Assess Attribute Uncertainty in Hot Spot Analysis

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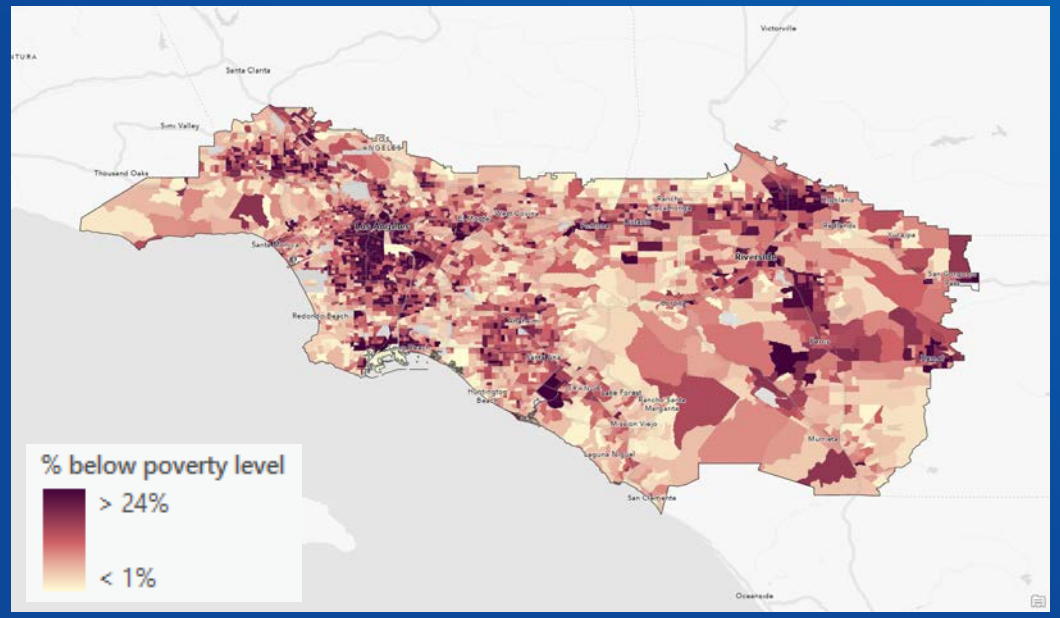
Agenda

- What is hot spot analysis?
- What is attribute uncertainty (margins of error)?
- Demo of the tool: Assess Sensitivity to Attribute Uncertainty
- Other supported analyses
- Resources handout

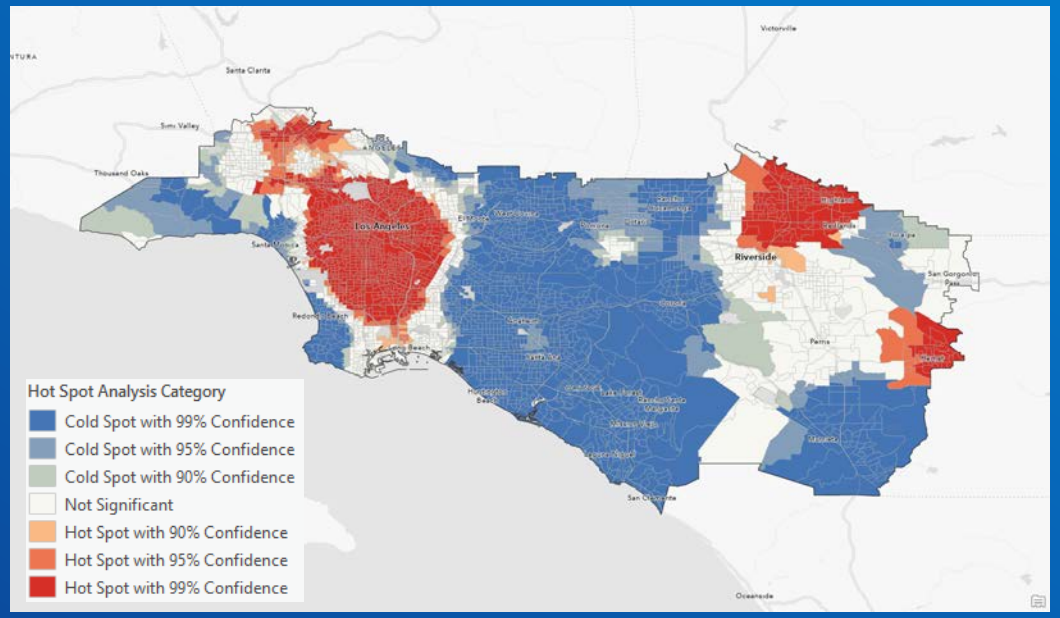
What is Hot Spot Analysis?

