



# ArcGIS Pro

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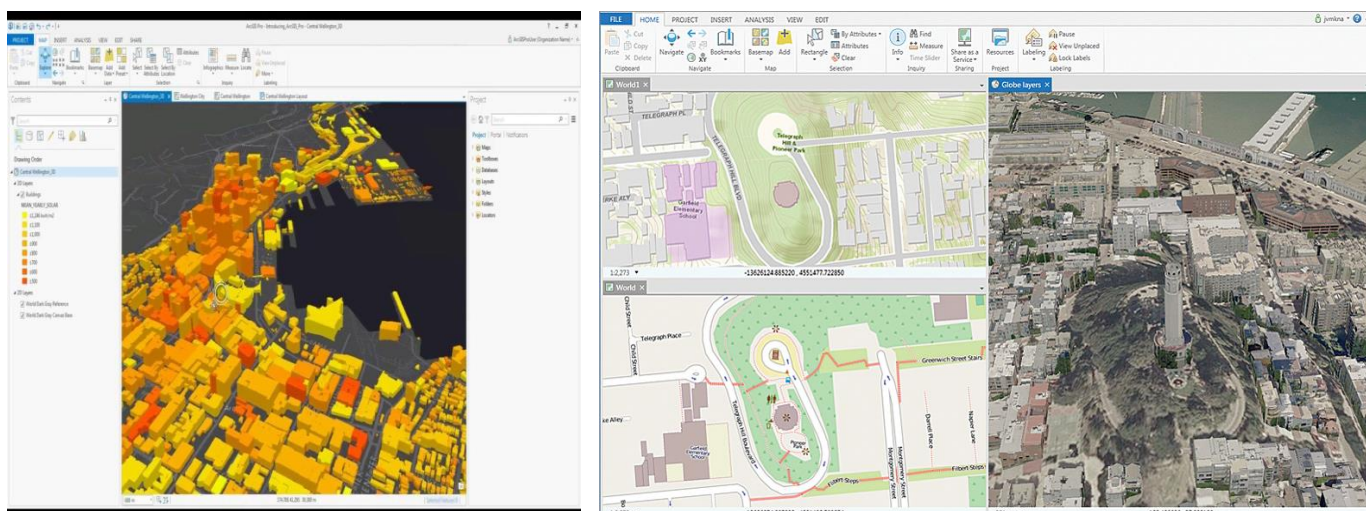


# ArcGIS Pro

ArcGIS Pro, the powerful single desktop GIS application, is a feature-packed software developed with enhancements and ideas from the ArcGIS Pro user community. ArcGIS Pro supports data visualization; advanced analysis; and authoritative data maintenance in 2D, 3D, and 4D. It supports data sharing across a suite of ArcGIS products such as ArcGIS Online and ArcGIS Enterprise, and enables users to work across the ArcGIS system through Web GIS.

## Transform data into maps and actionable information

Combine multiple data sources to make maps that are as smart as they are beautiful. Use scientific analytical tools on 2D, 3D, and 4D data to identify patterns, make predictions, and answer questions. Quickly share projects and information within your organisation, online, and through mobile apps



### Exploration and Visualization

Using 3D exploratory analysis, investigate your data by interactively creating graphics and editing analysis parameters on-the-fly. Interactive tools help you to create analytical objects by clicking on the scene or using input source layers. Manipulate analysis parameters and receive real-time visual feedback.

### Cartography and Design

Easily and accurately add your customized data to meet today's cartographic and design standards. Compile your data with just a few clicks and bring your projects into Adobe Illustrator with the new AIX export capability. ArcGIS Pro's deep symbology tools, performant rendering, and vast support of geospatial formats merges the domains of analysis and presentation. Take your projects further and tell the story you've always envisioned.

## Imagery

ArcGIS Pro provides a collection of powerful tools to manage and analyze large collections of imagery such as drones, satellites, lidar and more.

## Analytics and Data Science

Understand the world around you. Use scientific analytical tools on 2D, 3D, and 4D data to identify patterns, make predictions, and answer questions.

## Data Management

Ensure data integrity with a complete set of tools for storing, editing, and managing various forms of spatial data—including big and real-time data.

## Share Your Work

Quickly author and discover content and web maps all within ArcGIS Pro. Discover created work from within your organization or worldwide from the ArcGIS user community. Seamlessly access ArcGIS Living Atlas of the World content and share your work throughout the Geospatial Cloud.

## Customize and Create

Reimagine ArcGIS Pro with add-ins and configurations developed with the ArcGIS Pro SDK for .NET. Create, customize, and perfect your ideal ArcGIS Pro environment.

