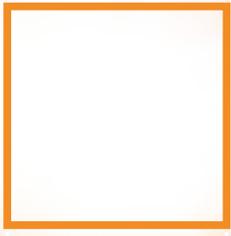




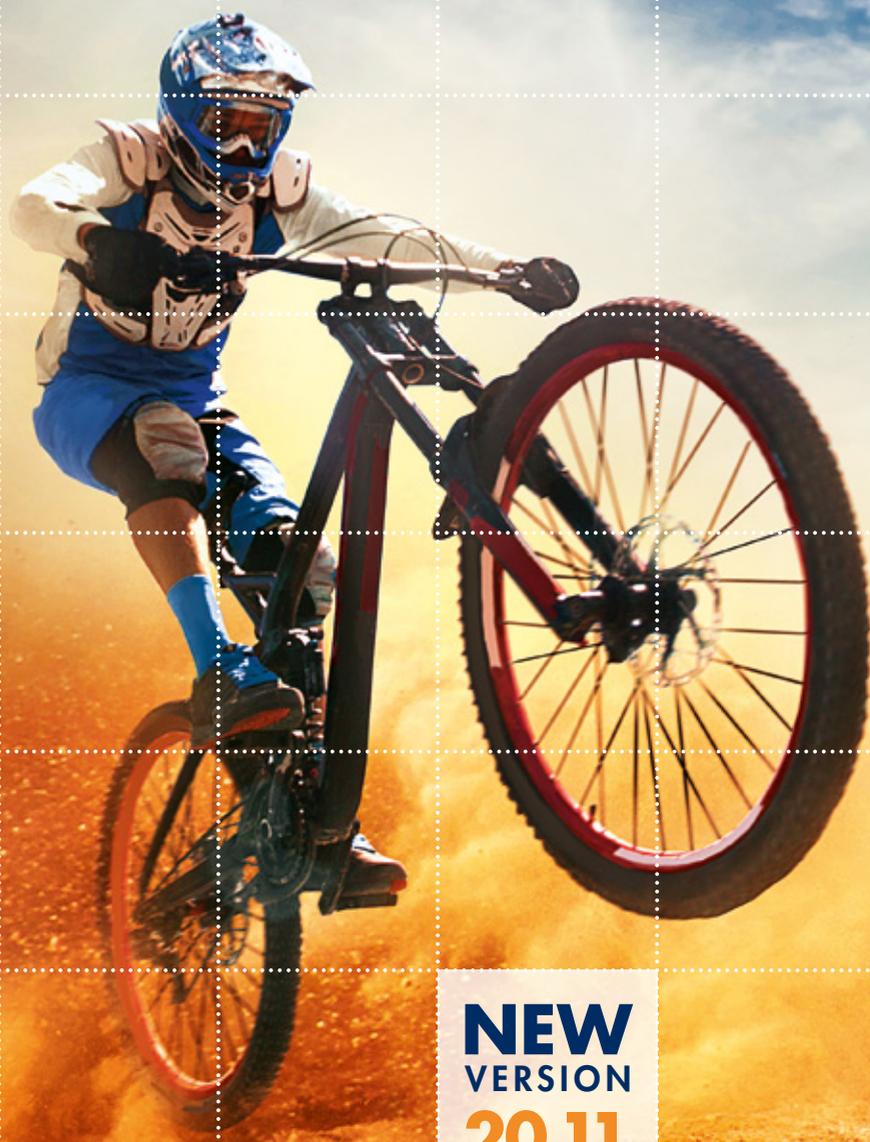
HALCON

a product of MVTec

EN



MVTEC BRINGS
HALCON'S CORE
TECHNOLOGIES TO
THE NEXT LEVEL



NEW
VERSION
20.11

MVtec Brings HALCON's Core Technologies to the Next Level

HALCON 20.11 comes with many new and improved features that help you further enhance your machine vision performance. It is available for both the Steady and Progress editions. As a result, in addition to these newest features, HALCON Steady customers now access the numerous new features available in the last Progress releases since HALCON 18.11.

New Features in HALCON 20.11

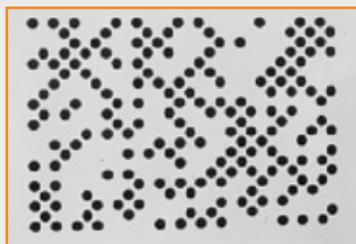
DEEP OCR

With Deep OCR in HALCON 20.11, MVtec introduces a holistic deep-learning-based approach for OCR. This new technology brings machine vision one step closer to human reading. Compared to existing algorithms, Deep OCR can localize numbers and letters much more robustly, regardless of their orientation, font type, and polarity. The ability to automatically group characters allows the identification of whole words. This strongly increases the recognition performance as, e.g., misinterpretation of characters with similar appearances can be avoided.



