

# About This Release

As of VisionPro Deep Learning 2.1.1, Cognex offers fixes to solve some known issues in the previous versions.

- Fixed an issue that the execution of VisionPro 10.1 C# API method `Cognex.Vision.Startup.Shutdown()` is not completed within an expected time when using VisionPro Deep Learning Tool Block.
- Fixed an issue that the Focused tools (Blue Locate, Blue Read, Green Classify Focused, Red Analyze Focused Supervised, Red Analyze Focused Unsupervised) occasionally expose inconsistent results given exactly the same configurations.
- Fixed an issue that the processing of Blue Locate or Blue Read rarely gets slower.
  - To solve this issue, we allowed access to a new processing parameter called `max_scan_iterations` in the runtime API. With this parameter, you can limit the maximum search time to speed up the processing. For more details, see [Breaking Changes to the API on page 19](#).

**Note:**

- The VisionPro and VisionPro Deep Learning software require that a valid Cognex Security Dongle be installed directly to PCs running the software during all phases of operation (programming, processing, training, testing, etc.). Any attempts to temporarily remove, substitute, or share a Cognex Security Dongle may cause your system to operate incorrectly, and may result in the loss of data.

When VisionPro Deep Learning is configured for the Client/Server functionality, and a computer has been configured as a server, the Cognex Security Dongle must be attached to the server, but the client(s) does not need a Cognex Security Dongle.



- Sample code is included with the VisionPro Deep Learning 2.1.1 installer. The resources for the sample code (*VisionPro Deep Learning 2.1.1 Sample Code Resource.msi*), which include images and workspaces, are available for download from the [Cognex Support Site](#).
- For more information about new API functionality in this release, see the *Cognex VisionPro Deep Learning Suite .NET Library* and *Cognex VisionPro Deep Learning Suite C API* help files.

# Introducing Cognex Deep Learning™

- VisionPro Deep Learning is Cognex's new PC-based deep learning software product. It is the direct successor to VisionPro ViDi™. The first release of VisionPro Deep Learning adds a new "High Detail" mode to the existing ViDi Classifier, which is now known as "Focused" mode. High Detail mode was originally developed as part of the SuaKIT™ product. It provides highly accurate results for a wide range of challenging applications, while Focused mode typically trains and runs faster. In the recent release of VisionPro Deep Learning, a new mode called "High Detail Quick" is added, offering a much faster training speed than High Detail along with all the merits of High Detail mode. Users can switch between modes without relabeling the images. This makes it easy to determine which mode offers the best combination of accuracy & speed for any particular application.
- VisionPro Deep Learning is compatible with VisionPro ViDi, including API, project loading and security dongles.
- SuaKIT users can import SuaKIT classification and segmentation project into VisionPro Deep Learning. They can then take advantage of the other features of Cognex Deep Learning Studio, including the Blue Locate, OCR tools, and tool chaining.

## Resolved Issues

This section describes changes and resolved issues in VisionPro Deep Learning 2.1.1.

- Fixed an issue that the execution of VisionPro 10.1 C# API method `Cognex.Vision.Startup.Shutdown()` is not completed within an expected time when using VisionPro Deep Learning Tool Block.
- Fixed an issue that the Focused tools (Blue Locate, Blue Read, Green Classify Focused, Red Analyze Focused Supervised, Red Analyze Focused Unsupervised) occasionally expose inconsistent results given exactly the same configurations.
- Fixed an issue that the processing of Blue Locate or Blue Read rarely gets slower. See [Breaking Changes to the API on page 19](#) for more details.

## Migrating to This Release

This topic contains information about changes that may affect existing VisionPro Deep Learning projects when migrating projects from previous releases to the current release.

## New Release - VisionPro Deep Learning 2.0.0 - 2.1.0

### Termination of CIE1 Deployment Support

The CIE1 deployment target is officially no longer supported by VisionPro Deep Learning 2.1 as VisionPro Deep Learning does not support smart cameras. The support for CIE1 deployment target has unofficially been terminated since VisionPro Deep Learning 2.0, but the option was visible in VisionPro Deep Learning GUI in 2.0.

## Past Release - VisionPro Deep Learning 1.1.0 - 2.0.0

### Termination of Designer Support

The integration with Cognex Designer is no longer supported from VisionPro Deep Learning 2.1.1. For this particular update, the users who are required to use Designer should use VisionPro Deep Learning 1.1.

## Past Release - VisionPro Deep Learning 1.0.1 - 1.1.0

### Change in Validation Loss Calculation

The base of calculating the Validation Loss in High Detail modes (Red Analyze and Green Classify) is changed from **128 iterations** to **0.125 epochs**. According to this change, the *Patience* parameter, which was calculated on 128 iterations (N times of 128 iterations) basis, is no longer used in High Detail modes and a new parameter named *Patience Epoch* is used instead. This new parameter is calculated on an epoch basis (N epochs). For the Green Classify High Detail tools already trained, you have to reconfigure the value of *Patience Epoch* manually due to this base change.

### Loss Tracking in Log Messages

The records of the validation loss in High Detail modes (Green Classify and Red Analyze High Detail) are no longer available in Log Messages as its function of providing the validation loss history is replaced with the Loss Inspector.

### Region Filter for Confusion Matrix

For all Red Analyze tools, the region filter is now also applied to the result of the confusion matrix. This application of the region filter is either performed by using `filtered()` expression.

## Past Release - VisionPro Deep Learning 1.0.0 - 1.0.1

The workspaces created in VisionPro Deep Learning 1.0.0 are fully compatible with VisionPro Deep Learning 1.0.1

## Past Release - ViDi 4.1 to VisionPro Deep Learning 1.0.0

### Architecture of Existing Green Classify Tool

When you open workspaces created from previous version (ViDi Suite) and if there is a Green Classify Tool, you would see as a Green Classify Tool in Focused mode. Existing architecture of Green Classify Tool is called Focused mode and a new architecture of Green Classify Tool is called High Detail mode.

### Keeping Existing names of APIs

Since VisionPro Deep Learning inherits ViDi, it retains the name ViDi in many parts of the APIs

## Internal version of APIs

Product version is 1.0.0 but, 5.0.0 is used for the version in APIs and binaries.

