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Getting to Know ArcGIS Image Analyst

Essential tasks and resources for getting started with the
ArcGIS Image Analyst extension.

Task checklist

TASK	COMPLETE
1. Get the guidance you need	<input type="checkbox"/>
2. Enable ArcGIS Image Analyst	<input type="checkbox"/>
3. Visualize data in image space	<input type="checkbox"/>
4. Classify imagery and use deep learning	<input type="checkbox"/>
5. Perform change detection	<input type="checkbox"/>
6. Analyze multidimensional raster data	<input type="checkbox"/>
7. Improve imagery with Pixel Editor tools	<input type="checkbox"/>
8. Work with stereo images	<input type="checkbox"/>
9. Get started with full motion video	<input type="checkbox"/>
10. Process imagery with advanced functions	<input type="checkbox"/>
11. Additional resources	<input type="checkbox"/>

1. Get the guidance you need

The purpose of the *Getting to Know ArcGIS Image Analyst* guide is to give you hands-on experience with the ArcGIS Image Analyst in ArcGIS Pro. You'll get started with stereo imagery, deep learning image classification, full motion video, and other advanced functionality.

We want you to be successful when you work through this guide, but there may be another guide or resource that is better suited to your goals. Look at the list of roles below to find out which resources are best for you.

If you're an imagery analyst or GIS professional...

If you are an **imagery analyst** or a **GIS professional** looking to get more familiar with advanced image processing capabilities, *this is the guide for you!*

If you're new to GIS or imagery...

If you are a **new ArcGIS Pro user** or simply **new to image analysis**, work through the tutorials below before diving into the *Getting to Know ArcGIS Image Analyst* guide.

- [Get started with ArcGIS Pro using this guided learn path.](#)
- [Learn how to use ArcGIS Pro to predict deforestation in Brazil.](#)
- [Get started with imagery by exploring the Esri Landsat app.](#)

If you're an administrator or manager...

If you are an **administrator** or a **manager** and you are looking for help accessing, downloading, and licensing ArcGIS Pro and extensions like the ArcGIS Image Analyst, download the [ArcGIS Pro Implementation Guide](#).

There you will learn how to obtain, install, and set up ArcGIS Pro for you and your organization.

2. Enable ArcGIS Image Analyst

ArcGIS Image Analyst is an extension for ArcGIS Pro that gives you access to enriched visualization, geospatial analytics, and powerful image exploitation tools. It is designed for analysts, scientists, and photogrammetrists who process, interpret, analyze, and create information products from imagery and other remotely sensed data.

[Learn how to purchase the ArcGIS Image Analyst extension.](#)

Once you have purchased ArcGIS Image Analyst or requested a [free trial](#), you can enable it in ArcGIS Pro. You'll need an administrator of your organization to assign you the ArcGIS Image Analyst license. Once assigned, you'll have immediate access to the tools and capabilities that come with ArcGIS Image Analyst.

[Learn how to view and authorize ArcGIS Pro extension licenses.](#)

Before you jump into the ArcGIS Image Analyst, watch a few short videos to help you understand just a few of the fundamental capabilities of image analysis in ArcGIS Pro:

- **Feature extraction:** See the different classification tools that enable you to extract quantifiable features from imagery. [5 minutes]
- **Process raster data:** Watch how quickly images and raster data can be processed using raster functions. [5 minutes]
- **Stereo viewing:** See how to view imagery in stereo and extract 3D features. [2 minutes]
- **Enriched visualization and measurement:** Watch how to view imagery and make measurements in image space. [4 minutes]
- **Full Motion Video:** See the new Full Motion Video functionality in action. [3 minutes]

[Start the ArcGIS Image Analyst video playlist.](#)

3. Visualize data in image space

Oblique imagery can look distorted in projected map space, making it hard to interpret. With ArcGIS Image Analyst, you can display imagery from the perspective of the sensor. In image space, buildings and features can be oriented vertically with no distortion related to terrain, so they're easier to interpret. Features can be interactively measured, or they can be digitized, edited, and saved in a map projection.

Watch the following video to get an introduction to working in image space, then get hands-on experience with the tutorial.

