Building and Scaling AI Applications with the Nx AI Manager

Robin van Emden

Senior Director of Data Science

Network Optix

Network Optix

Network Optix

- Founded in 2010 with the aim of creating a platform for enterprise video management.
- Offices in Los Angeles, Portland, London, Taipei, Adelaide, Belgrade.
- Over 4 million connected video streaming devices in more than 150 countries
- Recently acquired Scailable AI, which adds Amsterdam ☺

Network Optix

- Founded in 2010 with the aim of creating a platform for enterprise video management.
- Offices in Los Angeles, Portland, London, Taipei, Adelaide, Belgrade.
- Over 4 million connected video streaming devices in more than 150 countries
- Recently acquired Scailable AI, which adds Amsterdam ☺

Hard Problem: Video

Nx Toolkit Makes Video Solutions at Scale Easy

Network Optix Toolkit is a solution that handles the complexities of edge video, allowing you to concentrate on building your application.

Device / Stream Discovery

Video / Metadata Capture

Storage Management

Decoding / Visualization

OS / Hardware Support

System Scalability

Platform Extensibility

Usability / User Experience

Enterprise Scalability

Cyber Security

Nx Toolkit Makes Video Solutions at Scale Easy

Network Optix Toolkit offers partially open-source tools and libraries to build custom video solutions.

It provides server, desktop, mobile applications, and cloud services.

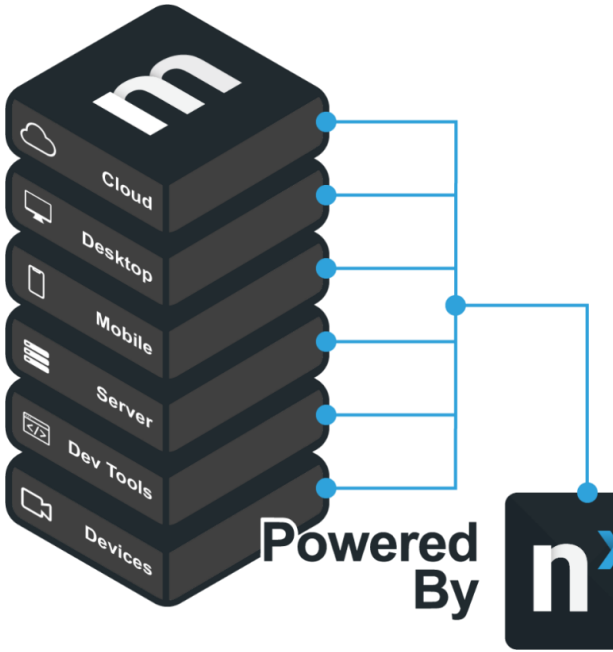
Developer Tools

- ✓ HTTP API
- ✓ Metadata SDK (C++)
- ✓ Storage SDK (C++)
- ✓ Video Source SDK (C++)

GitHub

networkoptix/
nx_open

NetworkOptix open-source components used to build Powered-by-Nx products including Desktop Client for Network Optix Video Management Platform.



Nx Toolkit Makes Video Solutions at Scale Easy

Network Optix Toolkit offers partially open-source tools and libraries to build custom video solutions.

It provides server, desktop, mobile applications, and cloud services.

