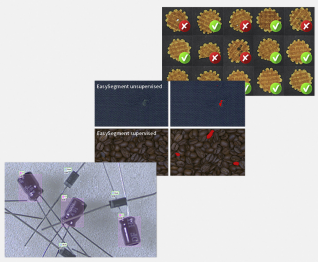
euresys
Empowering Computer Vision

Deep Learning Bundle

Convolutional Neural Network-based inspection libraries



At a Glance

- Set of Deep Learning inspection libraries optimized for machine vision applications
- Performs image classification, supervised or unsupervised segmentation and object localization
- Includes EasyClassify, EasySegment and EasyLocate
- Simple API
- Includes the free Deep Learning Studio application for dataset creation, training and evaluation
- Supports data augmentation and masks
- Compatible with CPU and GPU processing

Benefits

What Is Deep Learning ?

Neural Networks are computing systems inspired by the biological neural networks that constitute the human brain. Convolutional Neural Networks (CNN) are a class of deep, feed-forward artificial neural networks, most commonly applied to analyzing images.

Deep Learning uses large CNNs to solve complex problems difficult or impossible to solve with so-called conventional computer vision algorithms. Deep Learning algorithms may be easier to use as they typically learn by example. They do not require the user to figure out how to classify or inspect parts. Instead, in an initial training phase, they learn just by being shown many images of the parts to be inspected. After successful training, they can be used to classify parts, or detect and segment defects.

Why Choose Open eVision's Deep Learning Bundle?

- Deep Learning Bundle has been tailored, parametrized and optimized for analyzing images, particularly for machine vision applications.
- Deep Learning Bundle has a simple API and the user can benefit from the power of deep learning technologies with only a few lines of code.
- Try before you buy: Deep Learning Bundle comes with the free Deep Learning Studio training and evaluation application.

EasyClassify, EasySegment and EasyLocate cannot be purchased separately. They are only available as part of the Deep Learning Bundle.

Download and evaluate Deep Learning Bundle using Deep Learning Studio today, and feel free to call Euresys' support should you have any question.

EasyClassify Description

EasyClassify is the classification tool of Deep Learning Bundle.

EasyClassify requires the user to label training images, that is to tell which ones are good and which ones are bad, or which ones belong to which class. After this learning/training process, the EasyClassify library is able to classify images. For any given image, it returns a list of probabilities, showing the likelihood that the image belongs to each of the classes it has been taught. For example, if the process requires setting apart bad parts from good ones, EasyClassify returns whether each part is good or bad, and with what probability.

EasySegment Unsupervised mode

EasySegment is the segmentation tool of Deep Learning Bundle. EasySegment performs defect detection and segmentation. It identifies parts that contain defects, and precisely pinpoints where they are in the image. The unsupervised mode of EasySegment works by learning a model of what is a “good” sample (i.e. a sample without any defect). This is done by training it only with images of “good” samples. Then, the tool can be used to classify new images as good or defective and segment the defects from these images. By training only with images of good samples, the unsupervised mode of EasySegment is able to perform inspection even when the type of defect is not known beforehand or when defective samples are not readily available.

EasySegment Supervised mode

EasySegment is the segmentation tool of Deep Learning Bundle. EasySegment performs defect detection and segmentation. It identifies parts that contain defects, and precisely pinpoints where they are in the image. The supervised mode of EasySegment works by learning a model of what is a defect and what is a “good” part in an image. This is done by training with images annotated with the expected segmentation. Then, the tool can be used to detect and segment the defects in new images. The supervised mode of EasySegment achieves better precision and can segment more complex defects than the unsupervised mode thanks to the knowledge of the expected segmentation.

EasyLocate Description

EasyLocate is the localization and identification library of Deep Learning Bundle. It is used to locate and identify objects, products, or defects in the image. It has the capability of distinguishing overlapping objects and, as such, EasyLocate is suitable for counting the number of object instances.

In practice, EasyLocate predicts the bounding box surrounding each object, or defect, it has found in the image and assigns a class label to each bounding box. It must be trained with images where the objects or defects that must be found have been annotated with a bounding box and a class label.