## Launch New Capabilities

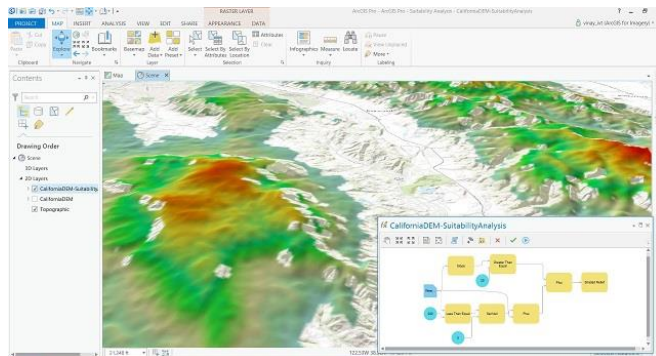
Discover Voxel layers, a 3D volumetric layer to visually analyze and explore your complex multidimensional data. Manage your 3D and 4D parcel data, run analysis with Trace networks, Python Notebooks, Geodatabase replication workflows and so much more. Add your work from ArcGIS Pro to Adobe Illustrator to finalize your design project.

**Listed below are a some of the key highlights of ArcGIS Pro.**

## Build GIS projects

ArcGIS Pro organizes the resources that you use to do your work into projects. A project contains maps, layouts, layers, tables, tasks, tools, and connections to servers, databases, folders, and styles. Projects can also incorporate content from your organization's portal or ArcGIS Online.

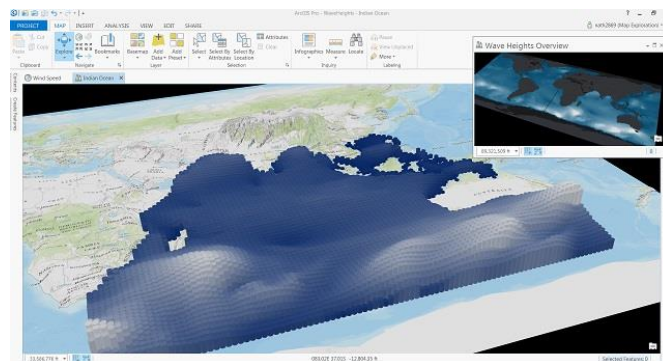
With ArcGIS Pro we can automate tasks. We can build your own project from scratch or start by opening a project template created by Esri or others in the community. You can find and add content from a folder, a portal, or ArcGIS Online by browsing or searching by keywords. Use basic item descriptions or standards-based metadata to make it easier to find information. When you want to share your project, you can create project templates for others to use as a starting point or package the project and its data.



## Visualize your data

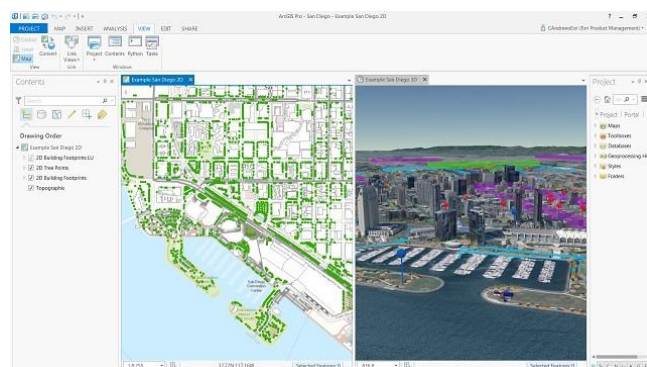
Maps and scenes are the canvases on which you display your spatial data—maps display 2D data, and scenes are a type of map that displays 3D data. You can store as many maps as you need in the same project, and you can open multiple maps at once and view them side by side. This means you can look at the same data in 2D and 3D simultaneously. ArcGIS Pro has built-in navigation functions and keyboard and mouse shortcuts that allow you to explore.

To author a map or a scene in a project, you add layers to it. You can add a layer to multiple maps; for example, you might use the same imagery basemap as the underlying backdrop for many maps. Layers have properties that allow you to set how their content is displayed, including the symbols used to draw the data. To display your data in a printable or exportable format, you can create layouts in your project.



## Edit geographic data

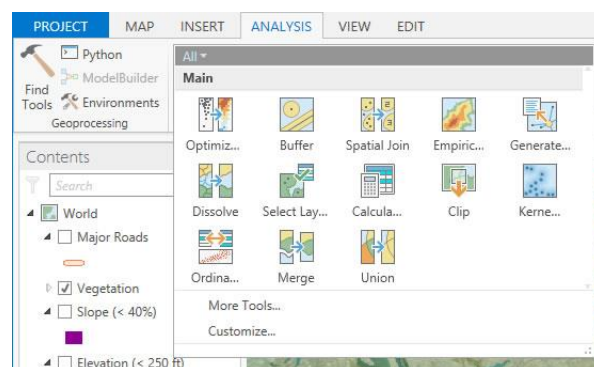
You can create, Edit and visualize the layers in both 2D and 3D so you can see your features from all perspectives. Editing involves creating, updating, and maintaining geospatial information that is stored and organized in layers. You can create new features in a layer by drawing them in a map and assigning attributes to define their characteristics, and update existing features to reflect their current condition based on newly acquired data or information that comes from the field. Use snapping and specified constraints to guarantee that features are precisely connected to each other and are created at the proper dimensions.