## No longer supported or Deprecated APIs

GPUMode.MultipleDevicesPerTool is no longer supported. For more information, see [Breaking Changes to the API](#).

You can see deprecated APIs here([C and .NET API Deprecated and Removed Feature](#)).

## Changes to Designer functionality

A project built with the 4.1 (or previous) version of the Designer Deep Learning Plugin is not compatible with the Cognex Deep Learning Plugin. To force the correct plugin to be used, use the Project Plugin Configurator in Designer's Utilities.

You cannot train in Designer, you can import Cognex Deep Learning Studio Runtime Workspace(.vrws file) created from Cognex Deep Learning Studio 1.0 and process the images.

The Runtime Block includes only one output pin. Individual Tools in the Tool Chain are not visible in the UI. And there are no preconfigured result pins so you need script for every single application.

Deep Learning Runtime Block does not support an External Fixture.

## Past Release - ViDi 3.4.1 to 4.1

### Changes to the Feature Filter Syntax

In the 4.1.0 release, the syntax for the Feature Filter Processing tool parameter was modified. If you were using `width` and `height` in your expression, they must now be qualified with `view`, such as `view.width` and `view.height`.

For example, in version 3.2 and earlier, syntax used to limit the found features to those where the center of the feature lies within the ROI would have been the following:

```
x < width and x > 0 and y > 0 and y < height
```

In 4.1.0 and later, it must now be expressed as the following:

```
x < view.width and x > 0 and y > 0 and y < view.height
```

**Note:**

This syntax can also more easily be expressed by using the `in` operator. For example, the following syntax could be used to simplify the expression:

```
x in [0,view.width] and y in [0,view.height]
```

### Changes to the Viewing of Overlay Graphics

In the 3.4.1 releases, the keyboard shortcuts used to show and hide overlay graphics in the Image Display Area have been changed. The new keystrokes are the following:

- The *Alt* key plus the *Right Arrow* key or the *Alt* key plus the *Left Arrow* key

These are used to cycle through the available combinations of display graphics (labels, markings, labels and markings, or no overlay graphics).

In previous releases, the space bar could be used to show or hide all overlay graphics, but that is no longer supported.

## Changes to Tool Training Workflow

In the 3.4.0 release, there is a new method for specifying the images/views that will be used to train a tool. If you will be re-training a tool that was trained in a previous release, you will need to configure the tool to use the new training set paradigm, via the Select Training Set dialog. Please refer to the Training Set and Use the Select Training Set Dialog topics.

## Known Issues

The following issues have been identified in this release:

### [Cognex Deep Learning Studio]

- “No License Found” error occasionally occurs when you try to open 2 different versions of VisionPro Deep Learning, or launch Parameter Search and VisionPro Deep Learning, at the same time.

### [GPU]

- Internal issues on supporting NVIDIA driver versions.  
Due to internal issues related to NVIDIA drivers, all users of VisionPro Deep Learning 2.1.1 **MUST** use NVIDIA driver according to the followings:
  - 461.09 or higher version for NVIDIA GeForce® series.
  - R460 U2 (461.09) or higher version for NVIDIA RTX / Quadro® series.
- C API malfunctioning depending on NVIDIA drivers.  
Due to internal issues related to runtime, C API may not work as intended. To prevent this issue, all users of C API **MUST** follow the steps below.
  - Remove the currently installed NVIDIA driver from your PC.
  - Reboot your PC and install the **DCH** NVIDIA driver of which version is compatible with VisionPro Deep Learning 2.1.1 (461.09 or higher, or R460 U2 (461.09) or higher for NVIDIA RTX / Quadro®)
- Processing Time could be slower compared to 1.0.0 under old GPUs.  
Processing Time could be slower compared to 1.0.0 when using NVIDIA GeForce® RTX™ 20 series or older series due to NVIDIA internal issues.

### [OS]

- OS compatibility issues on Windows Server 2016  
Due to OS compatibility issues caused from NVIDIA drivers, Windows Server 2016 is not supported on VisionPro Deep Learning 2.1.1. For the users with Windows Server 2016 environment, upgrading from Windows Server 2016 to Windows Server 2019 is required for the utilization of VisionPro Deep Learning 2.1.1 servers. Windows Server 2019 is only supported for 'servers' configured to use the Deep Learning Client/Server functionality.

### [Deep Learning Tools]

- For Blue Read, the markings are displayed on the view regardless of the Marking checkbox in Image File Information is whether enabled or disabled. This issue has existed since ViDi 4.1.
- If the name of a set in Database Overview contains a single quote ('), you cannot change the name of this set.
- If the name of a set in Database Overview contains a single quote ('), an error occurs when you try to filter views on View Browser by clicking the icon of this set in Database Overview.
- Erasing maskings/regions in the mask/region editor pane (*Edit Mask or Edit Region* in right-click popup menu on the image display area) applies Gaussian smoothing on all the regions/maskings. This causes the entire maskings/regions to shift slightly and their sizes to be changed slightly. This issue has been an existing issue from VisionPro ViDi.
- For Red Analyze Supervised modes (High Detail and Focused), applying the region filter could affect the result of Auto Threshold to be compromised in generating an optimal threshold for the best F1 score.
- For Red Analyze High Detail, generally, you can guess that processing time increases when you reduce the Downsampling Size, but the opposite case can happen but this is not a bug.
- For Red Analyze High Detail, if the tool crashes with some unknown reason, images in this tool are deleted when the workspace that contains this tool is imported.
- For Red Analyze High Detail, changing a value in Processing Parameter in Tool Parameters and rolling back to the original value could affect the result at 4 decimal places.
- For Red Analyze Tool, the area of a marked defect region and the area of a labeled defect region which is created by accepting (right-click on a marked region → click *Accept Region*) that marked region, is slightly different from each other.
- For Red Analyze Supervised, if there were an extremely enormous amount of defect regions per view, especially when the tool is not trained enough, VisionPro Deep Learning becomes slow and the expected value of processing time becomes inaccurate. Please take the tool re-trained to learn the image information fairly enough.
- High Detail mode uses a different resize algorithm to SuaKIT. (Green Classify Tool in High Detail mode only) To use an imported SuaKIT model with VPDL runtime API, please use SuaKIT resize API before processing.
- Once you are done with training High Detail mode of Green Classify Tool, you cannot change the name of the class.
- Processing results are different between GPU and CPU.  
The difference is in the second decimal place of the result. For example, When you process with CPU and GPU respectively, different results can be obtained, such as 0.80 and 0.81.
- Defect regions do not extend to the left side of the view in Red Analyze Tool.  
To avoid this problem, when the defect area touches the left side of the image, please set 4 pixels wider ROI than the original image size. For example, if you have (x=0,y=0,w=100,h=100) image and it has detected area touch to left side of the image, please set (x=-4, y=0, w=104, h=100) ROI size.
- When you set the smaller feature size (especially smaller than 10) and train the Red Analyze tool (both in Supervised and Unsupervised mode), the workspace is getting bigger. The vvb file which is for saving heat map within the workspace is the main reason :  
For example,
  - feature size=10, sampling density=3, 8192x819 image: 1 vvb file size=94MB
  - feature size=10, sampling density=10, 8192x8192 image: 1 vvb file size=1GB
  - feature size=40, sampling density=3, 8192x8192 image: 1 vvb file size=23KB

