COGNEX

VISIONPRO DEEP LEARNING

Solve challenging applications with powerful deep learning-based software

VisionPro® Deep Learning is an AI-based image analysis software for complex applications. It automates tasks that are too complicated and time-consuming to program with rule-based algorithms, while providing a consistency and speed that aren't possible with manual inspection.

VisionPro Deep Learning tolerates natural variation and differentiates between acceptable and unacceptable anomalies to simplify development of highly variable applications including:

- Defect detection and segmentation
- Assembly verification and part location
- Material classification
- Character reading, including distorted print

Simplified development and deployment

Expedites setup with fewer images and less time required to train your application.

Label checker

Simplifies image labeling by enabling batch labeling and reducing the number of images for review.

Common development environment

Provides a scalable solution that enables you to leverage the latest technology without duplicating engineering costs.

Parameter autotune

Quickly train deep learning models for faster setup and deployment.

Innovative toolset

Addresses challenging applications that require both high precision and high speed.

Faster line duplication

Accelerates expansion to multiple production lines for easy scalability.

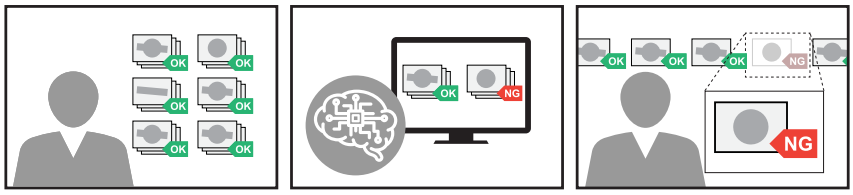
Set up a deep learning application with speed and precision

With a range of innovative features, VisionPro Deep Learning provides the capabilities and performance you need at every stage of application development, from labeling and training to deployment.

LABELING

1

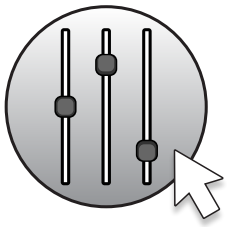
Label checker simplifies the labeling process, saving you time and effort. Run the checker to identify images containing unmarked or mislabeled defects. Using this feature, you only need to review a fraction of the image set – those flagged by the checker – compared to conventional labeling methods that require you to manually label and review every image.



TRAINING

2

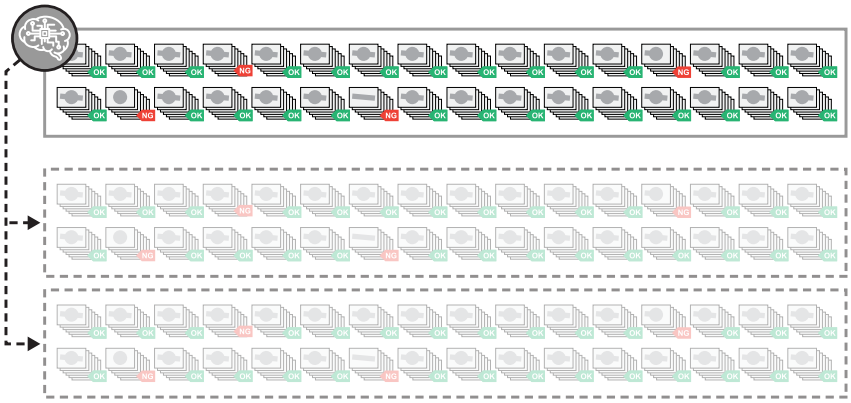
Parameter autotune calibrates deep learning models faster than conventional methods for quick and easy setup. In one click, you can optimize your application, expediting training while ensuring the accuracy of your results.



DEPLOYMENT

3

Faster line duplication accelerates validation and deployment of multiple production lines by allowing you to adapt an existing deep learning model for a new line. This simplifies retraining and facilitates additional deployments, enabling you to seamlessly ramp your capacity as your business grows.