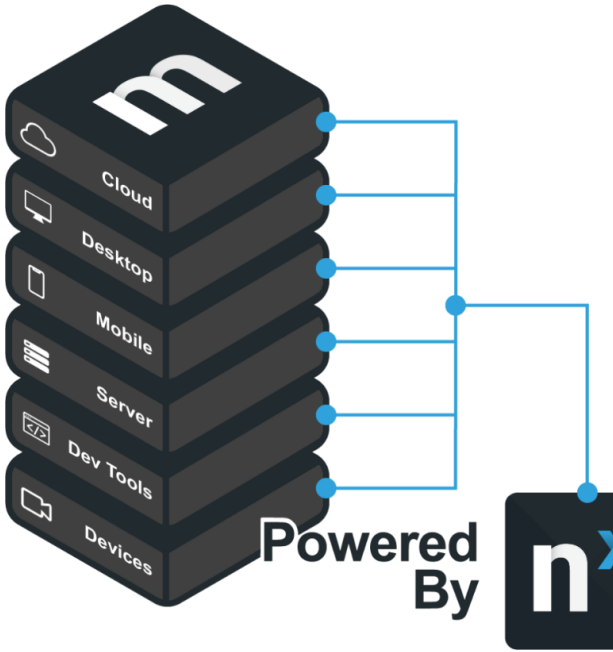
Developer Tools

- ✓ HTTP API
- ✓ Metadata SDK (C++)
- ✓ Storage SDK (C++)
- ✓ Video Source SDK (C++)

GitHub

networkoptix/
nx_open

NetworkOptix open-source components used to build Powered-by-Nx products including Desktop Client for Network Optix Video Management Platform.



Hard Problem: AI

Creating AI applications at Scale Is Hard

These days, there are numerous user-friendly tools available for training AI models…

Data scientists use their preferred tools to train AI models on laptops, in data centers, and in the cloud.

PyTorch EDGE IMPULSE ONNX

NotaAI Keras TensorFlow

… but building an AI solution for edge devices still takes a lot of time and effort.

- Diverse edge AI accelerators: GPU, NPU, DPU.
- Input and output interfacing, edge video.
- Data pre- and post-processing.
- Embedded engineering.