[API]

- For the API known issues, see [API Known Issues on page 20](#).

### [Workspace]

- If the tool is not saved well because of unspecific reasons, you cannot export or clone the workspace/tool. You can avoid this problem by processing the tools again and save the workspace.
- Boost::filesystem::rename error.  
This error occurs when the user or system repetitively saves the workspace in a short time. This is just an alert that there was an issue while saving. You can solve this problem only by saving the workspace again.
- Group is shown in the workspace imported from ViDi Suite.
  - If you import workspaces including "Group" feature which are made 4.1 and before, "Group" is still displayed in Cognex Deep Learning Studio 2.1.1, but you cannot modify this.
  - See the FAQ for the workaround for this issue.
  - It is recommended to delete "Group" in the previous workspaces and import to Cognex Deep Learning Studio 2.1.1.
- Especially with bigger than 10GB workspaces,
  - Cloning work does not end when you clone tools in different big workspaces at the same time.
  - Some images are not included in the created report.

### [Report]

- During creating a report when you log off your PC, some of images are shown black. To avoid this issue, please do not log off your PC (neither turn off the remote environment nor lock screen) while you are creating a report.

### [Migration]

- For SuaKIT plugin, The result of processing between the imported SuaKIT Segmentation project in VisionPro Deep Learning and the original SuaKIT Segmentation project could be different due to the internal logic change of VisionPro Deep Learning 2.1.1.

### [Integration]

- Due to the currently limited support of VisionPro 10, the external ROI is not supported for a DLRuntimeTool Edit Control Panel in VisionPro 10 for the time being.

### [VisionPro Deep Learning Service]

- MultipleDevicesPerTool is no longer supported for VisionPro Deep Learning. Therefore you will have an "One or more error occurred" error if you select "--gpu-mode =MultipleDevicesPerTool" for service. Please choose another option to run VisionPro Deep Learning Service.
- For VisionPro Deep Learning Service, Export Runtime Workspace to Service on the right-click pop-up menu on Workspaces panel is currently disabled.  
To export runtime workspace, please go to and select *Workspace - Export Runtime Workspace to Service* instead.

- For VisionPro Deep Learning Service, when hosting a service with 2 different server ports (Client 1 connects via Port 1 and Client 2 connects via Port 2), the “Lock” icon does not appear on a workspace in Workspaces for a client when this workspace has been already used by one another.

# System Requirements

These topics cover the computer operating system and hardware requirements to use VisionPro VisionPro Deep Learning in your application.

## Operating System Requirements

Microsoft® Windows® Operating System	English	Chinese	Japanese	Korean	French	German	Spanish
Windows 10 Professional (64-bit)	✓	✓	✓	✓	✓	✓	✓
Windows Server 2019	✓	✓	✓	✓	✓	✓	✓

**Note:**



- The use of the VisionPro Deep Learning software or the Deep Learning Service on a virtual machine (VM) is not supported.
- Due to the issues from the NVIDIA driver, Windows Server 2016 is not supported for VisionPro Deep Learning 2.1.1 Server/Client mode. See [Known Issues](#) for more details and the workaround.

## Computer Hardware Requirements

When assembling PCs for your VisionPro Deep Learning application, refer to the following general guidelines for either a deployment or training PC (see the separate topics for specific requirements applicable to those configurations):

- CPU

We recommend the higher specification than Intel Core i7. When selecting a CPU, a higher CPU clock speed rate and multiple core processors will result in faster runtime tool execution. If your application will be relying on the Blue Locate tool, it is more sensitive to clock speed rates, particularly with complex model matching applications.

- System Memory (RAM)

We recommend 32GB or higher.

### Graphics Processing Unit (GPU)

For training, we recommend GPUs that have 10GB or larger GPU Memory (1080 Ti, 2080 Ti, 3080).

For the processing of High Detail modes and High Detail Quick modes, GPUs that have 8GB or larger GPU Memory are recommended.

When selecting a GPU, Cognex only supports NVIDIA GPUs.

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- Power Supply

When selecting your power supply, include a 25% margin above the requirement to accommodate the system and GPU power requirements, in other words, select a power supply that is 1.25 times the system and GPU power requirements.

- USB 2.0

A USB port for a permanent connection to the Cognex Security Dongle via USB 2.0.

**Note:**

The VisionPro and VisionPro Deep Learning software require that a valid Cognex Security Dongle be installed directly to PCs running the software during all phases of operation (programming, processing, training, testing, etc.). Any attempts to temporarily remove, substitute, or share a Cognex Security Dongle

**i** may cause your system to operate incorrectly, and may result in the loss of data.

When VisionPro Deep Learning is configured for the Client/Server functionality, and a computer has been configured as a server, the Cognex Security Dongle must be attached to the server, but the client(s) does not need a Cognex Security Dongle.

## Training PC Requirements

The following requirements describe the suggested system for the VisionPro Deep Learning application training and development PC.

- CPU

We recommend the higher specification than Intel Core i7. When selecting a CPU, a higher CPU clock speed rate and multiple core processors will result in faster runtime tool execution. If your application will be relying on the Blue Locate tool, it is more sensitive to clock speed rates, particularly with complex model matching applications.