DOTCODE AND ECC 200 CODE READER

In HALCON 20.11, the data code reader has been extended by the new code type DotCode. This type of 2D code is based on a matrix of dots. It can be printed very fast and is applicable especially for high speed applications, like in the tobacco industry. Furthermore, the ECC 200 code reader now supports the Data Matrix Rectangular Extension (DMRE).



DotCode



Data Matrix Rectangular Extension (DMRE)

SHAPE-BASED MATCHING IMPROVEMENTS FOR SCENARIOS WITH LOW CONTRAST AND HIGH NOISE

In HALCON 20.11, the core technology shape-based matching has been improved especially for scenarios with low contrast and high noise (picture on the right). More parameters are now estimated automatically. This increases usability as well as the matching rate and robustness in low contrast and high noise situations.



New Features in HALCON 20.11

IMPROVED SURFACE-BASED 3D MATCHING

In HALCON 20.11, the core technology edge-supported, surface-based 3D matching is now significantly faster. The major speedup can be achieved in case of many edges and objects in the 3D scene. In addition to this speedup, the usability has been improved by removing the need of setting a viewpoint that defines the position of the sensor.



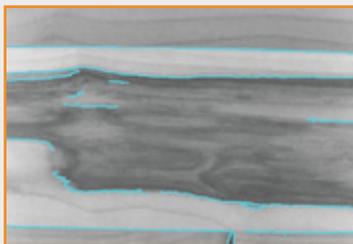
Scene with few objects or edges



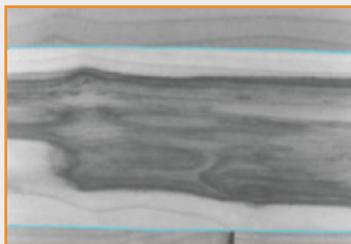
Scene with many objects or edges

DEEP LEARNING EDGE EXTRACTION

Deep learning edge extraction is a new and unique method to robustly extract edges (e.g., object boundaries) that comes with two major use cases. Especially for scenarios where a variety of edges is visible in an image, MVTec's deep learning edge extraction can be trained with only few images to reliably extract the desired edges. Hence, the programming effort to extract specific kinds of edges is highly reduced with MVTec HALCON. Besides, the pretrained network is innately able to robustly detect edges in low contrast and high noise situations. This makes it possible to extract edges that usual edge detection filters cannot detect.



Common edge extraction filter



Deep learning edge extraction after application-specific training

PRUNING FOR DEEP LEARNING

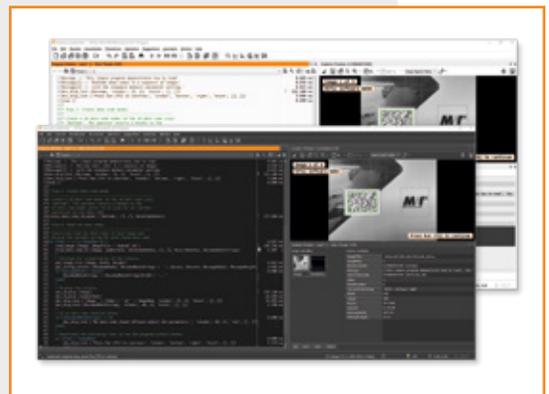
With network pruning, users have the option to subsequently optimize a fully trained deep learning network in terms of storage requirements and speed. With this feature it is possible to control the priority of the parameters speed, storage and accuracy and thus modify the network according to application-specific requirements.

HALCON/PYTHON

HALCON 20.11 introduces a new HALCON/Python interface. This enables developers who work with Python to easily access HALCON's powerful operator set.

HDEVELOP FACELIFT

For enhanced usability, HALCON's integrated development environment HDevelop has been given a facelift. In HALCON 20.11, more options for individual configuration have been implemented, e.g., a new modern window docking concept. Moreover, themes are now available to improve visual ergonomics and to suit individual preferences.



Further Highlights of HALCON 20.11

Experience HALCON's new and balanced feature set and profit from field-proven and mature technologies.

ANOMALY DETECTION

This feature significantly facilitates the automated surface inspection for, e.g., detection and segmentation of defects. Here, users face two challenges: getting enough training images of the respective defect and having to label all of these images. However, with HALCON's anomaly detection, you only need a low number of high quality "good" images for training. The technology is able to unerringly and independently localize deviations, i.e., defects of any type, on subsequent images. This means, defects of varying appearance can be detected without any previous knowledge or any preceding labeling efforts.



MORE FLEXIBILITY WITH DEEP LEARNING

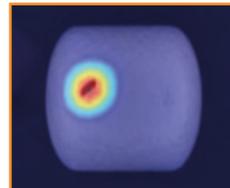
With HALCON 20.11, training for all deep learning technologies can be performed on the CPU.

By removing the need for a dedicated GPU, standard industrial PCs (that could not house powerful GPUs) can now be used for training as well. This greatly increases customers' flexibility regarding the implementation of deep learning, because training can now be performed directly on the production line allowing for "on the fly" adjustments of the application. Additionally, the inference for all deep learning technologies runs out-of-the-box on Arm® processors.