Expedite deployment with intuitive graphical training

VisionPro Deep Learning's graphical training interface simplifies the task of collecting images, training the neural network, and testing it on a variety of image sets.

TOOL-CHAINING

Unique tool-chaining capability lets users break down their problem into smaller steps, making it easier to achieve target performance.

1

LABELING

Quick labeling and review process requires fewer images and less time for setup.

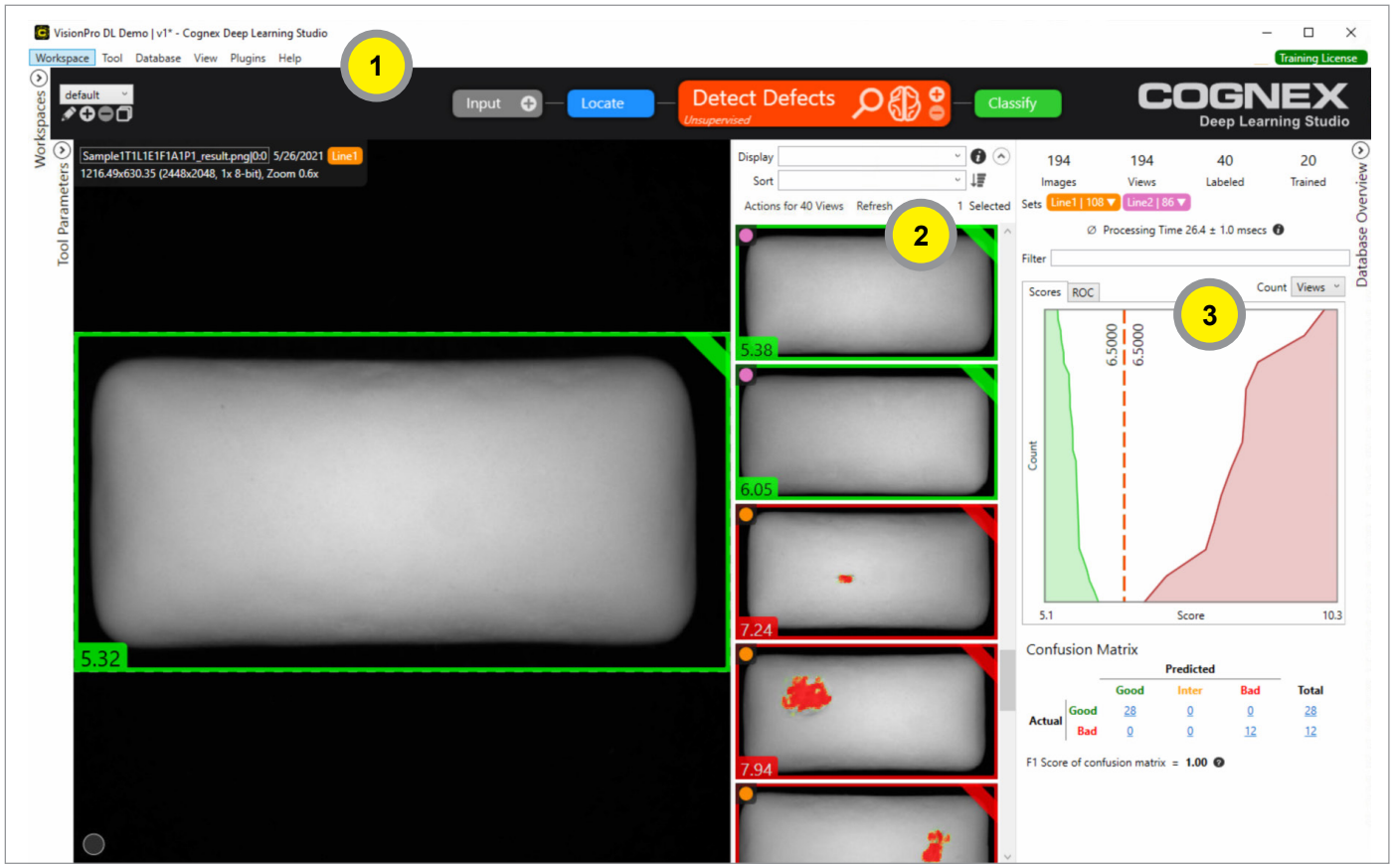
2

TRAINING

Simplified training and re-training allows for easy deployment and expansion to accommodate multiple products and lines.