## Perform analysis and geoprocessing

Geoprocessing provides a suite of tools for performing spatial analysis and managing GIS data in an automated way. A typical tool performs an operation on a dataset and creates a resulting output dataset. When you find the right geoprocessing tool, you specify input and output dataset locations, adjust additional parameters that affect the process, and run the tool. In addition to the tools that are built into ArcGIS Pro, you can create custom tools.

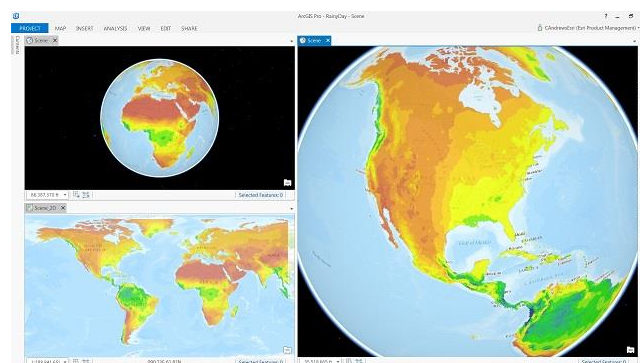
Model Builder is a visual language that allows you to create a diagram or model of your spatial analysis or data management process. This model is composed of graphical elements representing geoprocessing tools, data layers, and other variables and functions. Python is the scripting language of ArcGIS. ArcGIS includes a Python API known as ArcPy, which gives you access to all geoprocessing tools as well as an exhaustive suite of scripting functions that help you automate GIS tasks.



You can view the geoprocessing and spatial analysis history of your project so that you can easily run tools that were previously run in the project with the same or modified settings and better understand the process that created a layer in your map. Geoprocessing history is key to sharing a geoprocessing tool, as you can share any tool that has been run successfully and entered into the project geoprocessing history.

## Share your work

Sharing your work is an important part of ArcGIS Pro. You can share everything from entire projects to maps, layers, and other components of your work. You can share maps from your project as web maps. Web maps can be reused within ArcGIS Pro as well as across the ArcGIS platform, and they can be viewed in browsers and on mobile devices.



*Sharing by packaging creates a compressed file containing GIS data. Packaging is how you share complete projects or layers with others.*

## ArcGIS Pro Functionality Matrix

ArcGIS Pro 2.8 allows you to author geographic information to examine relationships; analyze your data; test predictions; and, ultimately, make better decisions. It is available in three license levels—Basic, Standard, and Advanced. These license levels have the same integrated applications, user interfaces, and development environment.

Map Creation, Interactive Visualisation, and Spatial Analysis			
	Advanced	Standard	Basic
Create interactive maps and scenes from file, database, and online sources	✓	✓	✓
Visually model and spatially analyse a process or workflow	✓	✓	✓
Basic spatial analysis tools for overlay, proximity, and summary	✓	✓	✓
Statistical tools for analysing spatial patterns, clusters, and relationships	✓	✓	✓
Scripting geoprocessing and other operations using Python	✓	✓	✓
Create street-level maps that incorporate GPS locations	✓	✓	✓
View CAD data or satellite/aerial imagery	✓	✓	✓
Visualise categories, relationships, distributions, and change in your data using charts.	✓	✓	✓
Publish and share maps and projects as packages and services on the web, mobile apps, and social media.	✓	✓	✓
Create, configure, and print page layouts	✓	✓	✓

<b>Multuser Editing and Advanced Data Management</b>			
	<b>Advanced</b>	<b>Standard</b>	<b>Basic</b>
<b>Complete GIS data editing capabilities</b>	✓	✓	
<b>Edit a multiuser enterprise geodatabase</b>	✓	✓	
<b>Use disconnected editing in the field</b>	✓	✓	
<b>Store historical snapshots of your data</b>	✓	✓	
<b>Automate quality control</b>	✓	✓	
<b>Create spatial data from scanned maps</b>	✓	✓	
<b>Manage workflows and job assignments</b>	✓	✓	
<b>Advanced Analysis, High-End Cartography, and Extensive Database Management</b>			
	<b>Advanced</b>	<b>Standard</b>	<b>Basic</b>
<b>Advanced GIS data analysis and modelling</b>	✓		
<b>Produce publication-quality maps</b>	✓		
<b>Advanced data translation and creation</b>	✓		
<b>Advanced feature manipulation and processing</b>	✓		
<b>Data conversion for CAD, raster, dBASE, and coverage formats</b>	✓		

## ArcGIS Pro Extensions

Utilize a number of ArcGIS Pro extensions to expand your product capabilities. ArcGIS Pro is connected to several Esri extensions, ranging from ArcGIS Spatial Analyst to ArcGIS 3D Analyst, to enhance the user setting. Find your extensions and create a workspace that gives you the best working experience.