[See a demonstration of image space in action.](#)

[Get hands on experience working in image space.](#)

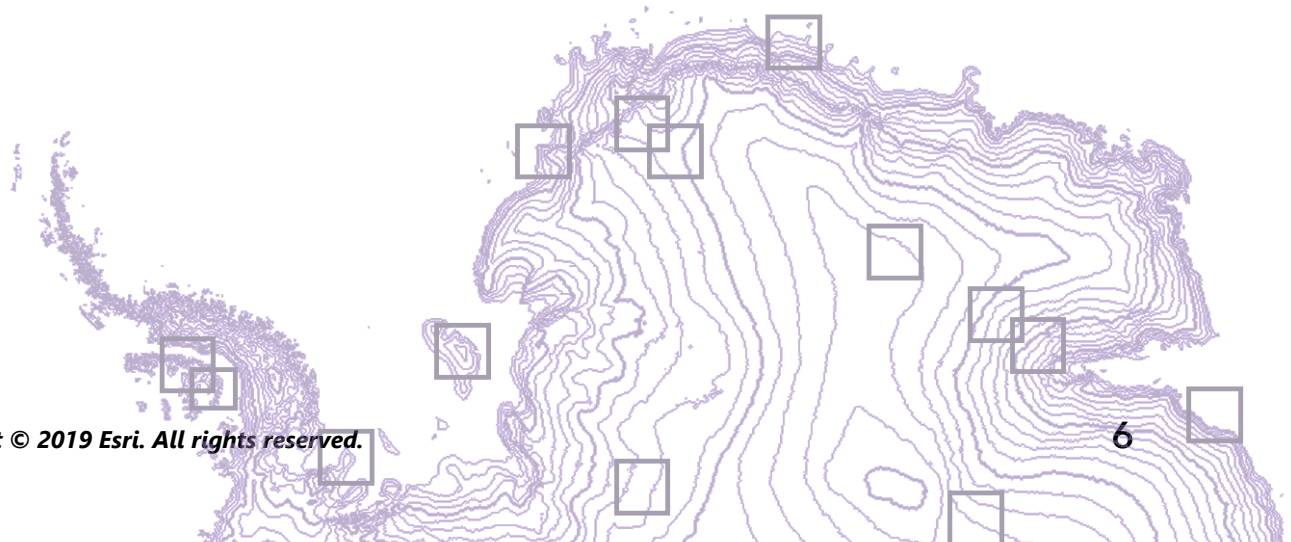
4. Classify imagery and perform deep learning

Extracting GIS data from an image can be done by digitizing features on top of a georeferenced image, detecting objects using deep learning techniques, or delineating features using image classification. Image classification refers to the task of assigning classes—defined in a classification system or schema—to all the pixels in a remotely sensed image. The output raster from image classification can be used to create thematic maps, quantify resources, or detect change.

In the following guided learning path, you will learn:

- **The basics of image segmentation, classification and machine learning:** watch a presentation from Esri experts on image classification techniques [1 hour]
- **How to extract land cover types from imagery:** get hands-on experience by extracting impervious surfaces from a remotely sensed image. [1.5 hour]
- **The Image Classification Wizard:** walk through the guided wizard in ArcGIS Pro to create a thematic map from imagery. [30 minutes]
- **How to use spectral profiles to improve results:** find out how you can use charts in ArcGIS Pro to improve your classification. [1 hour]
- **How to integrate deep learning with ArcGIS Pro:** use a trained deep learning model to extract palm tree location and health from an image. [1.5 hours]

[Learn how to extract features from imagery in ArcGIS.](#)



5. Perform change detection

Change detection is one of the fundamental processes in remote sensing. With the tools and capabilities available with the Image Analyst extension, you can perform change detection between categorical or continuous raster datasets, or even over a time series of images.

using categorical data, then you'll perform pixel value differences in vegetation using Landsat imagery. Then watch a video on time series change detection.

[Evaluate Ethiopia's changing landscape using the Change Detection Wizard.](#)