Parameter autotune calibrates deep learning models faster than conventional methods.

3



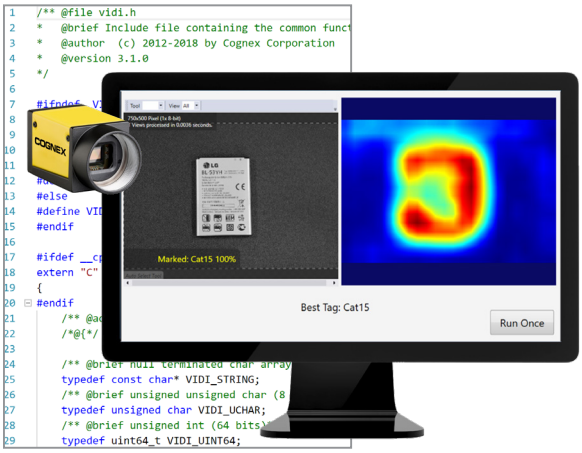
Scale your operations with flexible common development environment

From low-level machine integration to building an application-specific HMI, VisionPro Deep Learning provides flexibility in how you develop and deploy vision inspection in your production environment.

Tight integration with existing software and vision products creates greater compatibility across the Cognex product continuum and allows you to introduce the latest technologies without duplicating engineering costs. It also enables you to adapt an existing job to new or additional lines, delivering quick deployment into mass production environments.

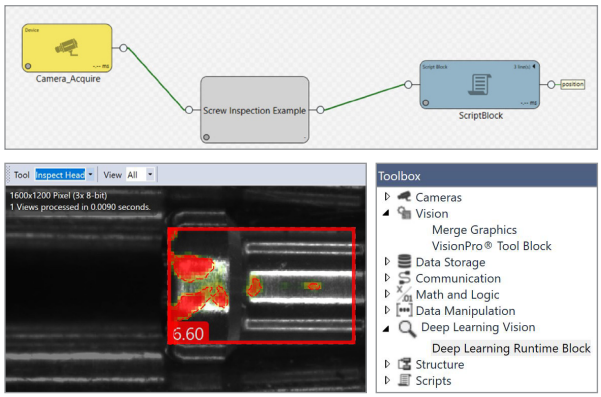
Programmatic integration

Easily convert images, graphics, and results between VisionPro and VisionPro Deep Learning.



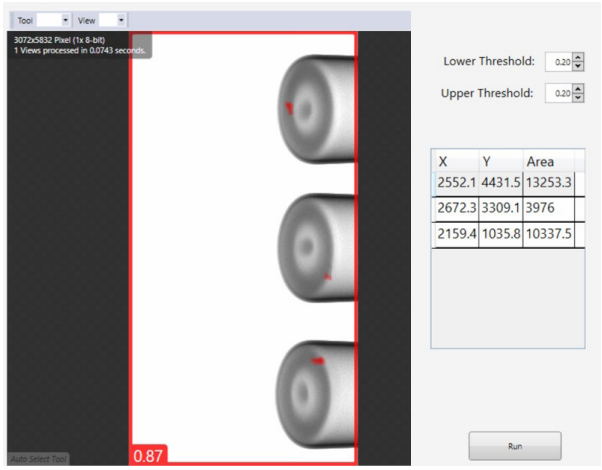
Graphical prototyping

Integrate Deep Learning workspaces into Cognex Designer applications to simplify image acquisition, results processing, and I/O[2].