Nx AI Manager Makes AI Solutions at Scale Easy

embedded VISION SUMMIT®

Train AI model

ONNX

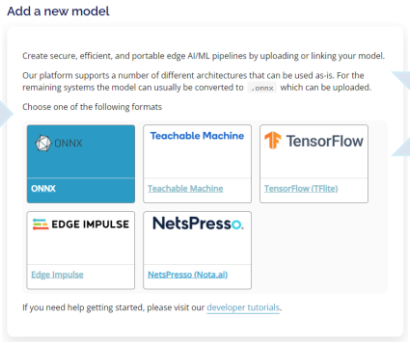
TensorFlow

PyTorch

EDGE IMPULSE

Nota AI

Upload to Nx Cloud



Deploy AI model to Device(s) with Nx AI Manager

Nx Client, Nx Mobile, Nx Web

Nx AI Manager Makes AI Solutions at Scale Easy

embedded VISION SUMMIT®

Train AI model

ONNX

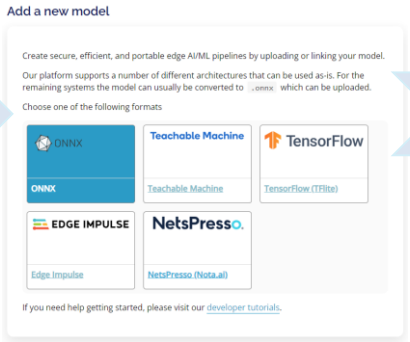
TensorFlow

PyTorch

EDGE IMPULSE

NotaAI

Upload to Nx Cloud



Deploy AI model to Device(s) with Nx AI Manager

Nx Client, Nx Mobile, Nx Web

Nx AI Manager Makes AI Solutions at Scale Easy

embedded VISION SUMMIT®

Train AI model

ONNX

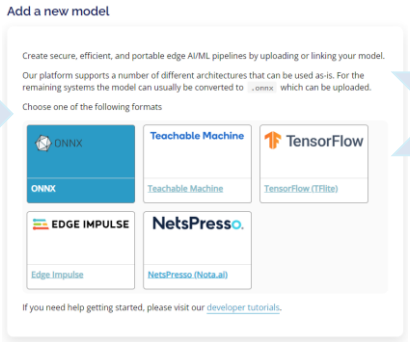
TensorFlow

PyTorch

EDGE IMPULSE

NotaAI

Upload to Nx Cloud



Deploy AI model to Device(s) with Nx AI Manager

Nx Client, Nx Mobile, Nx Web

Nx AI Manager Makes AI Solutions at Scale Easy

embedded VISION SUMMIT®

Train AI model

ONNX

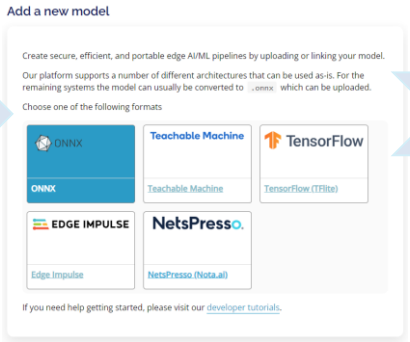
TensorFlow

PyTorch

EDGE IMPULSE

NotaAI

Upload to Nx Cloud



Deploy AI model to Device(s) with Nx AI Manager

Nx Client, Nx Mobile, Nx Web

Nx AI Manager -> Open Ai Accelerator eXchange [OAAX]

https://github.com/OAAX-standard/OAAX

ONNX TensorFlow PyTorch EDGE IMPULSE Keras

AI Model

Using OAAX you can use any hardware accelerator effortlessly to deploy your edge AI models.

NX Cloud

Inference Engine

Convert models in cloud

Standardized interface to native accelerator libraries

intel arm HAILO Qualcomm NVIDIA memryX

Nx AI Manager -> Open Ai Accelerator eXchange [OAAX]

https://github.com/OAAX-standard/OAAX

ONNX TensorFlow PyTorch EDGE IMPULSE Keras

AI Model

Using OAAX you can use any hardware accelerator effortlessly to deploy your edge AI models.

NX Cloud

Inference Engine

Convert models in cloud

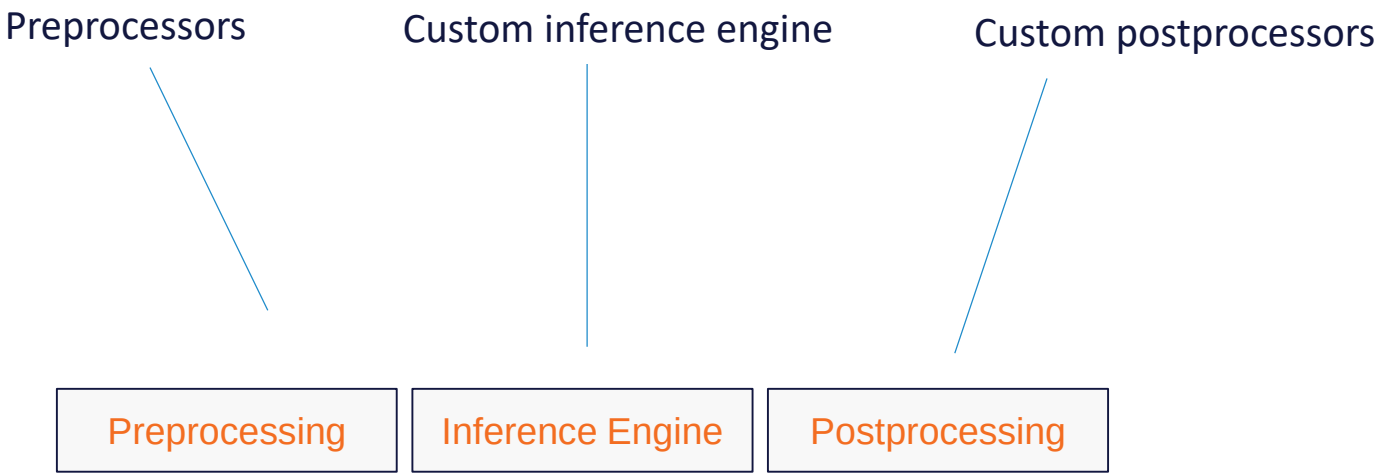
Standardized interface to native accelerator libraries

