ArcGIS Pro: Analysis and Geoprocessing Overview

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Agenda

• What is Analysis and Geoprocessing?
• Analysis in ArcGIS Pro
  - 2D (Spatial)
  - 3D (Elevation)
  - 4D (Temporal)
• Types of Analysis – Proximity/Overlay, Raster, Network, Statistical, Temporal, 3D, Imagery
• Charts
• Automating Analysis: ModelBuilder, Python
• Extending analysis with Python and R
What is Analysis and Geoprocessing?

• **Analysis** transforms raw data into information or knowledge
• **Spatial analysis** does this for geographic or spatial data
• **Geoprocessing** is a rich suite of tools and/or a framework for *processing geographic* data
  - ArcGIS Pro 2.5 = ~1,500 total geoprocessing tools (~80 new)
Proximity/Overlay

- Analysis toolbox
- Tools for extraction, proximity, and overlay analysis
- Clip, Intersect, Union, Spatial Join, Near, Buffer, Thiessen Polygons, Enrich Layer, Summarize Within/Nearby, Summary Statistics, **Count Overlapping Features**
Raster

- Spatial Analyst Extension
- Spatial modeling and analysis tools for raster data
- Density, Distance, Interpolation, Hydrology, Map Algebra, Suitability Modeling, Surfaces, Zonal Statistics

Spatial Analyst Tools
- Conditional
- Density
- Distance
- Extraction
- Generalization
- Groundwater
- Hydrology
- Interpolation
- Local
- Map Algebra
- Math
- Multidimensional Analysis
- Multivariate
- Neighborhood
- Overlay
- Raster Creation
- Reclass
- Segmentation and Classification
- Solar Radiation
- Surface
- Zonal
Demo #1
Analysis: XY Table to Point, Thiessen Polygons, Kernel Density

Where are the current gyms located?
Where do the current gym customers live?
Which gym is each customer closest to?
Where are the highest concentrations of customers?
Network

- Network Analyst Extension
- Tools for working with transportation networks
- Service Areas, Routing, Closest Facility, Location Allocation, OD Cost Matrix, Vehicle Routing Problem, Create Network Dataset
Demo #2
Network Analysis: Service Area Analysis
Proximity Analysis: Enrich Layer

• What areas represent a 15-minute drive from each gym?
• What are the socioeconomic/demographic/lifestyle characteristics of these areas?
Statistical (Geostatistics)

- Geostatistical Analyst Extension
- Tools for performing interpolation
- ESDA, Kriging methods, Sampling, Simulations, Validations,
  Geostatistical Layers, 3D Interpolation, Geostatistical Wizard
Statistical (Spatial Statistics)

• Spatial Statistics Toolbox (All License levels)
• Tools for performing Spatial Statistics
• Measuring Geographic Distributions, Pattern Analysis, Cluster Analysis, GLR/GWR, Random Forest, Local Bivariate, Colocation Analysis

Standard Deviational Ellipses

Multivariate Clustering

Cluster and Outlier Analysis

Hot Spots

Local Bivariate
Space-Time Analysis

- Space-Time Pattern Mining Toolbox (All License levels)
- Tools for performing Spatio-Temporal Statistics
- Emerging Hot Spot Analysis, Local Outlier Analysis, Time-Series Clustering, Visualize Space-Time Cube in 2D/3D
Demo #3
Spatial Statistics: Density-based Clustering / Mean Center / Similarity Search

- Where are the customers most densely clustered?
- Where is the center of each cluster of customers?
- Which potential gym location is most similar to the best performing, existing gym?
3D Analysis

- 3D Analyst Extension
- Tools for working with surface models or 3D vector data
- 3D Feature relationships, CityEngine textures, Interpolation, Data Management, Surface Generation, Visibility, LiDAR
GeoAnalytics Desktop

- Advanced License level
- Tools for performing parallel processing using Apache Spark
- Pattern analysis and prediction, Finding locations based on criteria, Data management, Summarizing data, Proximity analysis

1.8 million wildfire incidents
Imagery Analysis

• Image Analyst Extension
• Tools for working with imagery and raster data
• Deep Learning, Stereo mapping, Image classification,
• Image space analysis, Full Motion Video, Multidimensional Analysis
Charts

- Visualize qualitative, quantitative, and temporal data
- Bar charts, Box plot, Line chart, Data clock, Histogram, QQ plot, Scatterplot/Scatterplot matrix, Calendar Heat Chart
Ready-To-Use Services / Portal Analysis

- Ready-To-Use Service Tools use ArcGIS Online credits
- Portal Analysis Tools require an ArcGIS Enterprise deployment

### Ready-To-Use Service Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>Profile, Summarize Elevation, Viewshed</td>
</tr>
<tr>
<td>Hydrology</td>
<td>Trace Downstream, Watershed</td>
</tr>
<tr>
<td>Network Analysis</td>
<td>Find Closest Facilities, Find Routes</td>
</tr>
<tr>
<td></td>
<td>Generate Service Areas, Solve Location Allocation</td>
</tr>
</tbody>
</table>

### Portal Analysis Tools

- **Feature Analysis Tools**
  - Analyze Patterns
  - Manage Data
  - Summarize Data
  - Use Proximity

- **GeoAnalytics Tools (Big Data)**
  - Analyze Patterns
  - Find Locations
  - Manage Data
  - Summarize Data
  - Use Proximity

- **Raster Analysis Tools**
  - Analyze Patterns
  - Analyze Terrain
  - Deep Learning
  - Generalize
  - Hydrology
  - Manage Data
  - Summarize Data
  - Use Proximity
Automating Analysis

- Batch geoprocessing
- ModelBuilder, Export to Python
- Schedule geoprocessing
Extending Analysis with Python

- Python Scripts > Python Script tools
- ArcGIS Notebooks
Demo #4
ArcGIS Notebooks
Extending Analysis with R

- ArcGIS users
  - ArcGIS
  - R Script
  - R
  - R

- R users
  - ArcGIS
  - R

- ArcGIS developers
  - ArcGIS
  - Toolbox
  - R
Python and Geoprocessing in the Census Bureau

Joshua Bradley – US Census Bureau
Ashley Ace – US Census Bureau
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Print Stations Located in 150 Concourse Lobby

**Tuesday**
- 12:30 pm – 6:30 pm
  - Expo
  - Hall B
- 5:15 pm – 6:30 pm
  - Expo Social
  - Hall B

**Wednesday**
- 10:45 am – 5:15 pm
  - Expo
  - Hall B
- 6:30 pm – 9:30 pm
  - Networking Reception
  - Smithsonian National Museum of Natural History
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3. Scroll down to “Survey”.
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