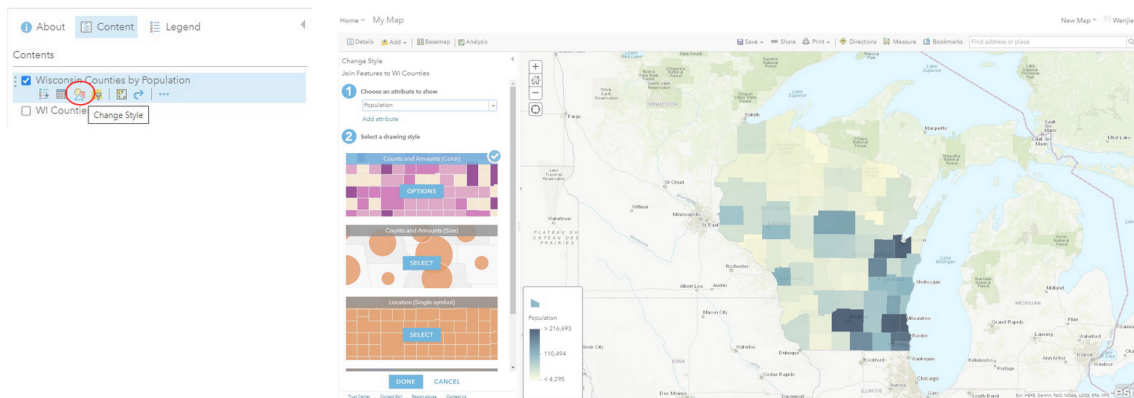
## Input Form

1. Click the Run Analysis button, and a new layer based on population will be shown.



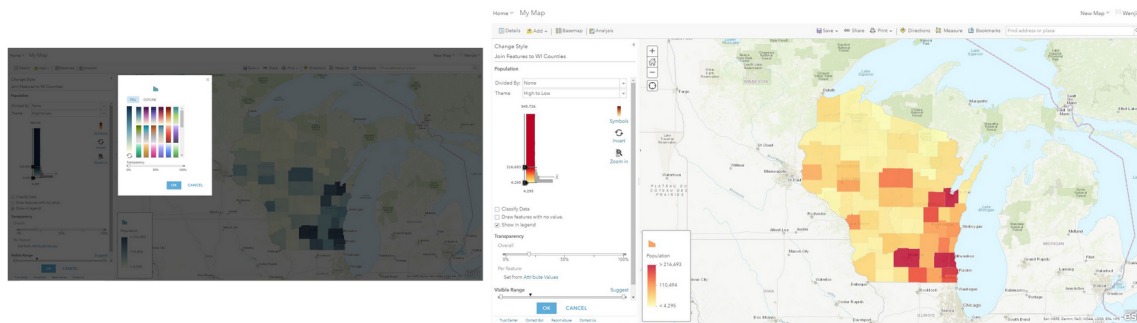
\ **Figure 13.** Join Output

1. Symbolize the Wisconsin Counties by Population layer by clicking “change style” button



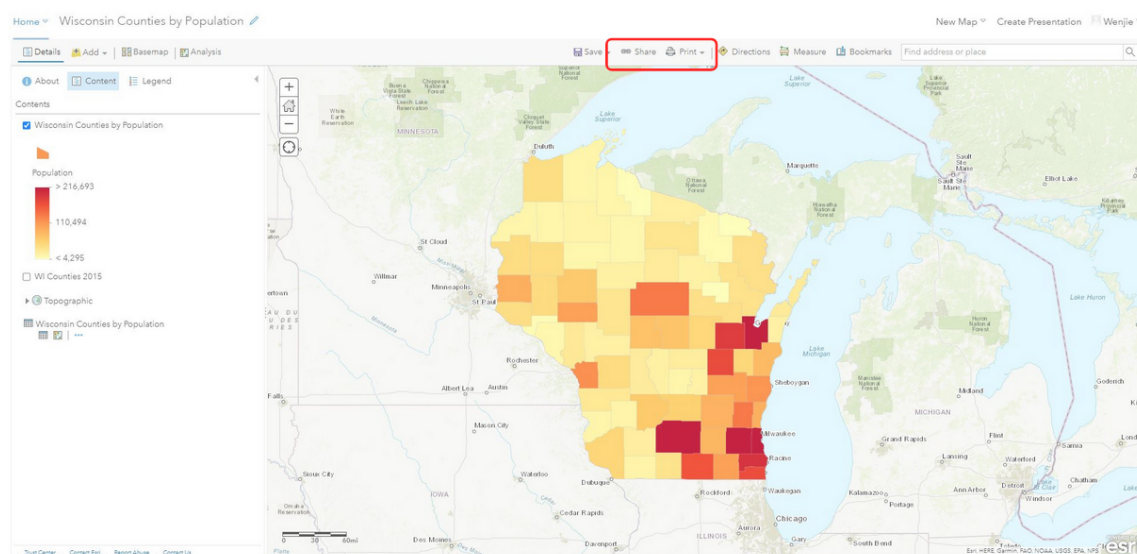
\ **Figure 14.** Change Layer Style

1. Choose the appropriate style to clearly show the population



\ **Figure 15.** Reset Choropleth Symbolology

1. Share or Print the Wisconsin Counties by Population map
2. For copyright information, refer to the copyright tutorial



\ **Figure 16.** Share or Print

## Exercise

1. What's the advantage of mapping tabular data?
2. Choose different basemap and use different symbol to create different thematic map.
3. Download a shapefile data related to students' research field and link their tabular data to it.

## Wrapping Up

This tutorial is part of an educational series produced by members of the [Big Ten Academic Alliance Geoportal](#). The BTAA Geoportal connects users to digital geospatial resources, including GIS datasets, web services, and digitized historical maps from multiple data clearinghouses and library catalogs. The

site is solely a search tool and does not host any data.\ To access additional tutorials in this series that cover various other topics, visit: <https://sites.google.com/umn.edu/btaa-gdp/tutorials>.

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