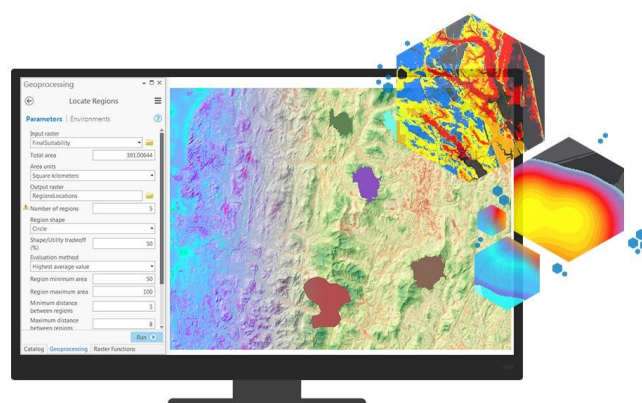
<b>ArcGIS Pro Extensions</b>	
<b>Advanced analysis</b>	
<b>ArcGIS Spatial Analyst</b>	<b>Helps with modeling terrains, finding suitable locations and routes, discovering spatial patterns, and performing hydrologic and statistical analysis.</b>
<b>ArcGIS 3D Analyst</b>	<b>Use 3D GIS capabilities to address problems that simply cannot be addressed in a 2D context.</b>
<b>ArcGIS Geostatistical Analyst</b>	<b>ArcGIS Geostatistical Analyst lets you generate optimal surfaces from sample data and evaluate predictions for better decision making.</b>
<b>ArcGIS Network Analyst</b>	<b>Advanced vehicle routing tools to maximize transportation efficiency</b>
<b>ArcGIS Image Analyst</b>	<b>Provides tools for advanced image interpretation, exploitation, and geospatial analysis on an array of imagery modalitie</b>
<b>ArcGIS Business Analyst</b>	<b>Helps to make smarter decisions for market planning, site selection, and customer segmentation by combining demographic, business, lifestyle, spending, and census data with map-based analytics.</b>
<b>Data and workflows</b>	
<b>ArcGIS Data Interoperability</b>	<b>Design data movement among hundreds of systems and apps. Automate the no-code transformation of the data across the boundaries of geography</b>
<b>ArcGIS Data Reviewer</b>	<b>Provides a complete system for automating and simplifying data quality management.</b>
<b>ArcGIS Publisher</b>	<b>It helps to share maps and Data easy to wide range of users</b>
<b>ArcGIS LocateXT</b>	<b>Automatically extract and map location information contained with large volumes of unstructured data</b>
<b>ArcGIS Workflow Manager</b>	<b>It streamlines your production process by automating and simplifying the performance and management of location-enabled work.</b>
<b>ArcGIS Parcel Fabric</b>	<b>Share, Edit and Manage Parcel Data</b>



## ArcGIS Spatial Analyst

The ArcGIS Spatial Analyst extension provides a broad range of powerful spatial modelling and analysis capabilities. You can create, query, map, and analyze cell-based raster data; perform integrated raster/vector analysis; derive new information from existing data; query information across multiple data layers; and fully integrate cell-based raster data with traditional vector data sources.

Thousands of organizations use the ArcGIS Spatial Analyst extension every day. For more than a decade, ArcGIS Spatial Analyst has been providing advanced spatial modelling and analysis tools. It helps with modelling terrains, finding suitable locations and routes, discovering spatial patterns, and performing hydrologic and statistical analysis.



### Analyze terrains

Derive useful insights from your data. Create a hillshade to use as a backdrop of the terrain to support other data layers. Calculate slope, aspect, and contours, or create a map displaying visibility

### Select best locations

Find the ideal location with features that match your requirements. Consider criteria such as suitable demographics, environment and terrain to find the best site

### Find best routes

Find the straight-line distance between two locations or create cost-weighted distance surfaces to understand the cost of getting from one location to another based on the criteria you specify

### Perform hydrologic analysis

Derive insights from hydrologic and landscape data. Model where water will flow, create watersheds and stream networks and discover other hydrologic characteristics

### Gain statistical insights

Analyze data distribution for a period. Calculate the mean crop yield over ten years, study variety of species contained within each neighbourhood, or find the mean elevation per forest zone

### **Manage risk**

Model risk factors such as ground slope, aspect, stability, forest fuel load and coastline inundation to understand the risk over your study area so you can come up with the appropriate mitigation plan

### **Estimate cost**

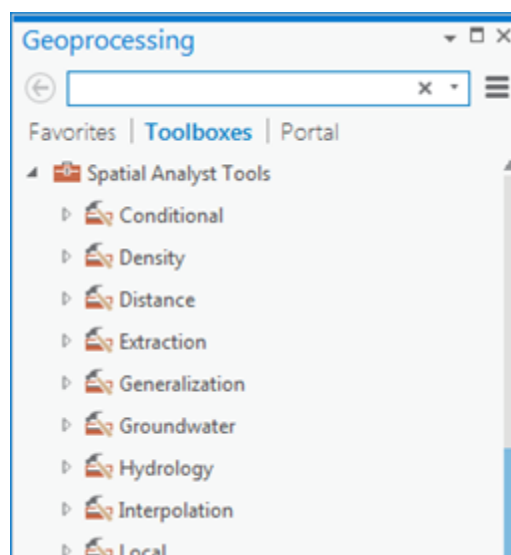
Depending on your industry, factors such as terrain, waiting time, or any other physical obstacles can add to your cost. Analyze and predict costs taking into account multiple factors

