Press release



New MVTec HALCON version includes deep learning-based technology for robust bin picking

- Deep 3D Matching as a robust, flexible and fast feature for finding objects in three-dimensional space
- In addition: Numerous improvements and optimizations of already available technologies
- Release on May 27, 2025

Munich, April 15, 2025 - MVTec Software GmbH, a leading global manufacturer of machine vision software, is launching the new version of MVTec HALCON on May 27, 2025. Version 25.05 of the standard software for machine vision includes numerous improvements as well as a new technology that combines deep learning algorithms with classic methods. "We always want to offer our customers the latest machine vision technologies and continuously update existing features. With the new HALCON version, we have once again achieved this goal. With Deep 3D Matching, we are providing a technology that has never existed in this form before. At the same time, we have further improved the performance and usability of existing deep learning methods," says Jan Gärtner, Product Manager HALCON at MVTec.

Deep 3D Matching, which was already available with limited functionality in the previous version, is particularly suitable for bin-picking and pick-and-place applications. Depending on the requirements, one or more cost-efficient standard 2D cameras can be used to determine the position. As part of the improvements, the neural networks have been optimized for deep learning-based text reading. In addition, the code reader for QR codes has been improved, a new set of operators for image acquisition have been added, and many other smaller improvements have been made. "At the moment, a particular important topic for MVTec is the new development of the integrated development environment HDevelopEVO. Users can already test HDevelopEVO. For the new version, we have extended the range of features that can be used," explains Jan Gärtner.

Train your own Deep 3D Matching models

Deep 3D Matching is a new deep-learning-based technology for fast and robust 3D object detection and pose estimation using 2D images. It requires minimal parametrization and delivers high performance, making it ideal for applications such as bin picking and robotic handling – even in challenging conditions.

With HALCON 25.05, users can now train their own Deep 3D Matching models independently, without requiring MVTec support. A new renderer allows them to generate training data from a CAD model of the relevant object and thus also enables training exclusively with synthetically generated, labeled data. This allows for a very flexible setup and can cover various object properties like reflections and transparency.





With the new training functionality, customers can now create 3D matching applications tailored to their specific needs and environment. If desired, model training can still be commissioned as a paid service through MVTec.

More robust Deep OCR with alignment-based text correction

In some applications, running Deep OCR's detection model, which localizes word regions in the image, may not be feasible due to tight cycle time constraints. In such cases, users define text regions manually or through rule-based image processing, which can lead to inaccurate recognition due to suboptimal crops.

With HALCON 25.05, Deep OCR thus includes an alignment step before recognition. This step refines rough word crops, significantly improving reading accuracy even when text regions are placed imprecisely. As a result, users can bypass the detection model while maintaining reliable OCR results – leading to a considerable reduction in processing time.

This makes text recognition workflows not only more flexible but also much faster, as precise ROI (region of interest) placement is no longer required. The alignment step itself is highly efficient and adds only minimal processing overhead.

Core feature improvements

With version 25.05, HALCON improves its code reader with QR code rectification, enabling reliable reading even on curved or deformed surfaces. This expands application possibilities in industries such as logistics, packaging, food production, and bottle labeling, where QR codes often appear on non-flat materials. The rectification process ensures higher readability without requiring perfectly flat surfaces. It is optional and can be enabled as needed. While processing time is slightly longer than standard QR code reading, the improved robustness makes it a valuable addition for demanding applications.

The 25.05 release of HALCON also adds the possibility to interrupt training for Generic Shape Matching, giving users greater flexibility and control over the process. Training can now be stopped manually or limited with a timeout (e.g., after 1 second), ensuring efficient operation without unnecessary waiting times. Previously, once training started, it had to run to completion, which could lead to delays – especially in embedded applications with limited resources. Now, users can seamlessly integrate training into their workflows, preventing long processing times and improving responsiveness.

New image acquisition interface for modern camera technologies

HALCON 25.05 introduces a new set of image acquisition operators designed for seamless integration with state-of-the-art camera technology. While MVTec has always focused on efficient camera connectivity, modern standards like GigE Vision and USB3 Vision bring both new opportunities and new challenges. The new interface simplifies camera handling while providing full control over advanced configurations.

These new operators provide a clearer, more intuitive interface, optimized for standard use cases





while maintaining full control over the GenICam GenTL architecture. Additionally, they support multiple streams if provided by GenICam GenTL devices. Users can expect performance equal to or even faster than previous operators, ensuring a smooth transition to the latest camera technology.

New version of HDevelopEVO

Together with HALCON 25.05, a new version of HDevelop EVO is also available, which provides users with various new features: HDevelopEVO 25.05 introduces support for referencing procedures stored in external files. Users can now split their programs into multiple files and reference procedures across them. This enables cleaner program structure and is a first step toward future support for modular libraries.

To address a common need in machine vision workflows, the latest version also adds the gray value histogram – one of the most frequently used tools for image analysis. It enables the user to visualize the distribution of pixel intensities in an image and to interactively set thresholds to select relevant regions for further processing.

Lastly, to support developers more effectively, HDevelopEVO 25.05 also introduces AI assistants. These include an interactive chat, agents for, e.g., IDE commands and shell commands, and automatic code completion. Users can choose between cloud-based, self-hosted, or local AI models while maintaining full control over data and model usage. The AI assistants must be explicitly activated by the user.

About MVTec Software GmbH

MVTec is a leading manufacturer of standard software for machine vision. MVTec products are used in all demanding areas of imaging: semiconductor industry, surface inspection, automatic optical inspection systems, quality control, metrology, as well as medicine and surveillance. By providing modern technologies such as 3D vision, deep learning, and embedded vision, software by MVTec also enables new automation solutions for the Industrial Internet of Things aka Industry 4.0. With locations in Germany, the USA, China, France, Taiwan and the Netherlands as well as an established network of international distributors, MVTec is represented in more than 35 countries worldwide. <u>www.mvtec.com</u>

About MVTec 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. MVTec HALCON provides outstanding performance and 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.

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 GenlCam, 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.

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