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## 1 Overview

This document contains information about the content, new features, and limitations of the eIQ Toolkit package. eIQ Toolkit is a machine learning environment which enables its users to train and run machine learning models as efficiently as possible on NXP hardware.

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Table 1. Component overview

Component name	Version
eIQ Portal	2.3.10
eIQ Model Tool	2.3.8
DeepView Converter	2.5.7-16
DeepViewRT	2.4.36-21
DeepView Trainer (Trainer-server)	2.3.6
DeepView Validator	2.3.9-4
Modelrunner	2.4.36-21-g23838a18
DeepView Importer	2.1.14-2-g24ee89e
DeepView Datastore	2.1.14-2
Python	3.8.10
Python – Tensorflow	2.5.0
Python – ONNX	1.10.2

## 2 References

This release includes the following references and additional information:

- *eIQ Toolkit User's Guide* (document EIQTUG) - provides the information about the eIQ Toolkit.
- *eIQ Toolkit Release Notes* (document EIQTRN) - provides the release information.
- *DeepViewRT User's Manual* - provides the information about DeepViewRT inference engine.
- *Datastore User's Manual* - provides the information about Datastore API for dataset management.
- *Custom Models Note* - provides the information about creating custom models for image-classification and object-detection problems.



### 3 New features

- Converter plugins - DeepView Converter was reworked into plugins. New converters can be easily implemented as custom plugins. Plugins can also implement any conversions or transformations.
  - The RTM, TF Lite, and ONNX converters were added as default plugins.
  - The dynamic GUI parameters entry was added for advanced parameters in Model Tool and eIQ Portal.
  - The reserved parameters list was added in the converter.
- Support for saved models and web-hosted models was added in the Model Tool.
- The GUI was upgraded for remote targets.
- The Augmentation GUI was improved.
- The sample information were added in the Dataset Curator.
- The Deepview Converter was significantly improved for conversions between TF Lite and RTM formats.
- The Deepview Validator was significantly improved.
- The Mobilenet SSD v1/2/3 Jupyter notebooks in the workspace directory were significantly reworked. More details about the individual commands and Mobilenet architecture were added.
- The Jupyter notebook to download the tested and publicly-available models is newly provided in the workspace directory.
- The ONNX Python package was updated to 1.10.2.
- The food dataset sample project was replaced with the Cards project. The food dataset often leads to issues during training (such as overfitting), which confused users.

### 4 Known issues and workarounds

The following list specifies the current known issues (which may impact the user experience) and workarounds:

- Conversions of the ONNX models to TF Lite are not fully supported due to issues in the third-party ONNX2TFLite module.
- Conversions from ONNX to RTM were observed to fail. Issues are caused by the use of "contrib ops", which are not fully supported. Develop your model using the default set of supported operators when conversion to other formats is required.
- If you install this software into a protected folder (for example, *C:\Program Files*), conversions, validations, and exportations to ONNX may not work. Either install the software into a user-owned directory or run the tools with elevated privileges.
- MobileNet SSD-Lite v2 and Mobilenet SSD v1 have issues with conversions from *.pb* to *.tflite*.
- Using the MLIR converter for quantization may lead to incorrect output shapes or dynamically sized tensors. Such cases were observed for MobileNet SSD object detection models or ONNX models. Use TOCO converter, which forces static shapes.
- Quantized TF Lite SSD models (any backbone) provide low accuracy (unexpected results), originating in the post-process layer. Use the float input and output.
- TF Saved Model checkpoint quantization is not supported in Model Tool. Use DeepView Converter from the command-line tools instead.
- When opening a project, wait until all the images are loaded.
- Remove all temporary files from the *%USERPROFILE%\AppData\Local\Temp* folder regularly. Not removing the temporary files may result in the Saved Model conversions in the DeepView Converter failing.
- Detection models from eIQ Toolkit 1.0 lacked the "Background" label from the model configuration files. To regenerate the models, train another epoch or create a new model session and restore the checkpoint file using the weights "From File" option and train a 0-epoch model initialization.

- Training with RMSprop and Adam optimizers sometimes does not converge (typically for very small datasets). Switch to a different optimizer. Use SGD, which provides a more stable (but slower) convergence.
- Not all backends support per-layer profiling in the Model Tool. Typically, this is the case for NPU-accelerated backends, where the machine-learning model is processed in a single iteration.
- When validating an ONNX model, use the `--dataset` argument. Using `.npz` files is not supported.
- The Per-Tensor quantized ONNX models cannot be validated due to observed issues with unsupported operators.
- The sample data provided to the DeepView Converter is limited to images.
- Clicking the "Epochs" button in the Model Graph with the QAT enabled during training causes issues.
- Clicking the "Generate New Random Augmentation" button does not work for projects with full-image labels. Use only region-specific labels or no labels to avoid this issue.

## 5 Revision history

Table 2. Revision history

Revision number	Date	Substantive changes
0	9 June 2021	eIQ Toolkit 1.0.3
1	24 June 2021	eIQ Toolkit 1.0.5
2	19 October 2021	eIQ Toolkit 1.1.8
3	18 January 2022	eIQ Toolkit 1.2.5

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