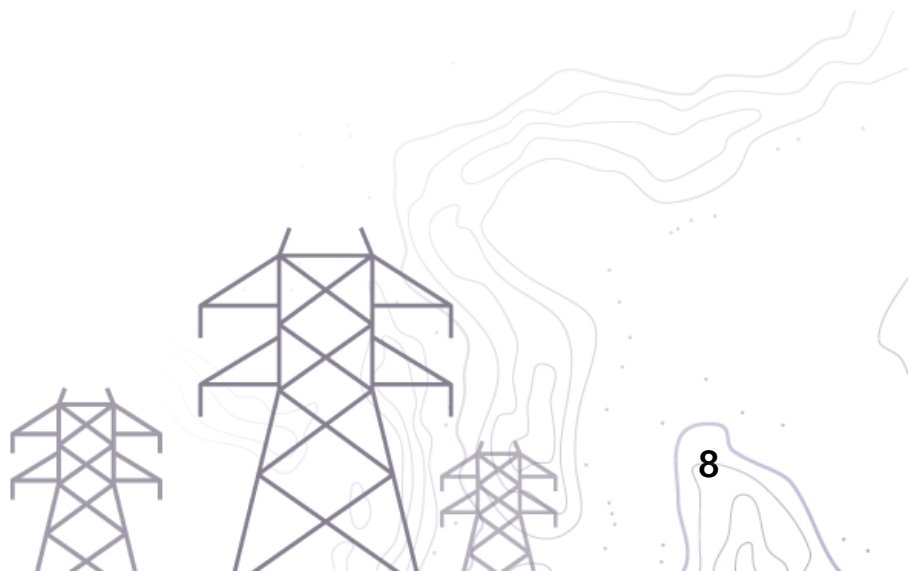
[Next, check out this video on time series change detection.](#)

6. Analyze multidimensional raster data

Multidimensional data represents data captured at multiple times or multiple depths or heights. These data types are commonly used in atmospheric, oceanographic and earth sciences. With the ArcGIS Image Analyst, you can manage, visualize, and process multidimensional raster data, and publish them as a web service. Adding a multidimensional raster layer to your map allows you to quickly display and explore your variables.

Use the following tutorials and articles to find out how you can use multidimensional raster data for trend analysis, anomaly detection, and prediction.

- [Work with multidimensional data](#)
Visualize temporal trends and anomalies in sea surface temperature data.
- [Get started with multidimensional raster data](#)
Generate a multidimensional mosaic dataset from a group of Landsat images, then convert the mosaic dataset into the Esri native Cloud Raster Format and visualize changes in the Chuquicamata mine in Chile.
- [How to create multidimensional raster data](#)
Watch three short videos on the three ways to create a multidimensional raster dataset.
- [Analyze climate impact on wine production using multidimensional analysis](#)
Read about how to use multidimensional raster analysis to predict the climate change impact on crops
- [Find out how plant hardiness zones will change with multidimensional data](#)
See how to use the arcpy API to explore multidimensional data for environmental analysis.



7. Improve imagery with Pixel Editor tools

With Pixel Editor functionality in the ArcGIS Image Analyst, you can interactively manipulate pixel values for raster and imagery data. This allows you to edit individual pixels or a group of pixels at one time. Editing operations are enabled according to your raster type and include options for pixel or object removal, redaction, filtering, and reclassification.

In the following guided learning path, you'll learn the basics of the Pixel Editor and see some of the tools and capabilities available.

[Learn about editing rasters in ArcGIS Pro with Pixel Editor.](#)