- H_0 is that X is distributed randomly across geography.
- Hot Spot tool identifies statistically significant spatial clusters of high and low values.
- Z-scores & p-values are used to determine whether to reject H_0, tract by tract.

Percent Below Poverty

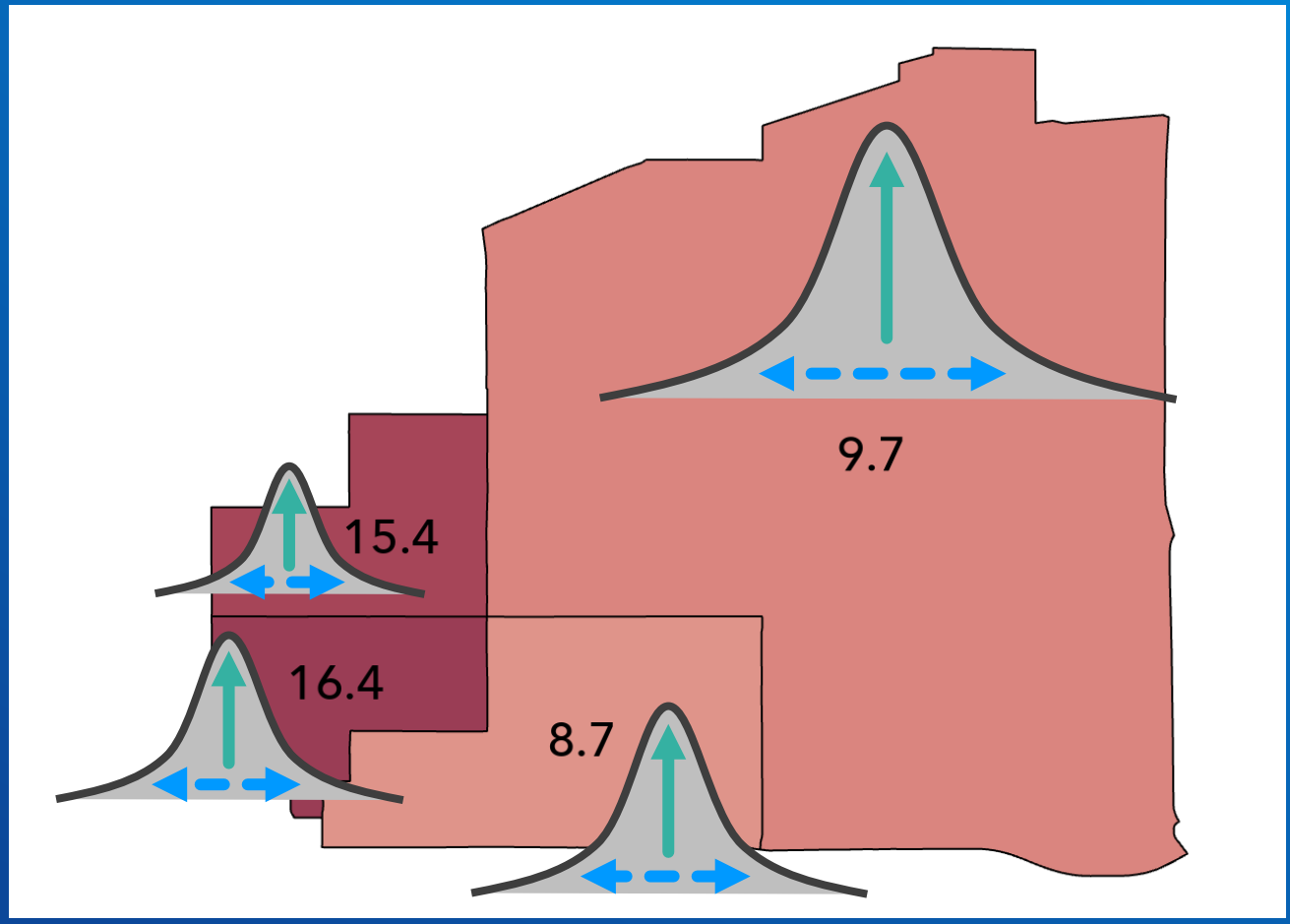


Hot Spot Analysis of Poverty



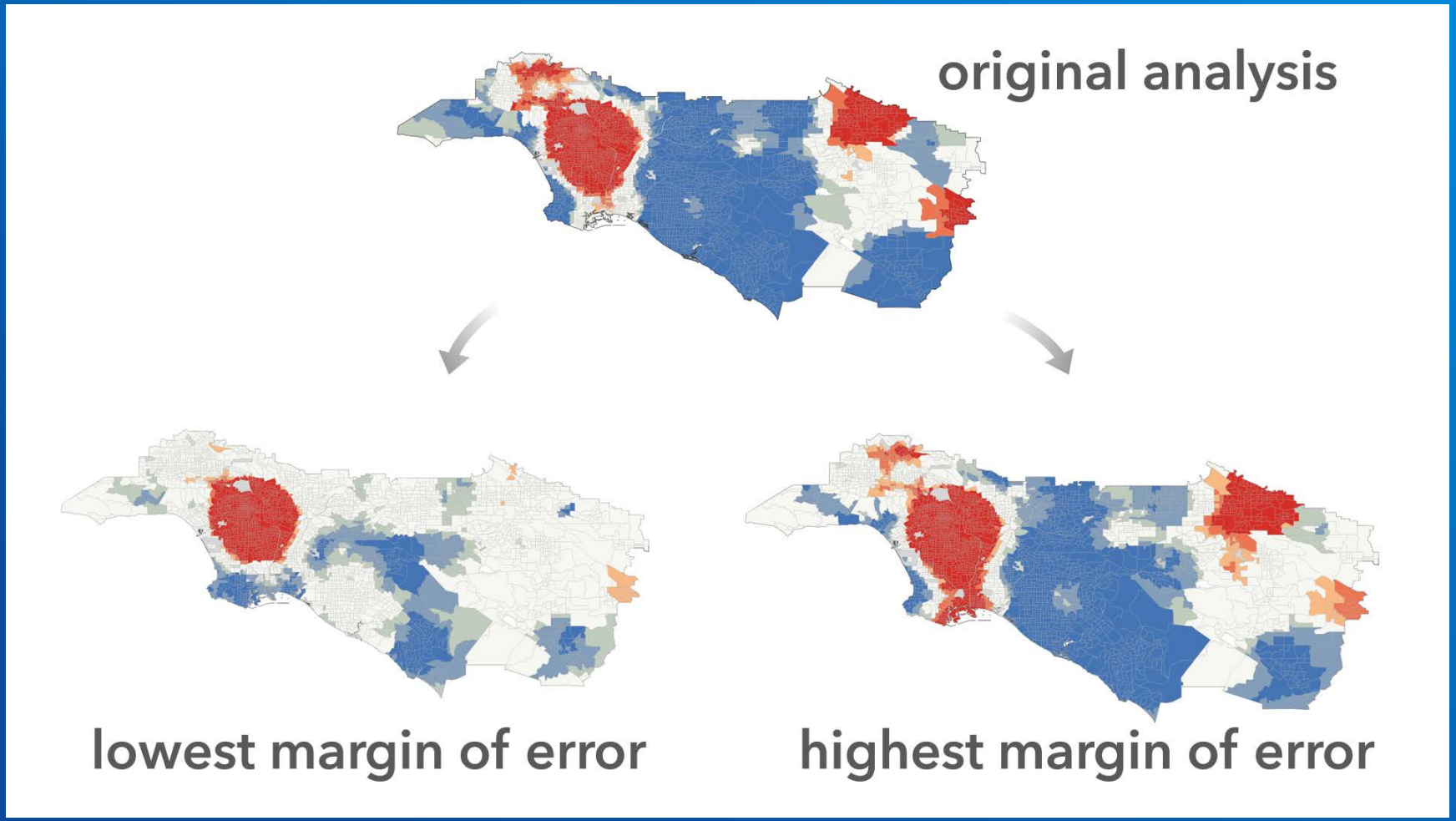
Attribute Uncertainty is quantified by MOE in ACS