### GPU

When selecting a GPU, Cognex only supports NVIDIA GPUs.

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For training, we recommend GPUs that have 10GB or larger GPU Memory (1080 Ti, 2080 Ti, 3080).

- System Memory (RAM)

First, 32GB or more than 32GB is recommended.

When selecting the system RAM, specify the greater of:

- The sum of all GPU memory. For example, if you have four NVIDIA GeForce® RTX™ 3080 Ti GPUs, which each have 10 GB of memory, the PC should have 40 GB of RAM.
- The RAM should be one and a half times the typical workspace size. For example, if your typical workspace is 20 GB, the PC should have a minimum of 30 GB of RAM.

**i Note:** You should have more than 50GB to train the tool with 15,000 images of 1K X 1K.

- System Storage

Cognex recommends the use of a solid-state drive (SSD), we recommend 100GB + as a free space.

- USB 2.0

USB port for a permanent Cognex Security Dongle (containing the training license) connection via USB 2.0.

**Note:**

The VisionPro and VisionPro Deep Learning software require that a valid Cognex Security Dongle be installed directly to PCs running the software during all phases of operation (programming, processing, training, testing, etc.). Any attempts to temporarily remove, substitute, or share a Cognex Security Dongle



may cause your system to operate incorrectly, and may result in the loss of data.

When VisionPro Deep Learning is configured for the Client/Server functionality, and a computer has been configured as a server, the Cognex Security Dongle must be attached to the server, but the client(s) does not need a Cognex Security Dongle.

## Deployment PC Requirements

The following requirements describe the suggested system for the deployment of your VisionPro Deep Learning application on a runtime PC.

- CPU

We recommend the higher specification than Intel Core i7. When selecting a CPU, a higher CPU clock speed rate and multiple core processors will result in faster runtime tool execution. If your application will be relying on the Blue Locate tool, it is more sensitive to clock speed rates, particularly with complex model matching applications.

For High Detail modes and High Detail Quick, if you have only CPU; not GPU, you cannot process the tool.

If a single core performs multi-tasks, processing may be jumped up. Therefore, it is necessary to use a sufficient amount of resources or allocate the single task to a single core.

- GPU

When selecting a GPU for processing, VisionPro Deep Learning 2.1.1 only supports NVIDIA GPUs. Consider the following when choosing an NVIDIA GPU:

At a minimum, an NVIDIA® CUDA® enabled GPU is required.

When selecting an NVIDIA GPU, a unit with a higher core clock frequency, CUDA cores and Tensor cores will result in faster computational speeds. Due to this, Cognex strongly recommends the use of NVIDIA RTX / Quadro® and Tesla GPUs for the following reasons:

- These GPUs support the compute-optimized Tesla Compute Cluster (TCC) mode.
- These GPUs are designed and tested for continuous duty-cycle operation.
- These GPUs undergo rigorous testing and qualification by NVIDIA.

In addition, these GPUs offer longer-term availability and driver stability.

8 GB of GPU memory is recommended for runtime.

- PCIe Lanes

Cognex recommends a minimum of x8 PCIe lanes. However, a PCIe x16 has the potential to reduce cycle time by approximately 10 ms, relative to a PCIe x8 (based on a 5 MP image).

- USB 2.0

USB port for a permanent Cognex Security Dongle (containing the runtime license) connection via USB 2.0.

**Note:**

The VisionPro and VisionPro Deep Learning software require that a valid Cognex Security Dongle be installed directly to PCs running the software during all phases of operation (programming, processing, training, testing, etc.). Any attempts to temporarily remove, substitute, or share a Cognex Security Dongle

**i** may cause your system to operate incorrectly, and may result in the loss of data.

When VisionPro Deep Learning is configured for the Client/Server functionality, and a computer has been configured as a server, the Cognex Security Dongle must be attached to the server, but the client(s) does not need a Cognex Security Dongle.

## NVIDIA® GPU Requirements

The following information covers the requirements when utilizing an NVIDIA GPU with your VisionPro Deep Learning application. The GPU is utilized by Deep Learning during the development of your application, typically with the training of tools. In addition, a GPU can also be used during runtime deployment, where it increases performance of runtime workspaces.

### NVIDIA Driver Support

- GeForce® RTX driver greater than or equal to 461.09
- NVIDIA RTX / Quadro® / Data Center driver greater than or equal to R460 U2 (461.09) (Optimal Driver for Enterprise).
  - It is highly recommended to visit <https://www.nvidia.com/Download/Find.aspx> to find the right versions for your GPU as your GPU may require higher version than R460 U2 (461.09).

### Supported NVIDIA GPUs

VisionPro Deep Learning 2.1.1 aims to support the most common GPU families, but it's not practical to test every model or driver. The table below indicates those models we have explicitly tested and confirmed work, as well as those few models and families that do not work. Most other common NVIDIA GPUs other than very new models have been used successfully by customers, even if they haven't been explicitly tested. In addition, we share specifications for minimum GPU capability, as well as recommendations high performance GPUs for demanding applications, such as those using Green Classify High Detail or Red Analyze High Detail.

- Minimum recommended performance: GTX 1060 6GB
- Recommended for high performance: GTX 1080 Ti / RTX 2080 Ti / RTX 3080

GPU	Model	Tested by Cognex	Recommended for High Performance
NVIDIA GeForce®	GTX 1060 6GB	Tested	
	GTX 1070		
	GTX 1080	Tested	
	GTX 1080 Ti	Tested	Recommended
	RTX™ 2070		
	RTX 2080		
	RTX 2080 Ti	Tested	Recommended
	RTX 3060		
	RTX 3060 Ti		
	RTX 3070	Tested	
	RTX 3070 Ti		
	RTX 3080	Tested	Recommended
	RTX 3080 Ti		
	RTX 3090	Tested	Recommended
NVIDIA RTX / Quadro®	P2000		
	P4000	Tested	
	P5000		Recommended
	GV100*		Recommended
	RTX 4000		
	RTX 5000		Recommended
	RTX 6000		Recommended
	RTX 8000		Recommended
	Titan V*		Recommended
	Titan RTX		Recommended
NVIDIA Tesla®	V100*		
Models known not to work:			
<ul style="list-style-type: none"> <li>GTX 1660 and GTX 1650: Please note that low performance and slow training time with unknown reason.</li> </ul>			

