



Creating thematic maps with hexagons

Analyze Toxic Release Inventory

The most common shape type in GIS analysis and thematic mapping is the grid. Over the past few years, the hexagon has become increasingly popular. There are several advantages to using hexagons. Read more about the increasing use of hexagons and their advantage at [Why hexagons?](#) Esri has provided a series of hexagons called hexbins that can be accessed for aggregating and summarizing spatial data in the Living Atlas of the World. Individual published layers of hexagons can also be generated. Hexagons are useful in displaying data that has many overlapping points.

Build skills in these areas

- Aggregating point data
- Using hexbins from the Living Atlas of the World
- Enriching data
- Using an individual published hexagon layer
- Filtering data

What you need

- Account required
- Estimated time: 30 minutes – 1 hour



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Scenario #1: Analysis of Toxic Release Inventory

The Toxic Release Inventory (TRI) is a listing of US facilities that have certain toxic chemicals that may pose a threat to human health and the environment. The [Environmental Protection Agency](#) has asked for a visualization of the [TRI](#) sites that produce or have produced carcinogens. You have the point data, but many of the points are overlapping, which makes it hard to visualize patterns and clusters in the data. You have decided to use hexbins to visualize the data and have decided on a 10 km resolution hexbin.

1. Open and save the map

1. Sign into your [ArcGIS organizational account](#).
2. Open [USA TRI Carcinogens](#).
3. Click Content.
4. On the top ribbon click Save As.
5. Save the map with the following parameters:
 - a. Title: USA TRI Carcinogens
 - b. Tags: Use individualized tags
 - c. Summary: Toxic release sites within the USA

Save Map

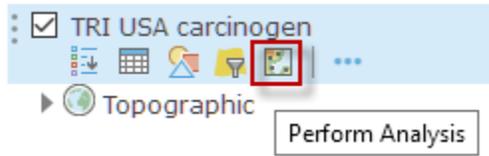
Title:	<input type="text" value="USA TRI Carcinogens"/>
Tags:	<input type="text" value="IGARC2_TRI_yourinitials X Add tag(s)"/>
Summary:	<input type="text" value="Toxic release sites within the USA"/>
Save in folder:	<input type="text"/>

SAVE MAP

CANCEL

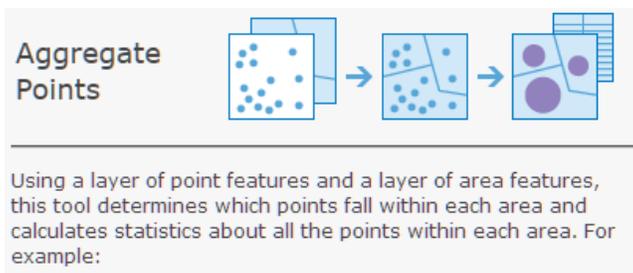
2. Aggregate TRI points within 20 km hexbin