ID	% poverty	Margin of Error
1	15.4	±7.9
2	16.4	±5.6
3	8.7	±6.5
4	9.7	±7.2



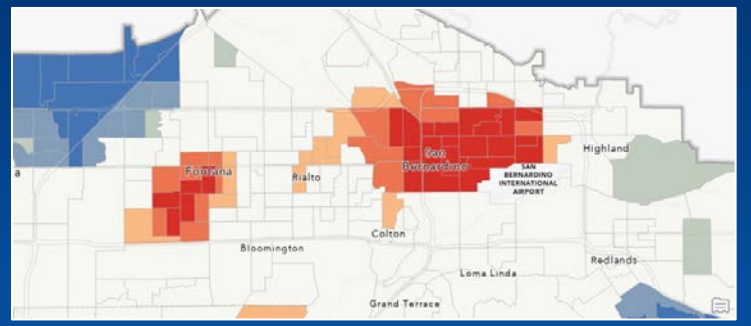
How certain are these results?

Variability of results due to uncertainty in measured values.

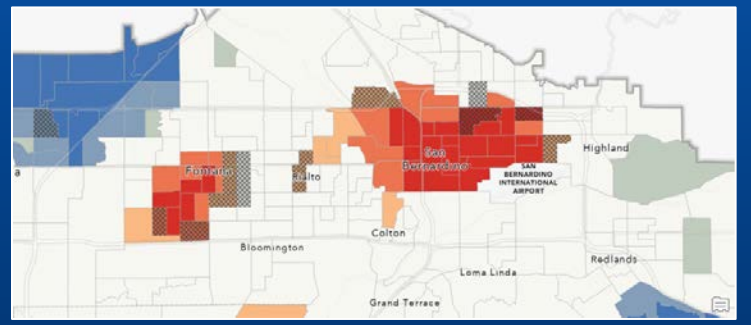


Live Demo: Assess Sensitivity to Attribute Uncertainty

Alberto Nieto



- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence



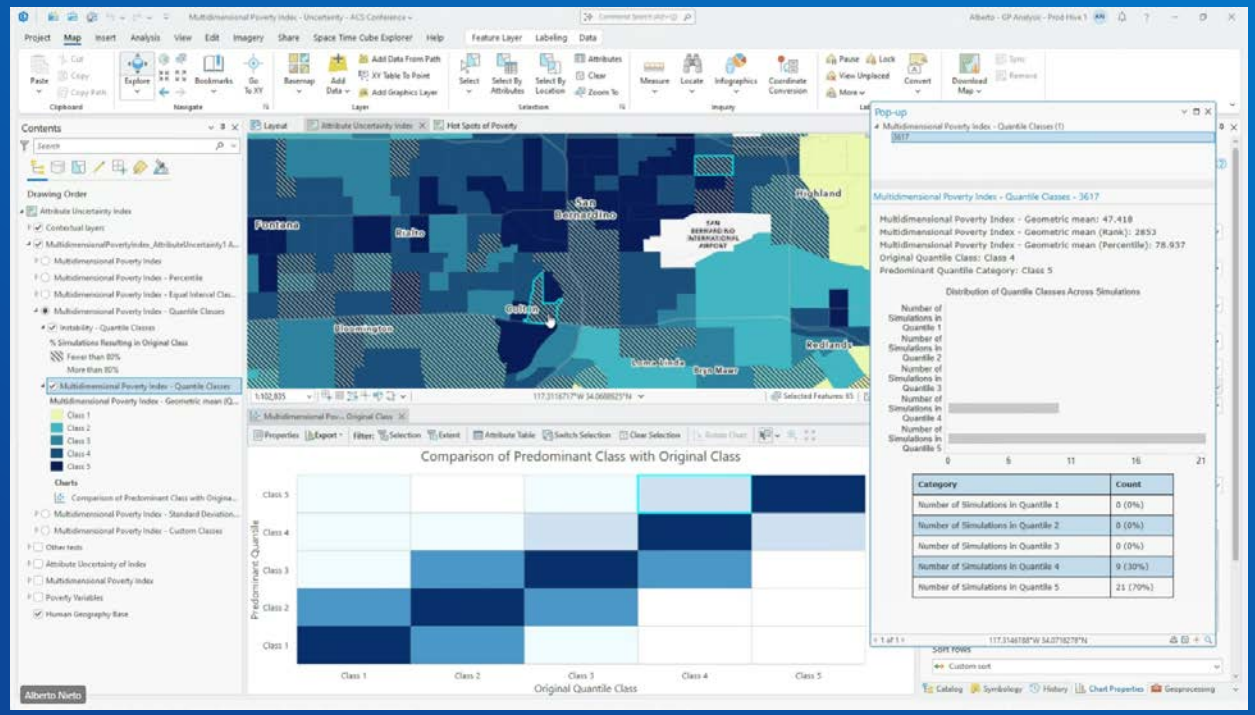
Unstable* results

*Simulations result in the original category < 80% of the time