intel arm HAILO Qualcomm NVIDIA memryX

Nx AI Manager Allows for Custom Pipelines

https://github.com/scailable/sclbl-integration-sdk

https://nx.docs.scailable.net/oaax-implementation



Deploying AI Models to Heterogeneous Devices

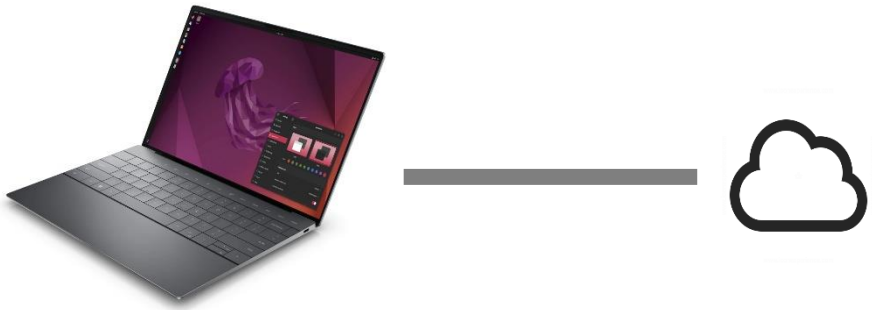
Step 1: Edge Devices, IP Cameras, and a Client Device

				
CPU	AARCH64	X86_64	AARCH64	X86_64
XPU ACCELERATOR	CPU SIMD	CPU SIMD	NVIDIA ORIN	HAILO-8

Step 2: Install an Nx Client and Register in the Nx Cloud

(1) https://meta.nxvms.com/download

```
> sudo apt install -y ./metavms-client-6.x.x.x-linux_x.deb
```



(2) https://meta.nxvms.com

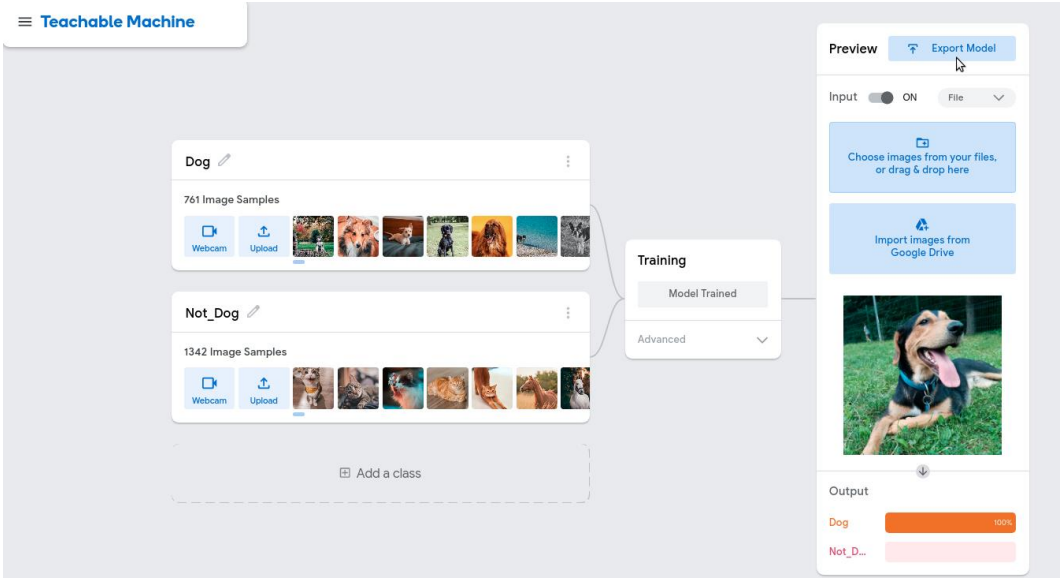
Step 3: Install Nx Server with NX AI Manager

(1) https://meta.nxvms.com/download

```
> sudo apt install -y ./metavms-server-6.x.x.x-linux_x.deb
```

				
CPU	AARCH64	X86_64	AARCH64	X86_64
XPU ACCELERATOR	CPU SIMD	CPU SIMD	NVIDIA ORIN	HAILO-8
INFERENCE RUNTIME LIBRARY	ONNXRuntime with ACL	ONNXRuntime with oneDNN, Intel OpenVINO	NVIDIA CUDA NVIDIA TensorRT	HAILORT