GPU	Model	Tested by Cognex	Recommended for High Performance
<p><b>Note:</b> When selecting a GPU, Cognex only supports NVIDIA GPUs.</p> <ul style="list-style-type: none"> <li>• VisionPro Deep Learning 2.1.1 supports the use of any NVIDIA CUDA® enabled GPU that provides a compute capability of 3.0 and higher, and requires a driver version greater than or equal to 461.09.</li> <li>• CUDA compute capability 3.0 or higher is required to use the core VisionPro Deep Learning functionality. The Low Precision parameter requires CUDA compute capability 6.1 or higher (for more information, visit the <a href="#">NVIDIA</a> website).</li> <li>• When training and processing High Detail mode and High Detail Quick mode, a requirement of 8 GB of GPU memory is for runtime operation, and 10 GB of GPU memory is recommended for training.</li> <li>• The NVIDIA GeForce Titan V, NVIDIA RTX / Quadro® GV100 and Tesla V100 include NVIDIA Tensor Cores. VisionPro Deep Learning 2.1.1 will automatically utilize Tensor Cores if they are present, provided you have a Standard or Advanced security license. Please contact your Cognex Sales Representative for information about enabling the functionality on your Cognex Security Dongle.</li> </ul>			

## API Development Requirements

The following software and components are necessary for developing VisionPro Deep Learning custom applications through the VisionPro Deep Learning API:

- Microsoft® Visual Studio® 2015, 2017 or 2019
- Microsoft .NET Framework 4.7.2

**Note:** For more information about the VisionPro Deep Learning API, please refer to the *Cognex Deep Learning .NET Documentation* and the *Cognex Deep Learning C Documentation* help files.

## Cognex VisionPro Support

VisionPro Deep Learning is qualified to support the following Cognex VisionPro release:

- VisionPro 10.1

## Image File and Format Requirements

The supported input image channels, bit depths, and image file formats in VisionPro Deep Learning and the image channels, bit depths, and image file formats converted after importing to VisionPro Deep Learning are described in the table below. The image channels, bit depths, and image file formats not described in this table are not supported in VisionPro Deep Learning.

Before Importing into VisionPro Deep Learning			After Importing into VisionPro Deep Learning		
Input Image Channel	Input Image Bit Depth	Input Image File Format	Imported Image Channel	Imported Image Bit Depth	Imported Image File Format
1 ch	8-bit	bmp	1 ch	8-bit	png
1 ch	8-bit	jpg	1 ch	8-bit	png

1 ch	8-bit	png	1 ch	8-bit	png
1 ch	8-bit	tiff	1 ch	8-bit	png
1 ch	16-bit	png	1 ch	16-bit	png
1 ch	16-bit	tiff	1 ch	16-bit	png
3 ch	8-bit	bmp	3 ch	8-bit	png
3 ch	8-bit	jpg	3 ch	8-bit	png
3 ch	8-bit	png	3 ch	8-bit	png
3 ch	8-bit	tiff	3 ch	8-bit	png
3 ch	16-bit	png	3 ch	16-bit	png
3 ch	16-bit	tiff	3 ch	16-bit	png
4 ch	8-bit	bmp	4 ch	8-bit	png
4 ch	8-bit	png	4 ch	8-bit	png
4 ch	8-bit	tiff	4 ch	8-bit	png
4 ch	16-bit	png	4 ch	16-bit	png
4 ch	16-bit	tiff	4 ch	16-bit	png

# VisionPro Deep Learning API Changes

The topics in this section provide a change log.

## Target Frameworks

- Non-UI NuGet packages now target NET Standard 2.0
- UI assemblies and executables now target .NET Framework 4.7.2
- Non-UI executables now target .NET Core 3.1

## NuGet Packages

- NuGet packages are project-based, and have dependencies.

## Use of NuGet Packages

VisionPro Deep Learning .NET library is compiled targeting a cross-platform framework, wherever possible.

All of the UI-related assemblies are compiled targeting either .NET Framework 4.7.2 or NET Standard 2.0.


Since VisionPro Deep Learning inherits ViDi, it retains the name ViDi in many parts of the APIs

Assembly	Framework Target
ViDi.NET.Local	NET Standard 2.0
ViDi.NET.Logging	NET Standard 2.0
ViDi.NET.Remote	NET Standard 2.0
ViDi.NET.Remote.Service	NET Standard 2.0
ViDi.NET.Remote.Client	NET Standard 2.0
ViDi.NET	NET Standard 2.0
ViDi.NET.Base	NET Standard 2.0
ViDi.NET.Common	NET Standard 2.0
ViDi.NET.Extensions	NET Standard 2.0
ViDi.NET.Interfaces	NET Standard 2.0
ViDi.NET.UI.Interfaces	.NET Framework 4.7.2
ViDi.NET.GUI	.NET Framework 4.7.2
ViDi.NET.UI	.NET Framework 4.7.2
ViDi.NET.VisionPro	.NET Framework 4.7.2

NuGet packages were introduced to simplify which assemblies are required to use a certain Cognex Deep Learning Studio functionality.

For example, the ViDi.NET.UI now shows exactly which assemblies are required, along with the requisite licenses for 3rd party assemblies.