### **Detect patterns**

Analyze data from the past to uncover patterns. Combine location of crime with societal factors to visualize patterns that help law enforcement and city planners to take appropriate measures

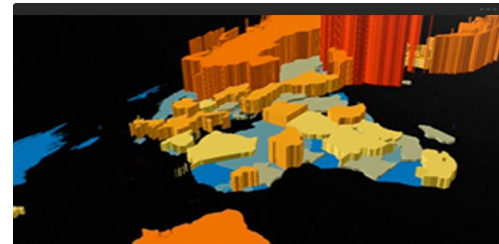
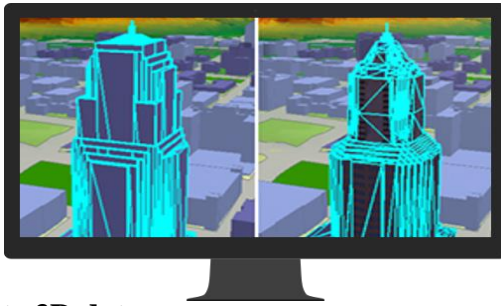
### **Geoprocessing tools**

Spatial Analyst provides many geoprocessing tools to perform spatial analysis operations. In addition to the purely analytic tools, general categories of these tools include those that perform basic mathematical and logical operations, as well as raster dataset creation and processing. The tools are organized by groups of related functionalities into toolsets.



## ArcGIS 3D Analyst

Gain a new perspective by visualizing your information in 3D. Use 3D GIS capabilities to address problems that simply cannot be addressed in a 2D context.



### Create 3D data

Use your 2D GIS datasets to create 3D scenarios that can be stored, viewed, and edited in 2D or 3D. You can use attributes, such as elevation, to display the data at a present height; or use attributes to extrude the data.

### Visualize your data in 3D

Seeing and interacting with geospatial data in 3D drives insights that just aren't possible in 2D. Visualize raster, vector, and lidar data for 3D feature, terrain, subsurface, and volumetric views.

### Manage your data

Maintain 3D data within a 3D context. All the standard ArcMap editing options—undo, redo, edit templates, etc.—are supported, as is the classic snapping environment.

On-the-fly editing allows you to explore different scenarios, so concepts can be quickly viewed in 3D, evaluated, and refined.

### Analyze your data in 3D

Analyze GIS data in true 3D space to save valuable time and cost. Geoprocessing tools give you the ability to perform complex surface, volumetric, and visibility analyses that can include time.

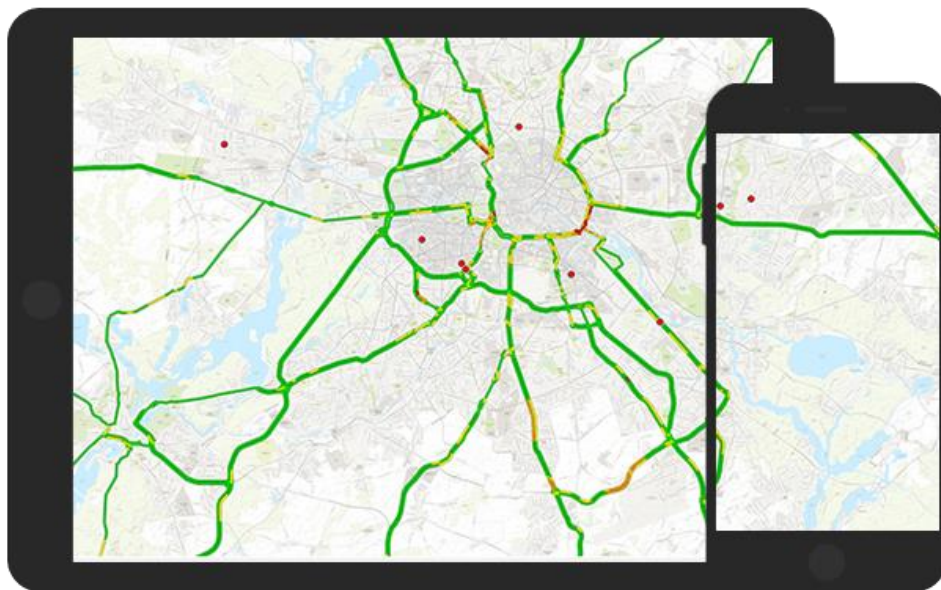
### Share your projects

Help decision makers and influencers better understand your work by sharing it in a realistic 3D perspective.