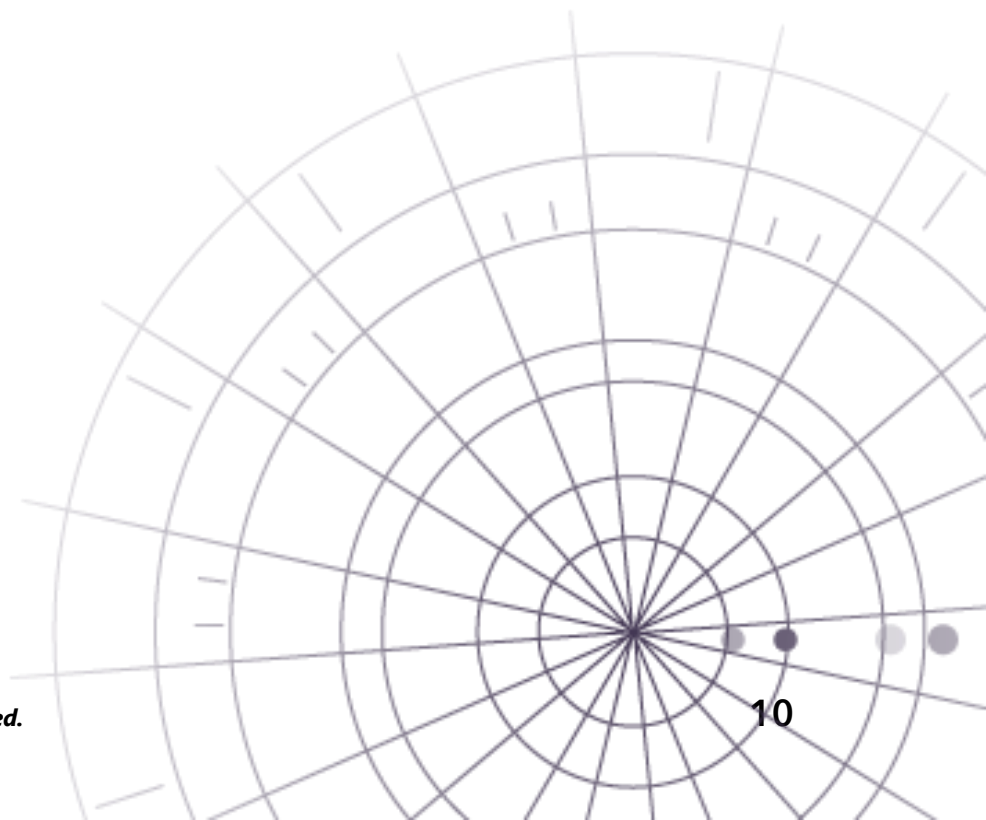
8. Work with stereo images

Stereoscopy is the science of using overlapping images acquired from a remote sensor at different look-angles to produce 3D models that emulate true binocular vision. With the ArcGIS Image Analyst, you can visualize stereo pairs and create 3D features in a stereo mapping environment.

To get an understanding of stereo mapping in ArcGIS Pro, read through the following documentation, which describes:

- [How to prepare satellite data for stereo mapping](#): Build a mosaic dataset from overlapping imagery.
- [How to prepare aerial data for stereo mapping](#): Build a mosaic dataset from overlapping imagery.
- [How to enable stereo viewing](#): See what is required and how to enable stereo viewing in an ArcGIS Pro project.
- [Create a stereo map](#): Visualize multiple stereo models in a stereo map and use tools to navigate the map.

[Then learn how to collect 3D features in stereo with this Learn Lesson.](#)

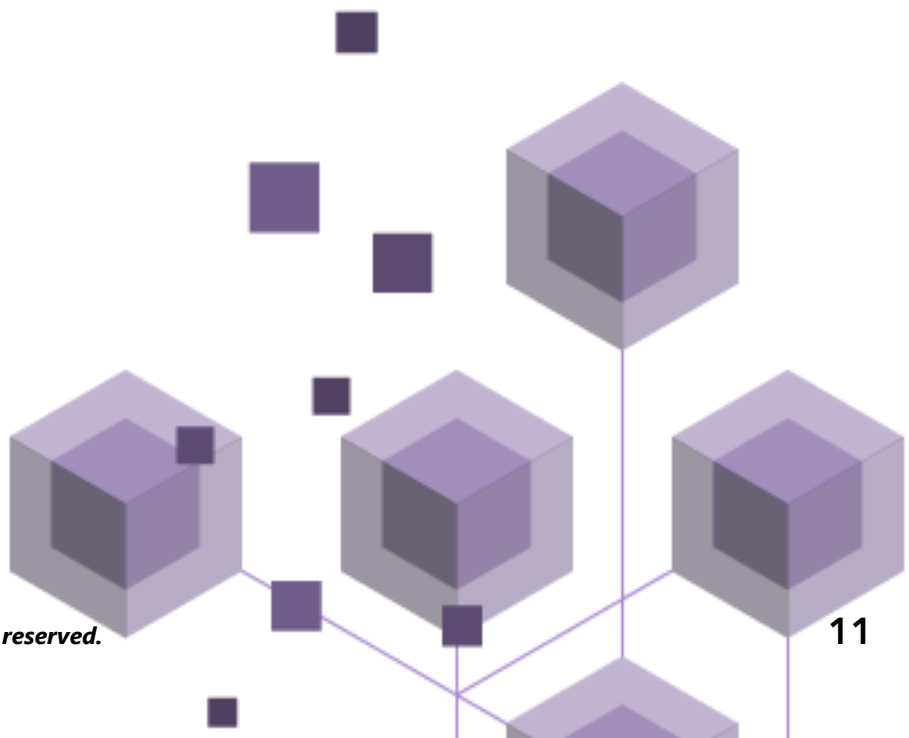


9. Get started with full motion video

With full motion video (FMV) in the ArcGIS Image Analyst, you can work with aerial video data right in your map. You can visualize a drone-captured video in the video player while seeing the path of the video frame update in your map. You can even capture geospatial features using the video player or pause the video and export the contents to a PowerPoint presentation with one click. For even more information, you can use deep learning models to track and extract object information from videos, all within ArcGIS Pro.