MORE TRANSPARENCY WITH THE GRAD-CAM-BASED HEATMAP

Deep learning networks are often considered a black box because users do not know what happens with the data during the inspection process. Therefore, it is very difficult to debug in case of misclassifications. HALCON's newly implemented Grad-CAM-based (Gradient-weighted Class Activation Mapping) heatmap supports you in analyzing which parts of an image influence the classification decision. Since this new heatmap can be calculated on the CPU without significant speed drops, users can analyze their network's class prediction "on the fly".



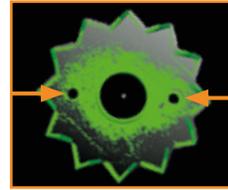
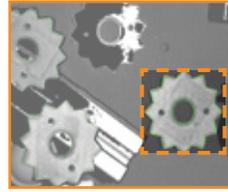
GENERIC BOX FINDER FOR PICK-AND-PLACE APPLICATIONS

The generic box finder allows users to locate boxes of different sizes within a predefined range of height, width, and depth, removing the need to train a model. This makes many applications much more efficient – especially within the logistics and pharmaceutical industries, where usually boxes in a large variety of different sizes are used.



MORE ACCURATE AND ROBUST MATCHING RESULTS WITH SURFACE-BASED 3D MATCHING

Especially in the assembly industry, workpieces must be located robustly and accurately to allow for further processing. Often, properties like small holes are the only unique feature to find the correct orientation of the object. HALCON's surface-based 3D matching can now make use of these features to increase accuracy and robustness of the matching result. Furthermore, edge-supported surface-based matching is now more robust against noisy point clouds: Users can control the impact of surface and edge information via multiple min-scores. If necessary, 3D edge alignment can also be switched off entirely to eliminate the influence of insufficient 3D data on the matching result.



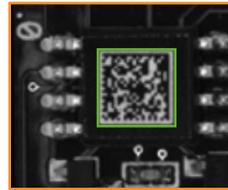
READING VERY SMALL CODES WITH THE SUBPIXEL BAR CODE READER

The bar code reader in HALCON 20.11 features an advanced decoding algorithm, which increases the decoding rate when reading codes with very thin bars. Thanks to this, it is now possible to even read codes with bars smaller than one pixel, as shown in the picture on the right.



SPEEDUP OF THE ECC 200 CODE READER

In HALCON 20.11, the code reader for ECC 200 codes is significantly faster on multi-core systems. This is especially true for codes that are difficult to detect and read. For such codes, a speedup of up to factor 3 can be reached. This speedup also increases the viability of embedded-based code readers by taking full advantage of existing hardware capacities.



HALCON'S SHAPE-BASED MATCHING

Shape-based matching is one of HALCON's most important core technologies and can be considered to be one of the most powerful matching tools on the market. MVTec continuously improves this technology to widen the application area even further. With HALCON 20.11, users can, for example, define so-called "clutter" regions (marked right in orange). These are areas within a search model that should not contain any contours. Adding such clutter information to the search model leads to more robust matching results, for example repetitive structures.



Definition of clutter regions



Matching result based on clutter information

Further Highlights of HALCON 20.11

- Deep-learning-based object detection with oriented rectangles
- Support of ONNX format
- Texture inspection with support for multi-channel images
- Support of .NET Core
- Multiple new tuple operators for various mathematical functions
- Calibration of telecentric line scan cameras
- Support of multi-view stereo with telecentric line scan cameras
- Socket communication with SSL/TLS encryption
- Just-in-time compiler for Arm®-based platforms
- General speedups for several operators

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www.halcon.com/now



What Is HALCON?

MVTec HALCON is the comprehensive standard software for machine vision with an integrated development environment (HDevelop) that is used worldwide. It enables cost savings and improved time to market. HALCON's flexible architecture facilitates rapid development of any kind of machine vision application.

What Is Included?

MVTec HALCON provides outstanding performance and a comprehensive support of multi-core platforms, special instruction sets like AVX2 and NEON, as well as GPU acceleration. It serves all industries, with a library used in hundreds of thousands of installations in all areas of imaging like blob analysis, morphology, matching, measuring, and identification. The software provides the latest state-of-the-art machine vision technologies, such as comprehensive 3D vision and deep learning algorithms.

What Is HALCON Progress?

HALCON Progress is the fast track to the latest features. With new releases approximately every six months, it gives you access to the newest features quicker and more frequently than ever before. These short release cycles are only available via an annual subscription.

Why HALCON?

The software secures your investment by supporting a wide range of operating systems and providing interfaces to hundreds of industrial cameras and frame grabbers, in particular by supporting standards like GenICam, GigE Vision, and USB3 Vision. By default, MVTec HALCON runs on Arm®-based embedded vision platforms. It can also be ported to various target platforms. Thus, the software is ideally suited for the use within embedded and customized systems.

Your Distributor