

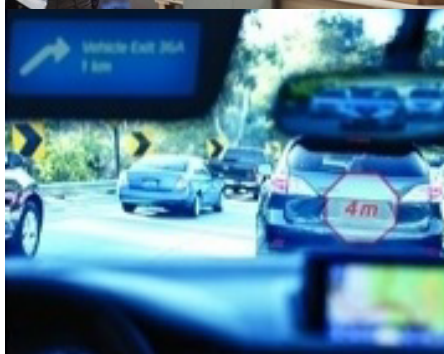
## PRODUCT BRIEF

Computer Vision and Deep Learning  
Intel® Distribution of OpenVINO™ Toolkit



# Accelerate Computer Vision and Deep Learning from Edge to Cloud

## Accelerate Development of High-Performance Computer Vision and Deep Learning Inference into Vision Applications



Intel® Distribution of OpenVINO™ toolkit (open visual inference and neural network optimization) is a free software kit that helps developers and data scientists speed up computer vision workloads, streamline deep learning inference and deployments, and enable easy, heterogeneous execution across Intel® platforms from edge to cloud. It helps to:

- **Unleash deep learning inference** using a common API. Streamline deep learning inference and deployment using standard or custom layers without the overhead of frameworks. Includes 40+ pre-trained models and support for 100+ open source and custom models.
- **Increase performance for AI and computer vision workloads** with heterogeneous processing and asynchronous execution across multiple types of Intel® processors—CPUs, CPUs with integrated graphics, Intel® FPGAs, and Intel® Movidius™ vision processing units (VPUs).
- **Accelerate development** using optimized OpenCV\* and OpenVX\* functions. Get started quickly with 15+ code samples. Add custom kernels into workloads (i.e., video/image processing, computer vision routines, feature extraction/tracking, OpenCL™).

Demand for intelligent vision solutions is increasing from edge to cloud—including digital surveillance, retail, industrial/manufacturing, smart cities and homes, office automation, autonomous driving, and more. Deep learning revenue is expected to grow from \$655 million in 2016 to \$35 billion by 2025<sup>2</sup>.

Top systems require multiple fast, scalable, reliable platforms and devices to support multi-channel streaming, real-time software-based analytics deep learning, and more. Intel's robust hardware and software products give OEMs/ODMs, system integrators, ISVs, and solution providers the tools they need to speed design, development, and deployment of high-performance computer vision solutions—enabling rich solutions for AI everywhere.

### What's Inside

- **Intel® Deep Learning Deployment Toolkit** with model optimizer and inference engine
- **Open Model Zoo** that includes 40+ optimized pre-trained models
- **Deep learning Workbench**, a GUI tool for profiling and inference experiments
- **OpenCV, OpenVX and Intel® Media SDK** to provide optimized traditional computer vision libraries and encode/decode capabilities.

**Free Download >**  
[software.intel.com/openvino-toolkit](https://software.intel.com/openvino-toolkit)





### Binary models:

- ResNet 50
- Face, person, and vehicle detection

## Deep Learning Workbench

This Web-based graphical environment allows users to visualize a simulation of performance of deep learning models and datasets on various Intel® architecture configurations (CPU, GPU, VPU). It provides key performance metrics such as latency, throughput, and performance counters for each layer of the selected neural network. This tool includes simple configuration for many inference experiments to detect optimal performance settings.

- **Run single** versus multiple inferences.
- **Calibrate** to reduce precision of certain model layers from FP32 to Int8.
- **Tune** with Winograd Algorithm to automatically determine the optimized algorithm based on convolution layer parameters and hardware configuration
- **Run experiments** on known data sets and determine accuracy of the model after parameter tuning or calibration using the accuracy checker.

## Optimized Libraries and Functions for Traditional Computer Vision

- **OpenCV:** A well-established, open source, and optimized computer vision library. It includes a wide variety of algorithms and functions available including the Intel® Photography Vision Library, a collection of highly optimized and state of the art computer vision functions.
- **OpenVX:** An optimized, graph-based approach for computer vision functions that is targeted at real-time, low power applications. More than 15 samples included.

## Why You Need It

### Boost Computer Vision Performance

- Provides access to Intel's computer vision accelerators (CPU, CPU with integrated graphics, FPGAs, and Intel Movidius VPUs) to accelerate performance.
- Supports heterogeneous execution across multiple types of Intel® processors
- Accelerates model inference through int8 quantization

### Streamline Deep Learning Inference and Deployment

- Enables deep learning inference on edge as well as cloud.
- Includes Deep Learning Deployment Toolkit with a model optimizer and an inference engine, which provides optimized inference across many hardware types.
- Allows you to use standard or custom layers without the overhead of frameworks.
- Includes more than 40 pre-trained models and support for 100+ open source and custom models.

### Speed Development for Vision Solutions, Save Time with a Heterogeneous Approach

- Supports heterogeneous execution across multiple types of Intel processors.
- Improves efficiency and saves development time.

## Success Stories



### Deep Learning for Healthcare Imaging

Intel and GE brought the power of AI to clinical diagnostic scanning and other healthcare workflows.

[Read more >](#)



### Performance Boost for a Deep Learning Algorithm

GeoVision sped up its facial recognition solution using Intel® System Studio and the Intel Distribution of OpenVINO toolkit.