- Capture hi-res screen shots and post, e-mail, or print them for presentations.
- Export video animations.
- Post on ArcGIS Online, other web services, or your website for others to access.

## ArcGIS Network Analyst

ArcGIS Network Analyst provides network-based spatial analysis tools for solving complex routing problems. It uses a configurable transportation network data model, allowing organizations to accurately represent their unique network requirements. You can plan routes for an entire fleet, calculate drive-times, locate facilities and solve other network related problems.



### **Optimized routes**

Find the quickest, shortest, or even the most scenic route depending on the value you choose to solve for. Routes can accumulate any number of cost values such as distance, time, slope, or other flow attributes. Solve for just two stop locations, or sequence many stops in the best order.

### **Find closest facilities**

Measure the cost of traveling between incidents and facilities to determine which are nearest to one other. Specify how many to find, whether the direction of travel is toward or away, and other constraints like search cutoff thresholds.

### **Solve multi-vehicle routing problems**

Given a set of work locations and a fleet of vehicles, determine what stops should be serviced by each route and in what sequence the stops should be visited. The solution minimizes the overall operating cost for the entire fleet while considering business rules you define.

### **Perform location allocation**

The location allocation tool finds the best location for you. A right location keeps costs low and accessibility high, for maximizing profit and high-quality service. The analysis takes into account facilities that provide goods and services, and where those goods and services are consumed.

### **Generate service areas**

A network service area is a region that can be reached from a location within a given travel time or travel distance. Once service areas are created, you can use them to identify how much land, how many people, or how much of anything else is within the neighborhood or region.

### **Create origin destination matrices**

The origin destination cost matrix produces a distance table, with least-cost paths along the network from many origins to many destinations. The cost values reflect the network distance, not the straight-line distance.

## ArcGIS Geostatistical Analyst

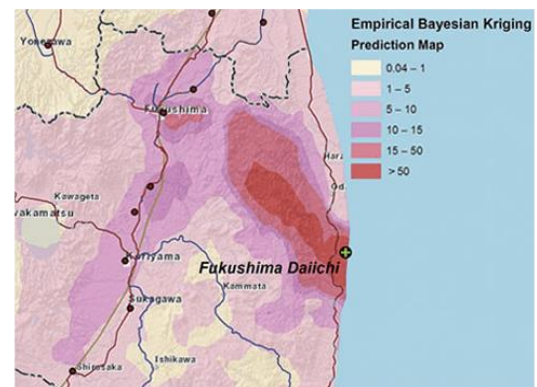
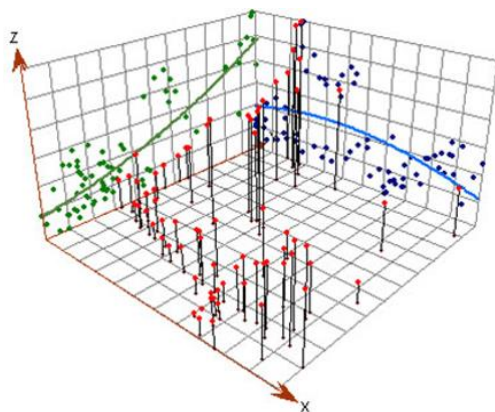
Any organization or individual who needs to statistically explore data and create surfaces for a number of variables will benefit from this statistical software package. Some of the various fields that use ArcGIS Geostatistical Analyst include agriculture, geology, meteorology, hydrology, archaeology, forestry, oceanography, fishery, health care, and environmental studies.

Any data that has associated spatial coordinates can be used in ArcGIS Geostatistical Analyst. These data can be arrayed spatially as random points, as a regular grid, or as centroids of polygons. Examples are temperature measured at monitoring stations, digital elevation models (DEMs), and cancer rates per county.

### Model Spatial Data and Uncertainty

It is not always possible or practical to predict and model spatial phenomena through real world observations. ArcGIS Geostatistical Analyst lets you generate optimal surfaces from sample data and evaluate predictions for better decision making.

These are especially helpful for atmospheric data analysis, petroleum and mining exploration, environmental analysis, precision agriculture, and fish and wildlife studies.



### Explore Your Data

ArcGIS Geostatistical Analyst extension offers a suite of interactive tools to visually investigate your data prior to analysis. These tools allow you to:

- Investigate the distribution of your data and look for outliers (Histogram, QQ Plots)
- Look for systematic trends in your data (Trend Analysis)
- Explore local variability and clusters (Voronoi Map)
- Visualize spatial correlation within and between datasets (Semivariogram/Cross-Covariance Clouds)

## **Create Precise Predictions**

When data are incomplete or subject to error, ArcGIS Geostatistical Analyst provides a probabilistic framework for quantifying uncertainties. Create surfaces from sample data using these interpolation methods:

- Inverse distance weighted
- Radial-based functions
- Global and local polynomials
- Kriging for exact data and for error-contaminated data
- Cokriging (multivariate version of the above-mentioned kriging models)
- Isotropical or anisotropical models

## **Evaluate and Assess**

Evaluate how your models perform using the following diagnostics.