Use the following exercises and videos to learn about full motion video:

- [Work with the video player](#)
Take a tour of the tools and functionality of the video player.
- [Create features in your video](#)
Digitize points of interest on your video and save them for analysis.
- [Use the video multiplexer tool](#)
See how to use the multiplexer tool to combine archived video with metadata to create FMV-compliant data.
- [Use deep learning with full motion video](#)
See how drone footage is used with predictive modeling tools in ArcGIS to conduct an automated, repeatable catfish survey.

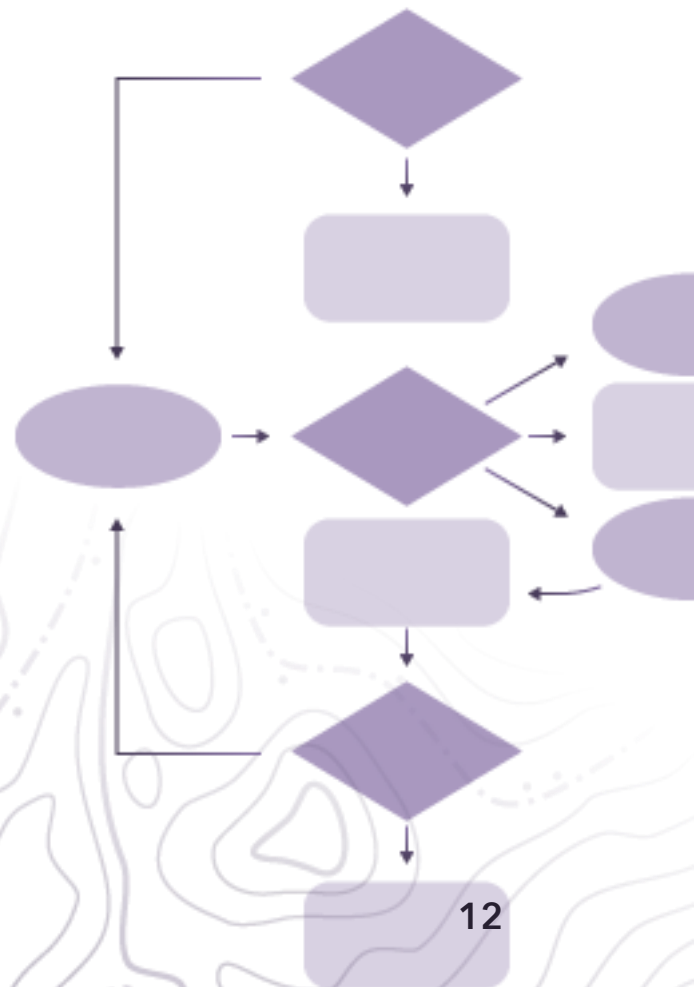


10. Process imagery with advanced functions

Raster functions are operations that apply processing directly to the pixels of imagery and raster datasets on-the-fly. You can choose to keep the output imagery by persisting the data, but by default, no new raster is created to take up space on the disk, and only pixels that are visible on your screen are processed so the computation time is fast.

ArcGIS Image Analyst provides a suite of raster functions [in addition to the functions available in ArcGIS Pro](#). For example, the Focal Statistics function and the Weighted Sum function are available with the ArcGIS Image Analyst.

Learn how to process imagery with raster functions.



11. Additional resources

- [ArcGIS Image Analyst](#) documentation is the best resource for learning how to use the software in general and to perform specific tasks. It also includes the list of [geoprocessing tools](#) and [raster functions](#) available with the extension.
- The [Learn ArcGIS gallery](#) includes a collection of lessons, articles, Story Maps, and videos that help you learn about ArcGIS. It includes a lot of great content on [imagery and remote sensing](#).
- The GIS community, including Esri, shares thousands of ready-to-use authoritative datasets in [ArcGIS Living Atlas of the World](#). Living Atlas covers everything from historical census data to environmental conditions derived from live sensor networks and earth observations.