[Read more >](#)

## See more success stories >

- Use the SDK's library of functions, pre-optimized kernels, and optimized calls for OpenCV and OpenVX. Write code once and deploy it to multiple types of Intel processor-based devices, easily customizing it for your models. Delivers broad capabilities to all developers—no domain expertise required.

## Accelerate Computer Vision and Deep Learning Inference from Edge to Cloud

**Download the free Intel Distribution of OpenVINO toolkit** to speed up computer vision workloads and streamline deep learning deployments with easy, heterogeneous execution across multiple types of Intel hardware.

Optimize more capabilities by using the Intel Distribution of OpenVINO toolkit with other tools:

- **Intel® SDK for OpenCL™ Applications** for Intel® CPUs and CPUs with integrated graphics workload balancing
- **Intel® System Studio** to optimize system bring-up and IOT device application performance

## Get Started Now

- [Download the free Intel® Distribution of OpenVINO™ toolkit >](#)
- [Learn more about Intel Distribution of OpenVINO toolkit >](#)
- [Explore Intel® Deep Learning Deployment Toolkit >](#)
- [Visit Tech.Decoded, Intel's developer knowledge hub >](#)

## Technical Specifications

|   |  |
|---|--|
| <b>CPU</b>  | <p><b>Supported Hardware</b></p> <ul style="list-style-type: none"> <li>6th-10th generation Intel® Core™ processors with Iris® Pro graphics and Intel® HD Graphics</li> <li>Intel® Pentium® processor N4200/5, N3350/5, N3450/5 with Intel HD Graphics</li> </ul> <p><b>Supported Operating Systems</b></p> <ul style="list-style-type: none"> <li>Microsoft Windows® 10 (64 bit)</li> <li>Ubuntu* 18.04.3 LTS (64 bit)</li> <li>CentOS* 7.4 (64 bit)</li> <li>Yocto Project* MR3 (64 bit)</li> <li>macOS 10.13, 10.14 (64 bit)</li> </ul> <p><b>Supported OpenVINO Toolkit Components</b></p> <ul style="list-style-type: none"> <li>Intel® Deep Learning Deployment Toolkit</li> <li>OpenCV</li> <li>OpenVX*</li> <li>Deep Learning Workbench</li> </ul> |
| <b>CPU with Integrated Graphics<br/>(Intel® Processor Graphics/GPU)</b> | <p><b>Supported Hardware</b></p> <ul style="list-style-type: none"> <li>6th-10th generation Intel® Core™ processors with Iris® Pro graphics and Intel® HD Graphics</li> <li>Intel® Pentium® processor N4200/5, N3350/5, N3450/5 with Intel HD Graphics</li> </ul> <p><b>Supported Operating Systems</b></p> <ul style="list-style-type: none"> <li>Windows 10 (64 bit)</li> <li>Ubuntu 16.04.3 LTS (64 bit)</li> <li>CentOS 7.4 (64 bit)</li> <li>Yocto Project MR3 (64 bit)</li> </ul> <p><b>Supported OpenVINO Toolkit Components</b></p> <ul style="list-style-type: none"> <li>Intel® Deep Learning Deployment Toolkit</li> <li>OpenCV</li> <li>OpenVX</li> <li>Deep Learning Workbench</li> </ul>   |
| <b>Intel® FPGAs</b>   | <p><b>Supported Hardware</b></p> <ul style="list-style-type: none"> <li>Intel® Arria® 10 GX FPGA Development Kit</li> <li>Intel® Programmable Acceleration Card with Intel® Arria® 10 GX FPGA</li> </ul> <p><b>Supported Operating Systems</b></p> <ul style="list-style-type: none"> <li>Ubuntu 18.04.2 LTS (64 bit)</li> <li>CentOS 7.4 (64 bit)</li> </ul> <p><b>Supported OpenVINO Toolkit Components</b></p> <ul style="list-style-type: none"> <li>Intel® Deep Learning Deployment Toolkit</li> </ul>  |
| <b>Intel® Movidius™<br/>Vision Processing Unit (VPU)</b>                | <p><b>Supported Hardware</b></p> <ul style="list-style-type: none"> <li>Intel® Movidius™ Neural Compute Stick</li> <li>Intel® Neural Compute Stick 2</li> </ul> <p><b>Supported Operating Systems</b></p> <ul style="list-style-type: none"> <li>Ubuntu 18.04.3 TLS (64 bit)</li> <li>CentOS 7.4 (64 bit)</li> <li>Windows 10 (64 bit)</li> <li>macOS</li> </ul> <p><b>Supported OpenVINO Toolkit Components</b></p> <ul style="list-style-type: none"> <li>Intel Deep Learning Deployment Toolkit</li> <li>OpenCV and OpenVX functions (needs to be run against the CPU or GPU)</li> </ul>  |
| <b>Intel® Vision Accelerator Design</b>                                 | <p><b>Supported Hardware:</b> Intel® Vision Accelerator Design with Intel® Movidius™ VPUs</p> <p><b>Supported Operating Systems:</b> Ubuntu 18.04.3 TLS (64 bit), Windows 10 (64 bit)</p> <p><b>Supported OpenVINO Toolkit Components:</b> Intel® Deep Learning Deployment Toolkit</p>   |

<sup>1</sup> See image on page 3 for details and configuration.

<sup>2</sup> Tractica, 2Q 2017

Performance results are based on testing as of 4/13/2018 and may not reflect all publicly available security updates. See configuration disclosure for details. No product can be absolutely secure.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

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