- Cross-validation for checking the model's quality
- Validation for checking prediction quality
- Compare cross-validation results of several models
- Show predicted value at cursor (MapTips)

## **Simulate Realizations**

Create multiple versions of a surface to perform risk analyses. Geostatistical simulation produces multiple surfaces that mimic the real phenomenon and provide possible values. This provides a basis for risk analyses, economic decision making, and other estimations involving uncertainty, allowing analysts to make more informed decisions.

## **Refine and Enhance Your Surfaces**

Improve decision making by enhancing and sharing your surfaces. Use renderers such as contours, regular grids and hillshading for enhanced surfaces. You can then export your prediction results as contour lines, polygons, raster or as a layer that stores the model parameters for the renderers that were used.

## ArcGIS Data Interoperability

The ArcGIS Data Interoperability extension is a simple solution for complex integrations. Design data movement among hundreds of systems and apps using a visual programming interface. Automate the no-code transformation of your data across the boundaries of geography, format, storage technology, and connectivity within the familiar ArcGIS geoprocessing environment. Work in your ArcGIS Pro desktop or deploy your integration to ArcGIS Enterprise. The ArcGIS Data Interoperability extension delivers geospatial integration to all your systems.

The ArcGIS Data Interoperability extension allows you to integrate spatial data formats into your GIS analysis. In addition, the extension provides the ability to model new customized spatial data formats based on built-in formats and transformers.

Authorizing Data Interoperability with a valid license and enabling it in the ArcGIS Desktop application adds additional out-of-the-box support for over 100 GIS, CAD, raster, and database formats, and grants you access to the FME Workbench application.

### **Remove data format barriers**

From CSV to JSON to S3, the georelational data you need can be anywhere. With a few clicks, bring your connected data sources to life by designing your transformations, implementing your logic, and moving your data where it needs to be.

### **Work without coding**

The Workbench application lets you diagram your business logic with hundreds of available transformations that are applied to streams of features that are connected how you want. Read any number of data sources, design their interaction or an analysis, then create or update the destination datasets you need.

### **Talk industry standards**

Governments use the Open Geospatial Consortium (OGC). Financial analysts use Microsoft Excel (XLSX). Business managers use customer relationship management (CRM). Engineers use CAD. Database administrators use SQL. Developers use REST. A variety of format choices are available for any industry you need to work with.

### **Synchronize data between systems**

Automate synchronization between multiple systems with ease. Detect and move only changed records. Synchronize on demand or on a schedule.

### **Work across the internet**

Data may be anywhere, including on premises, software as a service (SaaS), Amazon, Azure, A360, Google, HTTP, FTP, or Salesforce. Just connect and get the data moving where and how you want.



## ArcGIS Image Analyst

ArcGIS Image Analyst is an ArcGIS Pro extension that provides tools for advanced image interpretation, exploitation, and geospatial analysis on an array of imagery modalities. Automate and speed up workflows such as feature extraction, image classification, multidimensional analysis, and change detection, with a robust set of image-based machine and deep learning tools, raster functions, and geoprocessing tools. Benefit from quick analysis results using on-the-fly image processing and raster analysis.

The ArcGIS Image Analyst extension provides functions, tools, and capabilities for image and geospatial analysts who focus on the following areas:

- Image interpretation and exploitation
- Creation of information products from imagery
- Advanced feature interpretation and measurements from imagery
- Detailed feature compilation and measurement on stereo imagery
- Advanced raster and image analysis workflows for machine learning and feature extraction

Image analysts extract data and information from imagery using manual and computer-assisted methods. The Image Analyst extension provides advanced capabilities to support both image exploitation methods.

Manual image interpretation applications include Stereo Mapping, Image Space Analysis, and Full Motion Video (FMV). These applications support the collection of 2D and 3D feature data using standard feature creation and editing tools, saving feature class data in a geodatabase or as files, and sharing them in ArcGIS Enterprise.

Computer-assisted image exploitation includes advanced classification and a suite of raster functions and geoprocessing tools. Both functions and tools can be chained together into custom algorithms using raster functions, templates, and models, respectively. These processing chains can be deployed on the desktop or distributed processing environments in ArcGIS Enterprise either on-premises or through a portal.

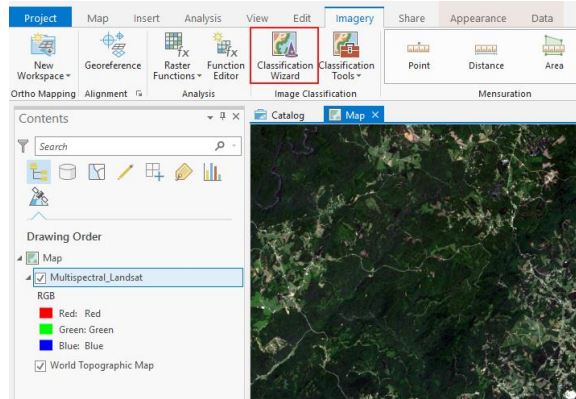
### Capabilities

The capabilities, functions, and tools that are provided in the Image Analyst extension are geared toward image analysts who perform manual image interpretation, advanced remote sensing, and semiautomated image processing feature extraction. These image exploitation activities are grouped into the following functional categories:

**Perspective imagery**—Work with oblique imagery oriented in a natural perspective mode to facilitate effective image interpretation applications.