**Note:** Dependencies may require additional dependencies.



## ViDi.NET.UI

Versions - 1

<input type="checkbox"/>	Project	Version
<input type="checkbox"/>	Example.Runtime.Console.MultiGPU\Example.Runtime.Console.Multi	
<input type="checkbox"/>	Example.Runtime.Console\Example.Runtime.Console.csproj	
<input type="checkbox"/>	Example.Runtime.GUI\Example.Runtime.GUI.csproj	5.0.0.23161-DEV
<input type="checkbox"/>	Example.Runtime.Parameters\Example.Runtime.Parameters.csproj	
<input type="checkbox"/>	Example.Training.Console\Example.Training.Console.csproj	
<input type="checkbox"/>	Example.Training.GUI.Plugin\Example.ViDi.Suite.GUI.Plugin.csproj	
<input type="checkbox"/>	Example.Training.GUI\Example.Training.GUI.csproj	
<input type="checkbox"/>	Example.VisionPro.Integration\Example.VisionPro.Integration.csproj	5.0.0.23161-DEV

**Installed:**  Uninstall

**Version:**  Install

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Options

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**Description**

Interfaces for ViDi controls

**Version:** 5.0.0.23161-DEV

**Owner(s):** Cognex Corporation

**Author(s):** Cognex Corporation

**License:** [View License](#)

**Date published:** Wednesday, July 15, 2020 (7/15/2020)

**Project URL:** <https://www.cognex.com/>

**Dependencies**

- ▲ .NETFramework,Version=v4.7.2
  - ViDi.NET.Common (>= 5.0.0.23161-DEV)
  - ViDi.NET.Extensions (>= 5.0.0.23161-DEV)
  - ViDi.NET.Interfaces (>= 5.0.0.23161-DEV)
  - ViDi.NET.Logging (>= 5.0.0.23161-DEV)
  - ViDi.NET.UI.Extensions (>= 5.0.0.23161-DEV)
  - ViDi.NET.UI.Interfaces (>= 5.0.0.23161-DEV)
  - ViDi.NET (>= 5.0.0.23161-DEV)
  - AForge (>= 2.2.5)
  - AForge.Imaging (>= 2.2.5)
  - MvvmLightLibs (>= 5.4.1.1)
  - System.Windows.Interactivity.WPF (>= 2.0.20525)

**Note:**

- VisionPro Deep Learning NuGet packages are located in the following directory:

C:\ProgramData\Cognex\VisionPro Deep Learning\X.X\Examples\packages

(C:) > ProgramData > Cognex > VisionPro Deep Learning > 1.0 > Examples > packages

Name	Date modified	Type
UserMessage.10.20.3122.201.nupkg	7/15/2020 1:23 PM	NUPKG File
ViDi.Cloud.Client.5.0.0.23161-DEV.nupkg	7/15/2020 1:19 PM	NUPKG File
ViDi.Cloud.Common.5.0.0.23161-DEV.nu...	7/15/2020 1:19 PM	NUPKG File
ViDi.NET.5.0.0.23161-DEV.nupkg	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.Base.5.0.0.23161-DEV.nupkg	7/15/2020 1:19 PM	NUPKG File
ViDi.NET.Common.5.0.0.23161-DEV.nupkg	7/15/2020 1:19 PM	NUPKG File
ViDi.NET.Data.5.0.0.23161-DEV.nupkg	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.Extensions.5.0.0.23161-DEV.nup...	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.Interfaces.5.0.0.23161-DEV.nupkg	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.Local.5.0.0.23161-DEV.nupkg	7/15/2020 1:19 PM	NUPKG File
ViDi.NET.Logging.5.0.0.23161-DEV.nupkg	7/15/2020 1:19 PM	NUPKG File
ViDi.NET.Remote.5.0.0.23161-DEV.nupkg	7/15/2020 1:19 PM	NUPKG File
ViDi.NET.Remote.Client.5.0.0.23161-DEV....	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.Remote.Service.5.0.0.23161-DEV...	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.Training.UI.5.0.0.23161-DEV.nup...	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.Training.UI.Interfaces.5.0.0.2316...	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.UI.5.0.0.23161-DEV.nupkg	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.UI.Extensions.5.0.0.23161-DEV.n...	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.UI.Interfaces.5.0.0.23161-DEV.nu...	7/15/2020 1:20 PM	NUPKG File
ViDi.NET.VisionPro.5.0.0.23161-DEV.nupkg	7/15/2020 1:19 PM	NUPKG File
Wibu.CodeMeter.WibuCmNET.6.70.3164....	7/15/2020 1:23 PM	NUPKG File



The NuGet feed is automatically set in the examples, but must be set to a global Visual Studio NuGet package feed.

- Cognex highly recommends backing up the NuGet packages to another secure repository (or its equivalent) and to keep a copy. This location should then be configured as a new NuGet feed. For more information, see the following Microsoft topic: [Hosting your own NuGet feeds](#)



**CAUTION:** A NuGet will be overwritten if a new version is installed. If both versions are unavailable, a manual NuGet upgrade must be performed.

## Localization

The Chinese translations are now located in zh-Hans, instead of zh-CHS.

## Breaking Changes to the API

In VisionPro Deep Learning 2.1.1, a new processing parameter `max_scan_iterations` is added only in API for Blue Locate and Blue Read. This parameter limits the maximum number of iterations for image scanning during processing and providing a fixed number for this parameter speeds up the processing.

**Note:** The features or the character features can be less detected than expected when the value of `max_scan_iterations` is set too low. The appropriate value for this parameter is dependent on the images.

You can get the value of this parameter by:

- `vidi_runtime_get_parameter`
- `vidi_runtime_tool_get_parameter`

You can change the value of this parameter by:

- `vidi_runtime_set_parameter`
- `vidi_runtime_tool_set_parameter`

The parameter path for `max_scan_iterations` is:

- `processing/blue/max_scan_iterations`

## Examples

This topic introduces the code examples of `max_scan_iterations` parameter for C and .NET API

Symbol	Definition
WORKSPACE	The name of your workspace.
STREAM	The name of the stream in your workspace.
TOOL	The name of the tool in the stream.
40	The value of the parameter.