Outputs of the Tool

- Layer with pop-up
- Chart

Outputs here do not replace your original output, but rather provide more insight and transparency.



All Supported Analyses

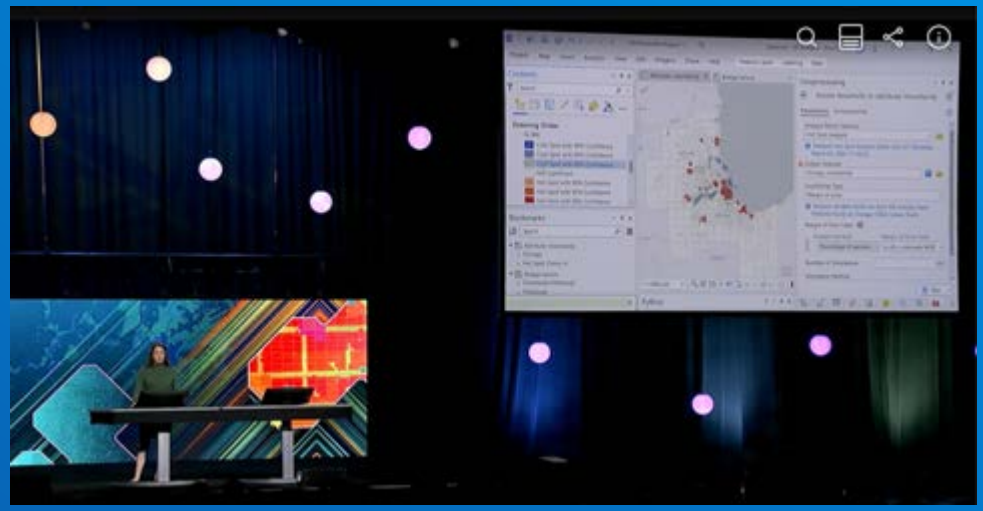
- Hot Spot Analysis (Getis-Ord Gi*)
- Calculate Composite Index

- Cluster and Outlier Analysis (Anselin Local Moran’s I)
- Optimized Hot Spot Analysis
- Optimized Outlier Analysis
- General Linear Regression
- Spatial Autocorrelation (Global Moran’s I)