**Image classification and pattern recognition**—ArcGIS geoprocessing toolset containing tools that find, identify, and quantify patterns in imagery data. Perform object-based and traditional

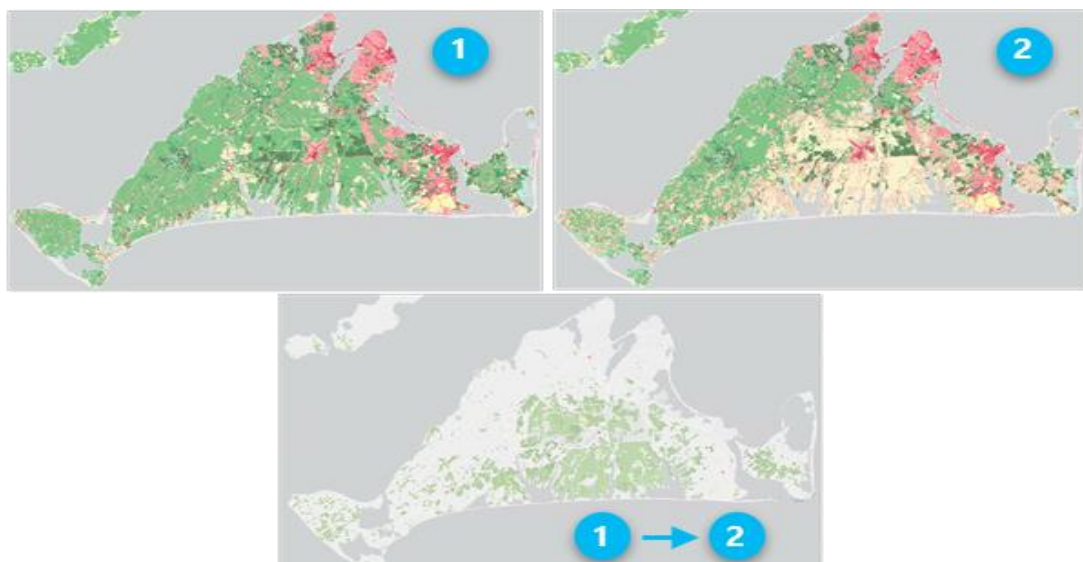
image analysis using image segmentation, classification, and regression analysis tools and capabilities.



**Deep Learning**—Perform image feature recognition using deep learning techniques.



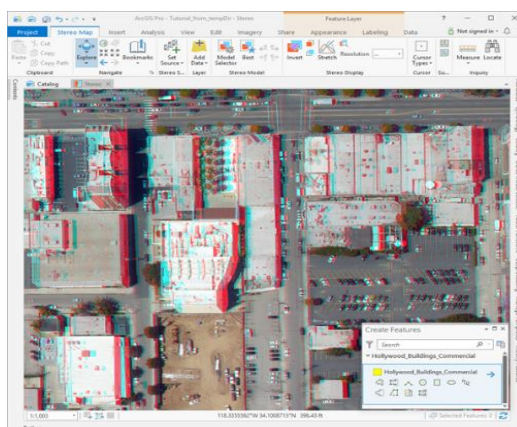
**Change detection**—Compare multiple images or rasters to identify the type, magnitude, or direction of change between dates.



**Multidimensional analysis**—Perform complex analysis on multidimensional raster data to explore scientific trends and anomalies. Adding a multidimensional raster layer to the map view allows you to display or examine your variables in one file. The Multidimensional tab is activated and provides capabilities to manage, visualize, and process multidimensional raster data and publish results as a web service.

**Pixel Editor**—Edit individual pixels and objects, groups of pixels and objects, and regions in raster and imagery data. Edit multispectral and single-band imagery. Edit elevation data to fill voids, and remove spikes or holes. Reclassify pixels, regions, or objects. Reclassify pixels using feature data.

**Stereo mapping**—Visualize imagery and capture 3D feature data in a stereo viewing environment.



**Motion Imagery**—Work with geospatially enabled video data together with your GIS data to assist in timely, well-informed decision support.

**Raster functions**—Perform real-time raster analysis and image processing on an extensive suite of remote sensing data types, and save your results if desired. Create raster function chains and deploy them on the desktop or in distributed processing and storage environments on-premises or in the cloud.

**Geoprocessing tools**—Perform remote sensing analysis and image processing using individual tools, and create and deploy them in processing models locally on the desktop or in distributed processing and storage environments on-premises or in the cloud.