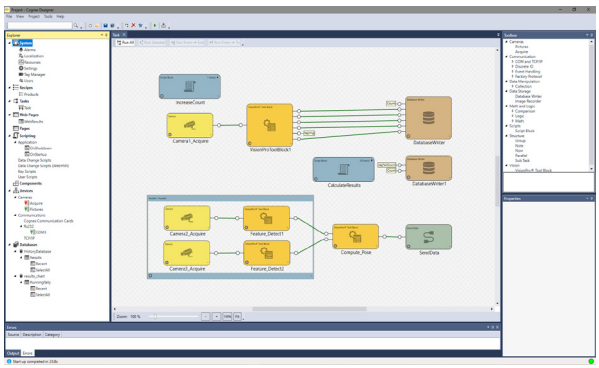
Fully deployable application

Create and deploy VisionPro and Deep Learning applications using Cognex Designer[2].



Backwards and forwards compatibilities meet every vision need

Train in the standalone Deep Learning Studio or load a Deep Learning workspace into Cognex Designer.



[1] Only available in VisionPro Deep Learning 2.0

Automate your most demanding vision applications with innovative toolset

VisionPro Deep Learning is optimized for real-world industrial image analysis, requiring vastly smaller image sets and shorter training and validation periods. Unlike traditional, rule-based tools, VisionPro Deep Learning tools are trained by example. Choose between Blue Locate, Red Analyze, Green Classify, and Blue Read to deploy the tools that's right for your application.

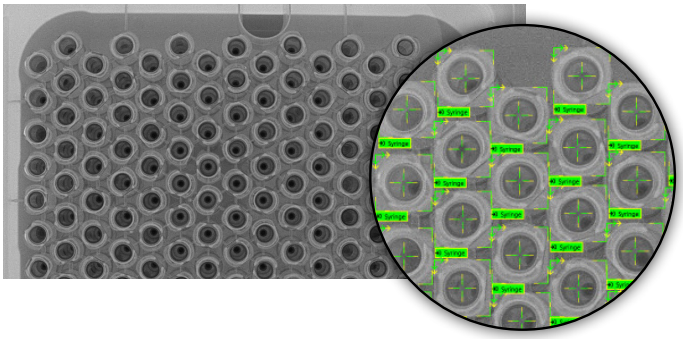
Locate

Blue Locate for fixturing, counting, and assembly verification

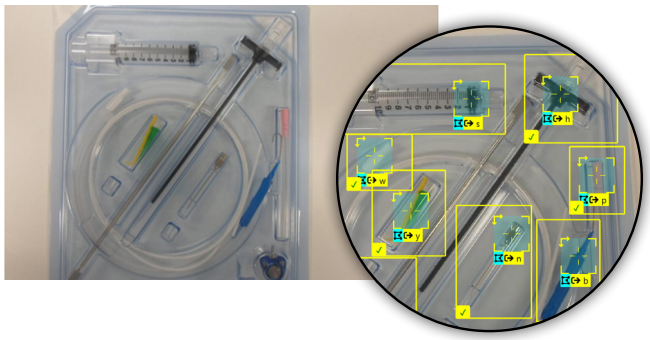
The Blue Locate tool finds parts despite variations in perspective, orientation, luminance, glare, and color by learning from the samples provided by the user. It detects features on noisy backgrounds, in poorly lit environments, on low contrast parts, and even parts that flex or change shape.

Blue Locate is also a reliable solution for automating assembly verification. The tool can be trained to locate a variety of components, even if they appear different or vary in size. By creating layouts based on the product being inspected, the tool checks multiple feature locations and component types simultaneously, while adjusting to varying layouts.