1. Click perform analysis under the feature TRI USA carcinogen.

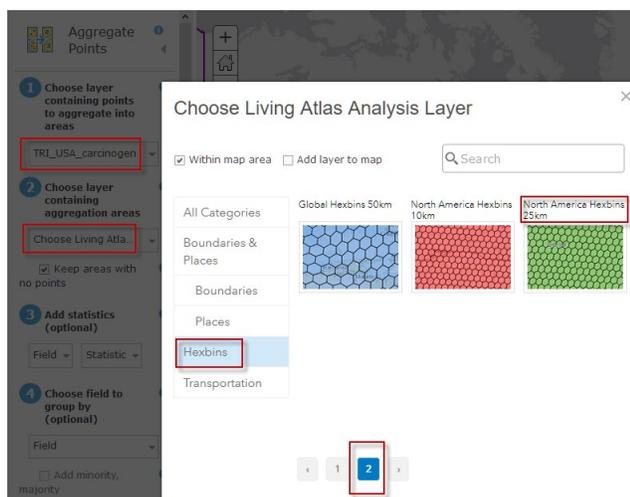


2. Click Summarize Data>>Aggregate Points.

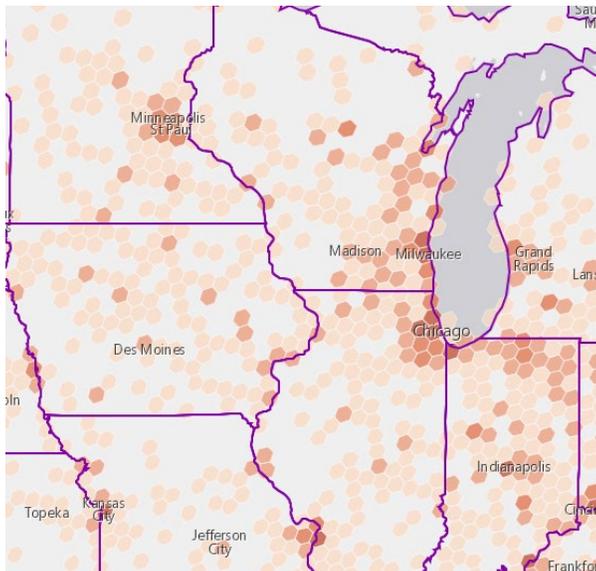
Using a layer of point features (TRI USA carcinogens) and a layer feature (hexbin), this tool determines which points fall within each area and calculates statistics about all the points with each area. The layer hexbin will be obtained from the Living Atlas of the World.



3. Click Aggregate Points.
 - a. TRI_USA carcinogen is the layer containing points to aggregate into areas.
 - b. Choose Living Atlas Analysis Layer in the Choose layer containing aggregation areas. You will find this on the drop-down menu under Choose the polygon layer.
 - o Click Hexbins
 - o Choose North America Hexbins 25 km.
4. Uncheck Use current map extent.



5. Uncheck Keep areas with no points.
6. Uncheck Use current map extent.
7. Before running analysis, check number of credits used and validate that you have enough credits to do this analysis.
8. Click RUN ANALYSIS.
9. Check off the TRI USA Carcinogen layer.
10. Click Change Style under Aggregation of TRI USA carcinogen to North America Hexbins 25 km.
11. Choose an attribute: Count of Points.
12. Select Counts and Amounts (Color).
13. Click OPTIONS.
14. Select Symbols.
15. Choose a dark red to light red ramp.
16. Change the basemap to Dark Gray Canvas to make the symbols pop.
17. Click OK.
18. Click DONE.



3. Interpret the data

1. Move USA States (Generalized) above the aggregation of TRI USA.
2. Zoom in and around the US.

Q1 Which states seem to have the highest concentrations of TRI sites?

Q2 What layers could you add to enhance your observations?

Scenario #2: Enrich hexagons with health insurance data

Kaiser Permanente Health Care Organization is proposing to bring its quality care affordable health plan to the state of South Carolina. Kaiser has asked you to construct a map showing the population that has health care within South Carolina.

4. Open and save a map

1. Open [Hexagon Health](#).
2. Sign into your [ArcGIS organizational account](#).
3. On the top ribbon, click Save As.
4. Save the map with the following parameters:
 - a) Title: Hexagons Healths_ yourinitials
 - b) Tags: Use individualized tags.
 - c) Summary: Representative hexagons for the USA.

Save Map

Title:	<input type="text" value="Hexagons Healths_ yourinitials"/>
Tags:	<input type="text" value="IGARC2_health_yourinitials x"/> <i>Add tag(s)</i>
Summary:	<input type="text" value="Representative hexagons for the USA."/>
Save in folder:	<input type="text" value=""/> ▾