Step 4: Train, Convert, Deploy and Run an AI Model



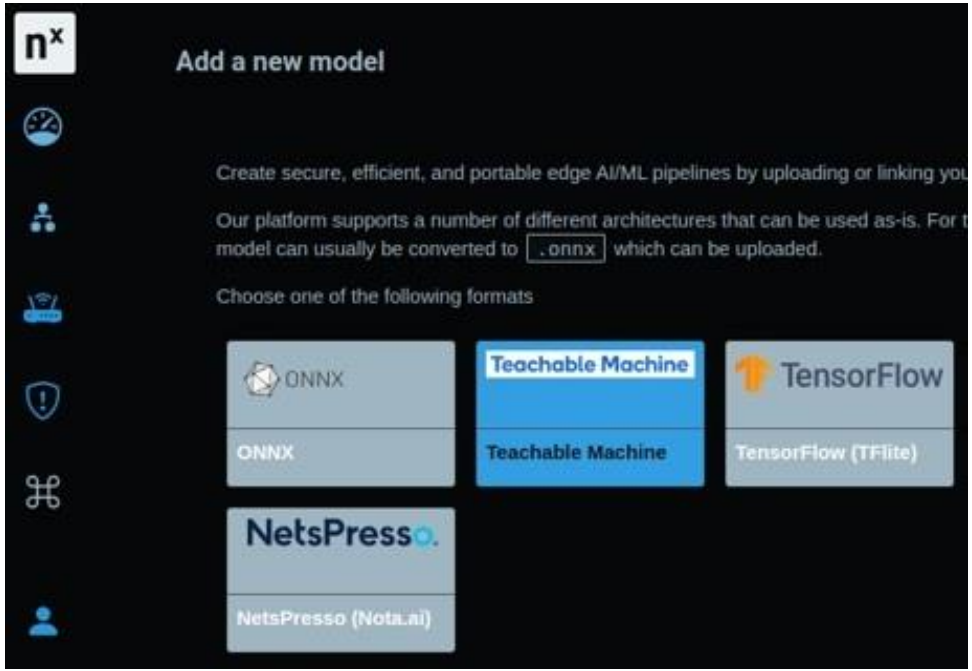
For instance:

Teachable Machine

TensorFlow Lite

https://nx.docs.scailable.net/for-data-scientists/importing-models/from-teachable-machine

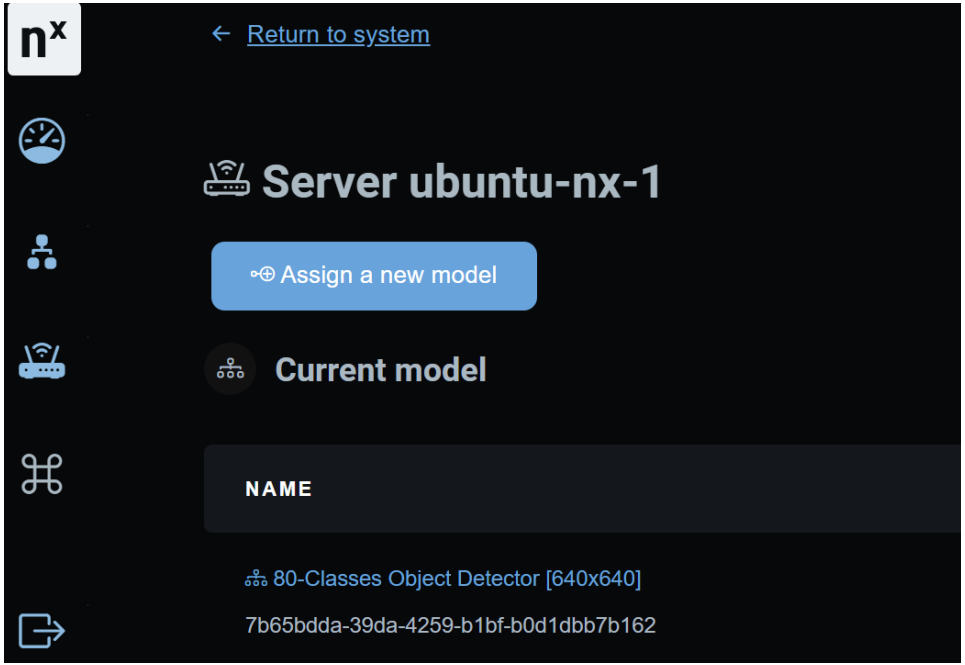
Step 4: Train, Convert, Deploy and Run an AI Model