Counts translucent objects



Ensures kits are assembled correctly

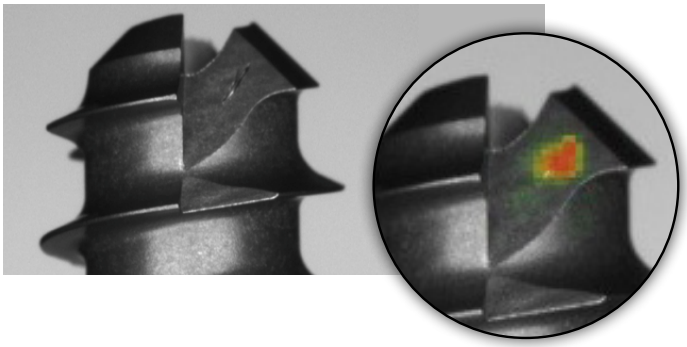


Analyze

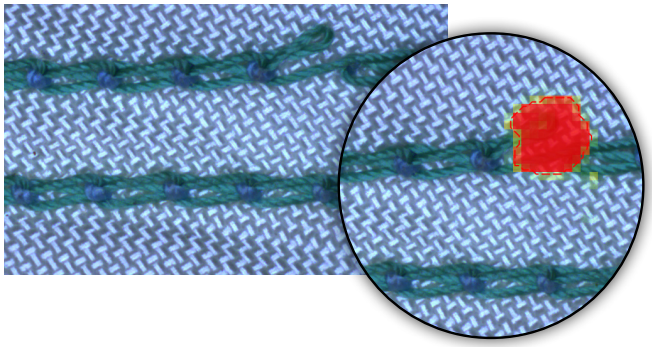
Red Analyze for defect detection and segmentation

The Red Analyze tool finds subtle defects on a wide variety of part backgrounds and surface textures. It can be trained to tolerate normal variations in lighting and part positioning, while detecting flaws, contamination and other defects. For situations where it's not practical to collect defect images, or where the defects are highly inconsistent, unsupervised mode can be trained from good images only and identify cases that deviate from the normal part appearance. Red Analyze can also be used to segment specific variable areas in an image to simplify other inspections.

Detects imperfections



Isolates subtle defects

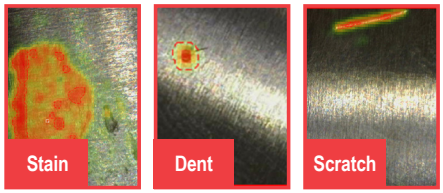


Green Classify for object and scene classification

The Green Classify tool is a robust classifier that can be used to solve challenging classification tasks and distinguish between different objects and defects. It identifies and sorts products into classes based on their common characteristics such as color, texture, materials, packaging, and defect type. The tool tolerates natural deviation within the same class and reliably distinguishes acceptable variation from different classes.

Classifies objects by type

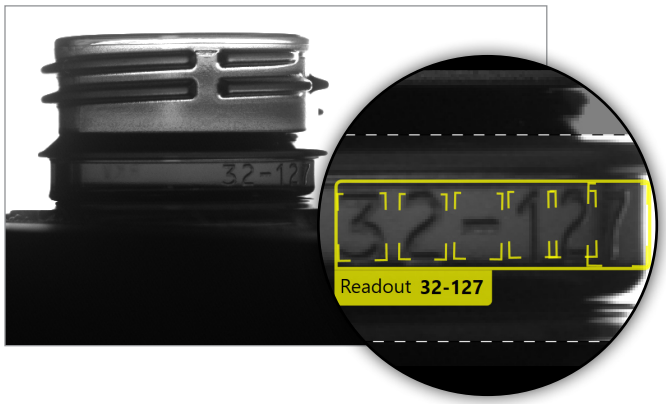
Classifies defects by type



Blue Read for text and character reading

The Blue Read tool deciphers badly deformed, skewed, and poorly etched codes using optical character recognition (OCR). Leveraging a deep learning-based, pre-trained font library, the tool can be trained to read application-specific codes that traditional OCR tools are not able to decode. Plus, the visual debug feature identifies mis-reads that can be easily corrected.