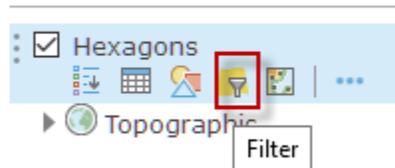
SAVE MAP

CANCEL

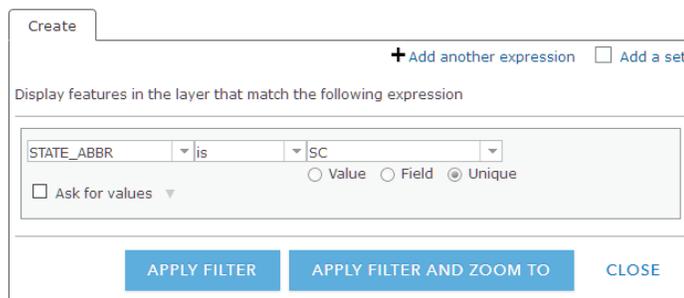
5. Filter South Carolina

1. Click Content.
2. Click Filter under Hexagons.

Contents



3. Construct the expression: STATE_ABBR is SC
Filter: Hexagons

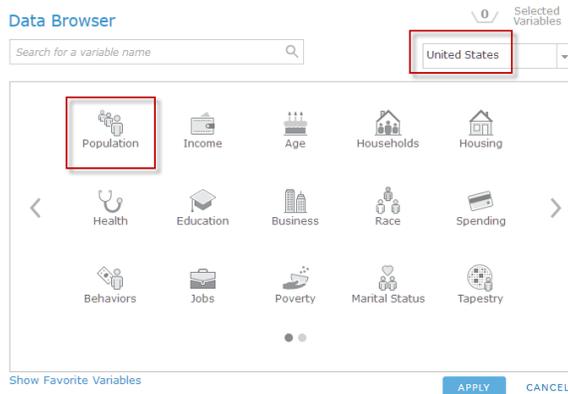


The screenshot shows the 'Create' dialog box for filtering features. The expression 'STATE_ABBR is SC' is entered in the text field. The 'Unique' radio button is selected. The 'Apply Filter' button is highlighted in blue.

4. Click APPLY FILTER. The hexagons for only South Carolina are selected.



5. Click Analysis on the top ribbon.
6. Click Data Enrichment.
7. Click Enrich Layer. Be sure that United States is selected in the upper corner box.
8. Click SELECT VARIABLES.
9. Click Population.



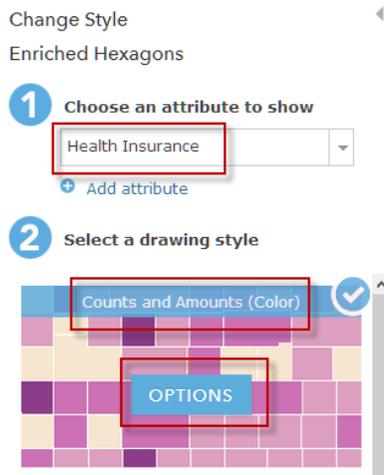
10. Select 2017 Total Population (Esri).
11. Click Back.
12. Choose Health.
13. Select 2017 Health Insurance.



14. Click APPLY.
15. Uncheck use current map extent.
16. Add your initials to the Result layer name.
17. Check credit usage.
18. Click RUN ANALYSIS.

6. Normalize and symbolize the data

1. Select Change Style under Enriched Hexagons.
2. Choose an attribute to show select Health Insurance.

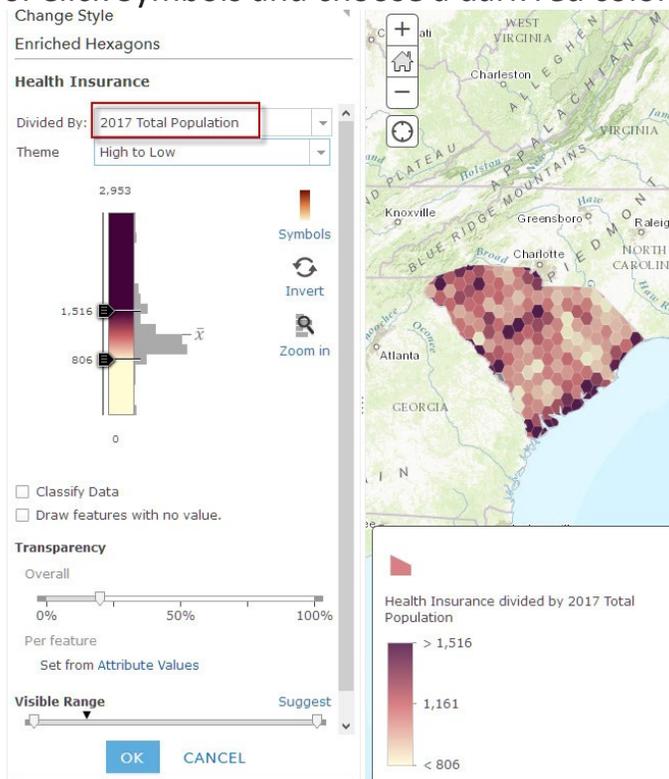


3. Select Counts and Amounts (Color).
4. Choose OPTIONS.

The colors that you see on the map in South Carolina represent the number of people insured. To obtain the percentage of residents that are insured, you must divide the number of people by the total population. That will give you a more realistic interpretation of the data.

5. The default is Divided by NONE. Use the drop-down menu to select Divided by 2017 Total Population.

6. Click Symbols and choose a dark red color ramp.



7. Click OK.

8. Click Done.

7. Interpret the data

Q3 What parts of South Carolina have the largest percentage of people with insurance?

8. Assessment

Repeat the above process using your state or, if you live in South Carolina, another state that interests you.