https://admin.sclbl.nxvms.com/

Nx AI Cloud

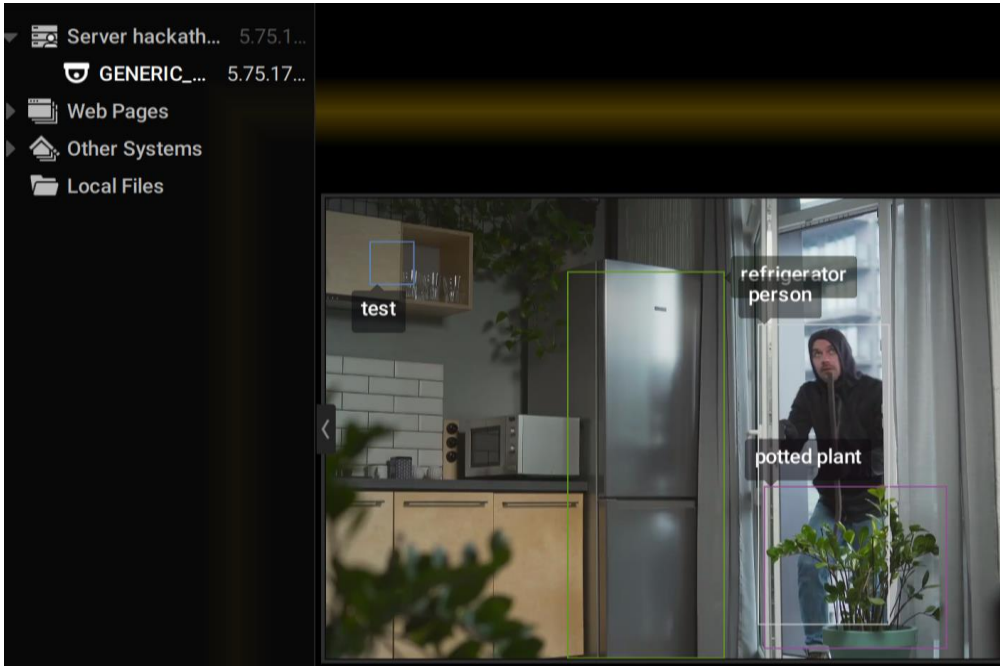
Step 4: Train, Convert, Deploy and Run an AI Model



https://admin.sclbl.nxvms.com/

Nx AI Cloud

Step 4: Train, Convert, Deploy and Run an AI Model



https://github.com/networkoptix

Nx Client

Let Me Show You How: Live Coding Session

Step 4: Live Coding Sessions at Our Booth

Booth #304

Takeaway

Building an AI + Video Application? Build on Nx EVOS

- **Simplified AI Deployment and Management:** Network Optix streamlines the implementation, deployment, and management of AI models across edge devices, allowing developers to focus on creating innovative Vision AI solutions.

- **Comprehensive Nx Meta Platform:** Nx Meta offers a full suite of tools through the **Nx Toolkit**, addressing video development challenges, empowering efficient and effective distributed video application development.

- **Versatile AI Model Integration**: The **Nx AI Manager** supports the entire AI model lifecycle, from training to real-time inference enabling seamless integration of custom AI models and real-time visualization within the Nx Client.

Thank you!

Continue exploring Nx Meta and more

Nx AI Plugin Documentation
https://nx.docs.scailable.net/

Nx Meta Developer Portal
https://meta.nxvms.com/

Nx tools:
https://www.networkoptix.com/nx-meta

OAAX github
https://github.com/oaax-standard

2024 Embedded Vision Summit

Scaling Vision-Based Edge AI Solutions: From Prototype to Global Deployment
Maurits Kaptein
General Session — Wed, May 22 at 10:00 am

Nx EVOS: A New Enterprise Operating System for Video and Visual AI
Nathan Wheeler
Exhibit Hall—ET-2 Thur, May 23 at 12:00 pm

Visit us at our booth — Booth #304