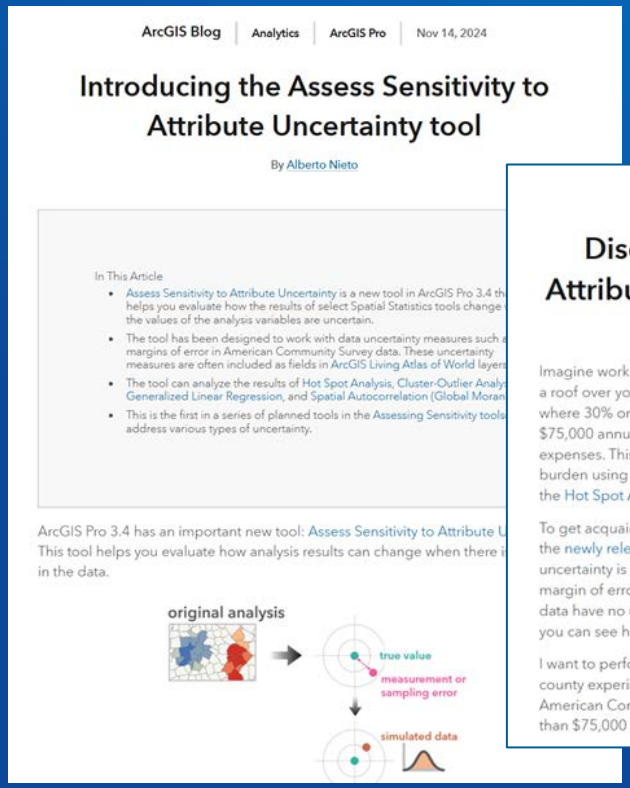
Resources Handout

Assess Sensitivity to Attribute Uncertainty

Video (9:27 – 14:12)



ArcGIS Blog Posts



ArcGIS Blog | Analytics | ArcGIS Pro | Nov 14, 2024

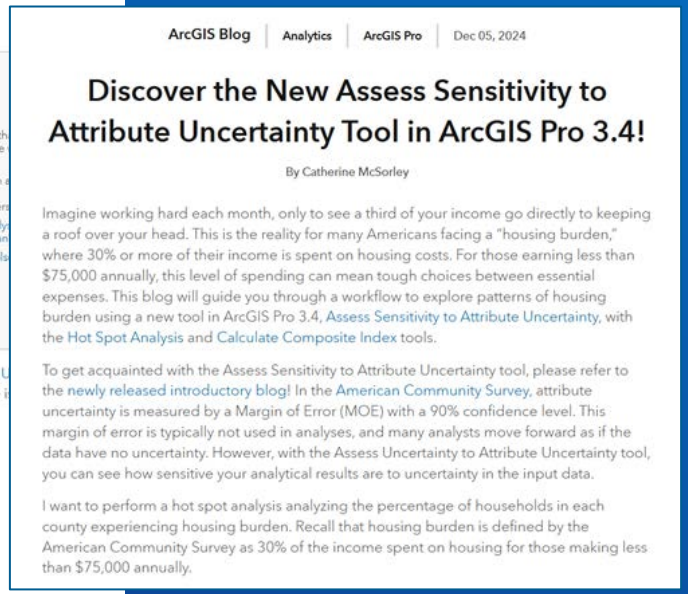
Introducing the Assess Sensitivity to Attribute Uncertainty tool

By Alberto Nieto

In This Article

- Assess Sensitivity to Attribute Uncertainty is a new tool in ArcGIS Pro 3.4 th helps you evaluate how the results of select Spatial Statistics tools change the values of the analysis variables are uncertain.
- The tool has been designed to work with data uncertainty measures such margins of error in American Community Survey data. These uncertainty measures are often included as fields in ArcGIS Living Atlas of World layers
- The tool can analyze the results of Hot Spot Analysis, Cluster-Outlier Analy Generalized Linear Regression, and Spatial Autocorrelation (Global Moran
- This is the first in a series of planned tools in the Assessing Sensitivity tools address various types of uncertainty.

ArcGIS Pro 3.4 has an important new tool: Assess Sensitivity to Attribute U This tool helps you evaluate how analysis results can change when there i in the data.



ArcGIS Blog | Analytics | ArcGIS Pro | Dec 05, 2024

Discover the New Assess Sensitivity to Attribute Uncertainty Tool in ArcGIS Pro 3.4!