C API

```
1 | VIDI_UINT status = vidi_runtime_tool_set_parameter
   | ("WORKSPACE", "STREAM", "TOOL", "processing/blue/max_scan_iterations", "40");
```

.NET API

```
1 | libraryAccess.SetToolParameter("WORKSPACE", "STREAM", "TOOL", "processing/blue/max_
   | scan_iterations", "40"); // libraryAccess is ILibraryAccess
```

## API Known Issues

- Due to an issue with CodeMeter .NET Standard, in which a hang could be introduced when first calling a ViDi2.Remote, the following is added in App.config:

```

1  <?xml version="1.0" encoding="utf-8"?>
2  <configuration>
3  <runtime>
4      <assemblyBinding xmlns="urn:schemas-microsoft-com:asm.v1">
5          <dependentAssembly>
6              <assemblyIdentity
7  name="WibuCmNET" publicKeyToken="01d86e1eb0c69c23" culture="neutral"/>
8              <bindingRedirect oldVersion="6.0.0.0-
9  8.0.0.0" newVersion="7.0.3933.502"/>
10             </dependentAssembly>
11         </assemblyBinding>
12     </runtime>
13 </configuration>

```

- Several minor issues with using APIs. See FAQ for the details.
- For C API, an exception occurs if a string includes one or more characters other than ASCII characters. To avoid this exception, a string that contains non-ASCII characters must be converted to UTF-8 encoded string. Please refer to C API Documentation to avoid this problem. Below is the list of allowed ASCII characters in C API.
  - English characters (both upper case and lower case)
  - Numbers (Arabic numerals)
  - `~!@#\$%^&()-\_+=[ ]{}.,;'

## C and .NET API Deprecated and Removed Features

The following list of C and .NET functions are being deprecated, and will either be renamed or removed in the next major release.

Library	Obsolete Name	New Name
.NET	ToolDatabase.GetOverlayImage()	
.NET	ViewKey.FileName	FrameKey.SampleName
.NET	LibraryAccess.SampleGetOverlayImage()	
.NET	IManualRegionOfInterest.External	IManualRegionOfInterest.Parameters.Mode
.NET	IManualRegionOfInterest.Mode	IManualRegionOfInterest.Parameters.Mode
.NET	IManualRegionOfInterest.Units	IManualRegionOfInterest.Parameters.Units
.NET	IManualRegionOfInterest.Offset	IManualRegionOfInterest.Parameters.Offset
.NET	IManualRegionOfInterest.Size	IManualRegionOfInterest.Parameters.Size

Library	Obsolete Name	New Name
.NET	IManualRegionOfInterest.Angle	IManualRegionOfInterest.Parameters.Angle
.NET	IManualRegionOfInterest.SplittingGrid	IManualRegionOfInterest.Parameters.SplittingGrid
.NET	IBlueRegionOfInterest.Model	IBlueRegionOfInterest.Parameters.MatchFilter
.NET	IBlueRegionOfInterest.Models	
.NET	IBlueRegionOfInterest.TargetMode	IBlueRegionOfInterest.Parameters.TargetMode
.NET	IBlueRegionOfInterest.FeatureFilter	IBlueRegionOfInterest.Parameters.FeatureFilter
.NET	IBlueRegionOfInterest.MatchFilter	IBlueRegionOfInterest.Parameters.MatchFilter
.NET	IBlueRegionOfInterest.MatchItems	IBlueRegionOfInterest.Parameters.MatchItems
.NET	IBlueRegionOfInterest.MatchItemsMode	IBlueRegionOfInterest.Parameters.MatchItemsMode
.NET	IBlueRegionOfInterest.Centered	IBlueRegionOfInterest.Parameters.Centered
.NET	IBlueRegionOfInterest.Units	IBlueRegionOfInterest.Parameters.Units
.NET	IBlueRegionOfInterest.Offset	IBlueRegionOfInterest.Parameters.Offset
.NET	IBlueRegionOfInterest.Size	IBlueRegionOfInterest.Parameters.Size
.NET	IBlueRegionOfInterest.Angle	IBlueRegionOfInterest.Parameters.Angle
.NET	IBlueRegionOfInterest.Scaled	IBlueRegionOfInterest.Parameters.Scaled
.NET	IBlueRegionOfInterest.Scale	IBlueRegionOfInterest.Parameters.Scale
.NET	IRedRegionOfInterest.ExtractRegions	IRedRegionOfInterest.Parameters.ExtractRegions
.NET	IRedRegionOfInterest.RegionFilter	IRedRegionOfInterest.Parameters.RegionFilter
.NET	IRedRegionOfInterest.Units	IRedRegionOfInterest.Parameters.Units
.NET	IRedRegionOfInterest.Border	IRedRegionOfInterest.Parameters.Border
.NET	IRedRegionOfInterest.MaskRegions	IRedRegionOfInterest.Parameters.MaskRegions
.NET	IRedRegionOfInterest.FailOnFilter	IRedRegionOfInterest.Parameters.FailOnFilter
.NET	IRedRegionOfInterest.RecycleMask	IRedRegionOfInterest.Parameters.RecycleMask
.NET	IRedRegionOfInterest.InvertMask	IRedRegionOfInterest.Parameters.InvertMask
.NET	IRedRegionOfInterest.GrowShrinkMask	IRedRegionOfInterest.Parameters.GrowShrinkMask
.NET	IGreenRegionOfInterest.Filter	IGreenRegionOfInterest.Parameters.Filter
.NET	IMatch.FeatureString	IReadModelMatch.FeatureString
.NET	IMatch.PrettifiedString	IReadModelMatch.PrettifiedString
.NET	IMatch.Points	INodeModelMatch.NodePoints
.NET	IMatch.Pose	INodeModelMatch.Pose
.NET	IMatch.Position	IReadModelMatch.Position
.NET	IMatch.Scale	INodeModelMatch.Scale
.NET	IMatch.AspectRatio	INodeModelMatch.AspectRatio
.NET	IMatch.Shear	INodeModelMatch.Shear
.NET	IModel.Occurences	IModel.Occurrences
.NET	INode.Names	INode.Fielding