Deep Learning Studio

Open eVision includes the free Deep Learning Studio application. This application assists the user during the creation of the dataset as well as the training and testing of the deep learning tool. For EasySegment, Deep Learning Studio integrates an annotation tool and can transform prediction into ground truth annotation. It also allows to graphically configure the tool to fit performance requirements. For example, after training, one can choose a tradeoff between a better defect detection rate or a better good detection rate.

Deep Learning Bundle Feature Comparison

Performance

Deep Learning generally requires significant amounts of processing power, especially during the learning phase. Deep Learning Bundle supports standard CPUs and automatically detects Nvidia CUDA-compatible GPUs in the PC. Using a single GPU typically accelerates the learning and the processing phases by a factor of100.

Neo Licensing System

- Neo is the new Licensing System of Euresys. It is reliable, state-of-the-art, and is now available to store Open eVision and eGrabber licenses.
- Neo allows you to choose where to activate your licenses, either on a Neo Dongle or in a Neo Software Container. You buy a license, you decide later.
- Neo Dongles offer a sturdy hardware and provide the flexibility to be transferred from a computer to another.
- Neo Software Containers do not need any dedicated hardware, and instead are linked to the computer on which they have been activated.

- Neo ships with its own, dedicated, Neo License Manager, which comes in two flavours: an intuitive, easy to use, Graphical User Interface and a Command Line Interface that allows for easy automation of Neo licensing procedures.

All Open eVision libraries are available for Windows and Linux

- Windows 7 to Windows 10, x86 (32 bits) and x86-64 (64 bits)
- Linux x86-64 (64 bits) with a glibc version 2.18 or newer

Developed with the support of the DG06 Technology Development Department

Applications

Machine Vision for the Electronic Manufacturing Industry

- PCB inspection
- Mark inspection
- LED inspection

Machine Vision for the General Manufacturing Industries

- Presence / Absence check
- Surface analysis
- Assembly inspection
- Code quality verification for label printing machines

Machine Vision for the Food Inspection Industry

- Food inspection and sorting

Specifications

Software

Host PC Operating System	• Open eVision is a set of 32-bit and 64-bit libraries that require a processor compatible with the SSE4 instruction set. • The Deep Learning Bundle is only available in the 64-bit Open eVision library. • Open eVision can be used on the following operating systems: – Windows 10 (32- and 64-bits) – Windows 8 (32- and 64-bits) – Windows 7 (32- and 64-bits) – Linux 64 bits (x86-64 only) with a glibc version greater or equal to 2.18 • Since Open eVision 2.6, discontinued support of: – Windows Vista 32-bits Service Pack 1 – Windows XP 32-bits Service Pack 3 – Windows Embedded Standard 2009 32-bits • Remote connections – Remote connections are allowed using remote desktop, TeamViewer or any other similar software. • Virtual machines – Linux virtual machines are supported. Microsoft Hyper-V and Oracle VirtualBox hypervisors have been successfully tested. – Windows virtual machines are not supported. • Minimum requirements: – RAM: 8 GB – Display size: 800 x 600. 1280 x 1024 recommended. – Color depth: 16 bits. 32 bits recommended. – Between 100 MB and 2 GB free hard disk space for libraries, depending on selected options.
APIs	• Supported Integrated Development Environments and Programming Languages: – Microsoft Visual Studio 2008 SP1 (C++, C#, VB .NET, C++/CLI) – Microsoft Visual Studio 2010 (C++, C#, VB .NET, C++/CLI) – Microsoft Visual Studio 2012 (C++, C#, VB .NET, C++/CLI) – Microsoft Visual Studio 2013 (C++, C#, VB .NET, C++/CLI) – Microsoft Visual Studio 2015 (C++, C#, VB .NET, C++/CLI) – Microsoft Visual Studio 2017 (C++, C#, VB .NET, C++/CLI) – Microsoft Visual Studio 2019 (C++, C#, VB .NET, C++/CLI) – QtCreator 4.15 with Qt 5.12

Ordering Information

Product code - Description	• 4182 - Open Deep Learning Bundle for USB dongle • 4232 - Open Deep Learning Bundle for PAR dongle • 4282 - Open Deep Learning Bundle for soft-based licensing • 4332 - Open eVision Deep Learning Bundle
Optional accessories	• 6512 - eVision/Open eVision USB Dongle (empty) • 6513 - eVision/Open eVision Parallel Dongle (empty) • 6514 - Neo USB Dongle (empty)

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