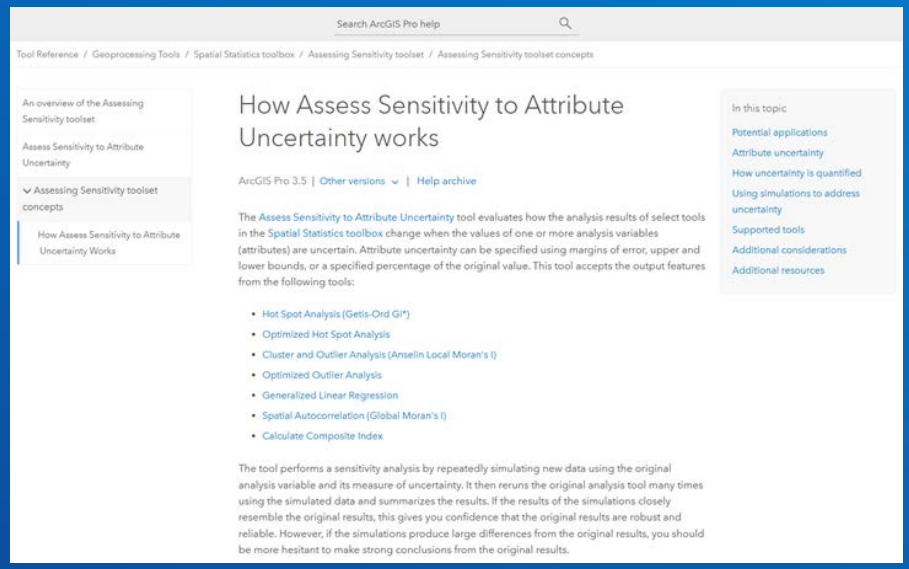
By Catherine McSorley

Imagine working hard each month, only to see a third of your income go directly to keeping a roof over your head. This is the reality for many Americans facing a "housing burden," where 30% or more of their income is spent on housing costs. For those earning less than $75,000 annually, this level of spending can mean tough choices between essential expenses. This blog will guide you through a workflow to explore patterns of housing burden using a new tool in ArcGIS Pro 3.4, Assess Sensitivity to Attribute Uncertainty, with the Hot Spot Analysis and Calculate Composite Index tools.

To get acquainted with the Assess Sensitivity to Attribute Uncertainty tool, please refer to the newly released introductory blog! In the American Community Survey, attribute uncertainty is measured by a Margin of Error (MOE) with a 90% confidence level. This margin of error is typically not used in analyses, and many analysts move forward as if the data have no uncertainty. However, with the Assess Uncertainty to Attribute Uncertainty tool, you can see how sensitive your analytical results are to uncertainty in the input data.

I want to perform a hot spot analysis analyzing the percentage of households in each county experiencing housing burden. Recall that housing burden is defined by the American Community Survey as 30% of the income spent on housing for those making less than $75,000 annually.

Help Documentation



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An overview of the Assessing Sensitivity toolset

Assess Sensitivity to Attribute Uncertainty

Assessing Sensitivity toolset concepts

How Assess Sensitivity to Attribute Uncertainty Works

How Assess Sensitivity to Attribute Uncertainty works

ArcGIS Pro 3.5 | Other versions | Help archive

The Assess Sensitivity to Attribute Uncertainty tool evaluates how the analysis results of select tools in the Spatial Statistics toolbox change when the values of one or more analysis variables (attributes) are uncertain. Attribute uncertainty can be specified using margins of error, upper and lower bounds, or a specified percentage of the original value. This tool accepts the output features from the following tools:

- Hot Spot Analysis (Getis-Ord Gi*)
- Optimized Hot Spot Analysis
- Cluster and Outlier Analysis (Anselin Local Moran's I)
- Optimized Outlier Analysis
- Generalized Linear Regression
- Spatial Autocorrelation (Global Moran's I)
- Calculate Composite Index

The tool performs a sensitivity analysis by repeatedly simulating new data using the original analysis variable and its measure of uncertainty. It then reruns the original analysis tool many times using the simulated data and summarizes the results. If the results of the simulations closely resemble the original results, this gives you confidence that the original results are robust and reliable. However, if the simulations produce large differences from the original results, you should be more hesitant to make strong conclusions from the original results.

In this topic

Potential applications
Attribute uncertainty
How uncertainty is quantified
Using simulations to address uncertainty
Supported tools
Additional considerations
Additional resources