Library	Obsolete Name	New Name
.NET	ITool.Parameters	ITool.ParameterBase
.NET	IFeature.Id	IFeature.Name
.NET	IRedView.Deviation	IRedView.Score
.NET	ITag.Key	ITag.Name
.NET	ITag.Value	ITag.Score
.NET	IWorkspace.Name	IWorkspace.UniqueName
.NET	IWorkspace.LastModification	
.NET	IToolDatabase.SetTrainFlag(string filter, string group)	IToolDatabase.SetTrainFlag(string filter, bool flag)
.NET	IToolDatabase.GetOverlayImage(ViewKey, string, uint)	
.NET	ILibraryAccess.ToolGetOverlay(WorkspaceName, StreamName, ToolName, string, uint, string, ILibraryAccessContext)	
.NET	IStream.AddImage(Image, string) IStream.AddImage(System.IO.Stream, string) GetImage(string, uint)	
.NET	ITool.Mask	ITool.RegionOfInterest.Mask
.NET	ITool.Parameters	ITool.ParametersBase
.NET	IToolParameters.TrainSelection	
.NET	IToolParameters.KeepTrainSelection	
.NET	BorderType.White BorderType.Reflect BorderType.Wrap	
.NET	Node.Names Node.IDs	Node.Fielding
.NET	ProductCode.OptimizedMemory	ProductCode.Standard ProductCode.Advanced
.NET	CalibratedRedView.Deviation	
.NET	TrainingFlagMode.Auto	
.NET	RedTool.IRedTool.Parameters	RedTool.IRedTool.BaseParameters
C	vidi_runtime_init_sample()	vidi_runtime_create_sample()
C	vidi_runtime_process()	vidi_runtime_sample_process()
C	vidi_runtime_process_sample()	vidi_runtime_sample_process()
C	vidi_runtime_get_image()	vidi_runtime_sample_get_image()
C	vidi_runtime_sample_get_overlay()	Use get_overlay for the specific tool.
C	vidi_training_tool_get_status()	vidi_training_stream_list_tools()
C	vidi_training_stream_process_sample()	vidi_training_sample_process()
C	vidi_training_blue_add_feature()	vidi_training_set_feature()
C	vidi_training_blue_add_model()	vidi_training_blue_create_model()

Library	Obsolete Name	New Name
C	vidi_training_tool_set_mask()	vidi_training_roi_set_mask()
C	vidi_training_tool_get_mask()	vidi_training_roi_get_mask()
C	vidi_training_init_sample()	vidi_training_add_sample()
C	vidi_training_process_sample()	vidi_training_sample_process()
C	vidi_training_sample_get_overlay()	
C	vidi_training_tool_get_overlay()	
C	occurences	occurrences
C	names	fielding
C	red/mode	training/network_model
C	vidi_training_tool_train()	vidi_training_tool_train2()

# Software Installation

To successfully install VisionPro Deep Learning, perform the following:

1. Attach the Cognex Security Dongle to a USB port on the computer that will be used to develop the vision application.
2. Download the Cognex VisionPro Deep Learning installer from the [Cognex support page](#).
3. Run the VisionPro Deep Learning installer and follow the prompts.

**Note:**

Choosing the Custom option will allow you to install selected features:

- The Wibu Runtime Server, which is needed to connect to the USB Cognex Security Dongle.
- The main VisionPro Deep Learning application (this is required).
- The VisionPro Deep Learning Developer API.



- The VisionPro and VisionPro Deep Learning software require that a valid Cognex Security Dongle be installed directly to PCs running the software during all phases of operation (programming, processing, training, testing, etc.). Any attempts to temporarily remove, substitute, or share a Cognex Security Dongle may cause your system to operate incorrectly, and may result in the loss of data.

When VisionPro Deep Learning is configured for the Client/Server functionality, and a computer has been configured as a server, the Cognex Security Dongle must be attached to the server, but the client(s) does not need a Cognex Security Dongle.

# Documentation Updates

## VisionPro Deep Learning 2.1

- Updates on Red Analyze Tool and Green Classify Tool for newly added High Detail Quick modes
- Updates on Edit Deployment Target page that introduces the CIE1 deployment is no longer available
- Updates on Parameter Search and Use the Parameter Search Utility
- Updates on [Image File and Format Requirements on page 14](#)
- Updates on the contents explaining statistical results
  - Statistics
  - False Positive and False Negative Results
  - Blue Locate Tool – Statistics
  - Blue Read Tool – Statistics
  - Green Classify Tool – Confusion Matrix
  - Green Classify Tool – F Score
  - Red Analyze Tool – Statistics – Confusion Matrix
  - Red Analyze Tool – Statistics – Region Area Metrics
- Updates on the model scores for Blue Locate/Read
  - Blue Locate Tool – Node Model
  - Blue Locate Tool – Layout Model
  - Blue Read Tool – Node Model
  - Blue Read Tool – Regex Model
  - Blue Read Tool – String Model
- Updates on C#, C++ example codes (...ProgramData\Cognex\VisionPro Deep Learning\2.1\Examples). There were many improvements in example codes and some of the notable changes are:
  - The unit of angle for input is changed from "degree" to "radian" (example: Perturbation of Red Analyze)
  - For Green Classify, the codes that load label information per image is added.
  - The parameter path used for `vidi_runtime_get_parameter()` and `vidi_runtime_set_parameter()` is changed to be a "full path" which should include "tool/" within it.  
Example: `"workspaces/(workspace_name)/streams/(stream_name)/tools/(tool_name)/tool/processing/sampling_density"`

**Note:** When either "roi", "runtime\_parameters/", or "post\_process\_parameters/" are used in the parameter path, this path should not include "tool/".

- ① Example 1: `"workspaces/(workspace_name)/streams/(stream_name)/tools/(tool_name)/roi..."`
- Example 2: `"workspaces/(workspace_name)/streams/(stream_name)/tools/(tool_name)/runtime_parameters/..."`

- Updates on Getting Started page contents.

## VisionPro Deep Learning 2.0

- Updates for VisionPro Deep Learning 2.0 release
  - The documentation for the integration with Cognex Designer is no longer provided

## VisionPro Deep Learning 1.1

- Updates for VisionPro Deep Learning 1.1 release
- Designer Plugin script examples for each tool have been updated for VisionPro Deep Learning 1.1.
- Updates of the comments in C#, C++ example codes (...\\ProgramData\\Cognex\\VisionPro Deep Learning\\1.1\\Examples\\)
- Updates about how to use multiple GPUs for VisionPro Deep Learning in Multiple GPUs Utilization.
- Updates about the introduction to the various training parameters for VisionPro Deep Learning in Training Parameters
- Updates about how to import SuaKIT projects in Import SuaKIT Project.

## VisionPro Deep Learning 1.0.1

- Updates for VisionPro Deep Learning 1.0.1 release
- Updates for Migrating To This Release

The migration records from ViDi Suite 3.4 to ViDi Suite 4.1.0 have been reorganized for the correct migration history.

You can access the latest VisionPro Deep Learning Help on the Cognex Support website:

<https://support.cognex.com/en/documentation/deep-learning>