Reads embossed characters on injection molded products



Deciphers label-based codes on packaging

Select the best mode for your application needs

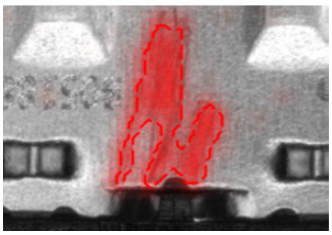
The Red Analyze and Green Classify tools can be used with two different network architecture settings: Focused Mode or High Detail Mode. Focused Mode is ideal for applications where speed is paramount and results are needed quickly. High Detail Mode is designed for more complex applications that demand maximum accuracy over processing speed. Users can change between modes without re-labeling images and evaluate which architecture best suits their application requirements.

Red High Detail Mode for High-Precision Defect Segmentation

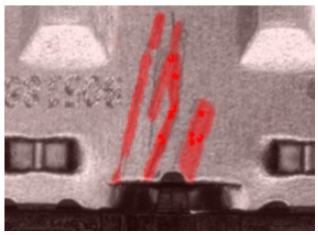
Accurate pixel-level defect segmentation is the primary advantage of Red High Detail Mode. Leveraging the powerful and exhaustive High Detail Mode architecture, the tool can accurately learn the appearance of challenging defects and predict them in untrained images with pixel-level precision. Red High Detail Mode is a good fit for applications that call for both detection and measurement of challenging and subtle defects like blemishes, cracks, and scratches.

Focused Mode

High-Detail Mode



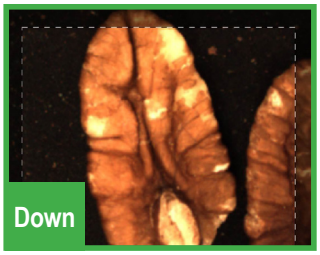
Focused Mode

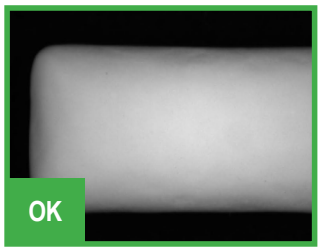


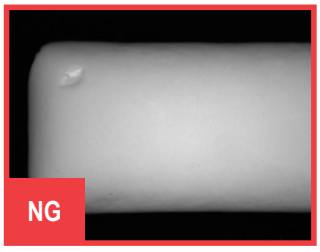
High-Detail Mode

Green High Detail Mode for High-Accuracy Classification

Green High Detail Mode excels at identifying subtle characteristics in an image or a region of interest and classifying it accordingly. It provides best-in-class classification accuracy even when dealing with significant variation. The tool is very versatile, tackling a range of applications types from defect type classification to OK/NG classification, and part SKU classification.







TensorRT

Enables higher speed processing of high detail mode tools, without sacrificing accuracy.

Batch Processing

Using the high detail mode for classification, supports faster setup through parallel processing of multiple images.

SPECIFICATIONS

Graphical & application programming interfaces		Windows based graphical user interface (GUI) with plugin support C library (Windows DLL) for runtime and/or training Microsoft .NET library (Wrapper for C library and WPF GUI components)
Hardware & OS Requirements	CPU	Intel Core i7 or higher (recommended)
	GPU	Cognex only supports NVIDIA GPUs Recommend GPU memory of 11GB or higher (GTX 1080Ti, RTX 2080Ti, 3070, 3080, 3090) Note: VisionPro Deep Learning performance — in terms of processing time — will depend on hardware selection
	RAM Memory	32 GB or more (recommended)
	USB	1 free USB port (for the license dongle)
	OS	Windows 10 64-bit Windows Server 2019 64-bit
	Storage	Solid-state drive (SSD) with 100 GB or more of free space (recommended)
Supported image file formats		PNG, BMP, TIFF, JPEG
Supported image properties		1–4 channels, 8 or 16 bits

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