NVIDIA Data Loading Library (DALI)

Release Notes
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Chapter 1. DALI Overview

NVIDIA\textsuperscript{®} Data Loading Library\textsuperscript{™} (DALI) accelerates the preprocessing of input data for deep learning applications. By offloading augmentations onto GPUs, DALI addresses performance bottlenecks in today’s computer vision deep learning applications that include complex, multi-stage data augmentation steps. With DALI beta release, deep learning researchers can scale training performance on image classification models such as ResNet-50 with MXNet, TensorFlow, and PyTorch across Amazon Web Services P3 8 GPU instances or DGX-1 systems with Volta architecture. Framework developers will have less duplication due to better code reuse and maintainability.

DALI offers both performance and flexibility of accelerating different data pipelines (graphs that can have multiple outputs and inputs), as a single library, that can be easily integrated into different deep learning training and inference applications.
Chapter 2. DALI Release 1.29.0

Using DALI 1.29.0

DALI builds for CUDA 12 dynamically link the CUDA toolkit. To use DALI, install the latest CUDA toolkit.

To upgrade to DALI 1.29.0 from a previous version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

▶ Added the fn.experimental.median_blur GPU operator (#4950, #4975).
▶ Improved JAX support:
  ▶ Added support for jax.Sharding to dali.plugin.jax.DALIGenericIterator (#4969).
  ▶ Improved examples and tutorials (#4973, #4956, #4944, #4937).
▶ Optimized the HWC to the CHW transposition variant of the fn.crop_mirror_normalize operator (#4972).
▶ Moved to CUDA 12.2U1 (#4966).

Fixed Issues

The following fixes are included in this release:

▶ Fixed layout broadcasting in arithmetic expressions (#4951).
▶ Added the missing layout propagation in fn.reductions (#4947).
Breaking Changes

There are no breaking changes in this release.

Deprecated Features

No features were deprecated in this release.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP.
  
  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.

  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.

  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:

  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 3. DALI Release 1.28.0

Using DALI 1.28.0

DALI builds for CUDA 12 dynamically link the CUDA toolkit. To use DALI, install the latest CUDA toolkit.

To upgrade to DALI 1.28.0 from a previous version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added CUDA 12.2 support (#4930, #4938, and #4939).
- Added cudaMemcpyAsync support (#4900, #4923, and #4921).
- Improved JAX multiprocessing support (#4929, #4927, #4919, #4906, and #4920).
- Added DALIRaggedIterator, which is a DALI Pytorch plugin iterator that supports non-uniform tensors (#4911).

Fixed Issues

No major fixes are included in this release.

Breaking Changes

DALI 1.27 was the final release that supported Python3.6.

Deprecated Features

No features were deprecated in this release.
Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP.
  
  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  
  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 4. DALI Release 1.27.0

Using DALI 1.27.0

DALI builds for CUDA 12 dynamically link the CUDA toolkit. To use DALI, install the latest CUDA toolkit.

To upgrade to DALI 1.27.0 from a previous version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added O_DIRECT support mode support to fn.readers.tfrecord (#4820).
- Added JAX integration (#4867, #4883, #4853).
- Added the GPU backend for fn.experimental.readers.fits images that are stored in the FITS format (#4752).

Fixed Issues

The following issues were fixed in this release:

- Assured deterministic outputs for multiple instances of auto_augment pipelines that are built with the same seeds (#4885).
- Fixed the blocking option in the external source operator (#4874).
- Fixed the returning empty pixel mask for COCO samples with no objects (#4856).
- Fixed the handling of unsupported images by image decoders in fn.experimental.decoders (#4846).
Breaking Changes
There are no breaking changes in this release.

Deprecated Features
DALI 1.27 is the final release that will support Python 3.6.

Known Issues
This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental VideoReaderDecoder does not support open GOP.
  It will not report an error and might produce invalid frames. VideoReader uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 5. DALI Release 1.26.0

Using DALI 1.26.0

DALI builds for CUDA 12 dynamically link the CUDA toolkit. To use DALI, install the latest CUDA toolkit.

To upgrade to DALI 1.25.0 from a previous version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added O_DIRECT mode support to fn.readers.numpy (#4796, #4848).
  - Added an option to filter out iscrowd entries from COCO (#4792).
  - Moved to CUDA 12.1 update 1 (#4798).
  - Made DALI GPU tensors directly convertible to PyTorch (#4800).

Fixed Issues

The following issues were fixed in this release:

- Fixed a memory leak in the fn.experimental.remap operator (#4790).
- Fixed the recognition of new CuPy ndarrays in fn.external_source (#4793).

Breaking Changes

There are no breaking changes in this release.
**Deprecated Features**

No features were deprecated in this release.

**Known Issues**

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP.
  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 6. DALI Release 1.25.0

Using DALI 1.25.0

DALI builds for CUDA 12 dynamically link the CUDA toolkit. To use DALI, install the latest CUDA toolkit.

To upgrade to DALI 1.25.0 from a previous version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added the experimental flexible image transport system (FITS) reader (fn.experimental.readers.fits) for the CPU backend (#4591).
- Added the CPU backend for the histogram equalization operator (fn.experimental.equalize) (#4742).
- Added the CPU backend for the 2-D convolution for images and video (fn.experimental.filter) (#4764).
- Added support for feeding pipeline inputs as named arguments in Pipeline.run() (#4712).
- Improved the automatic augmentations and conditional execution in the following ways:
  - Support for CPU inputs in predefined automatic augmentations (#4772).
  - Reduced memory consumption (#4697).
  - Support for conditional execution in debug mode (#4738).
  - EfficientNet training example with DALI AutoAugment (#4678).
  - More predefined policies for AutoAugment (#4753).
Support for numerical types in the `if` predicate and `not` expression (#4715).

Operator improvements:
- Improved the performance of CPU brightness and contrast operators for `uint8` samples (#4737).
- Improved the `fn.readers.webdataset` performance (#4708).
- Support booleans in `fn.readers.numpy` (#4745).
- Added support for booleans in the DALI iterator for PyTorch (#4757).

Fixed Issues
The following issues were fixed in this release:
- Fixed possible hangs on a pipeline build or teardown when using `fn.experimental.decoder.image` (#4727).
- Fixed D2D copy synchronization that might result in `fn.experimental.decoders.video` returning incorrect frames for high-resolution videos (#4717).
- Fixed buffer exhaustion in `fn.experimental.decoder.image` (#4723).
- Fixed GPU unary arithmetic operators (for example, `math.abs` and `math.floor`) incorrectly processing non-scalar samples (#4746).
- Fixed host JPEG decoder leaking memory on incorrect files (#4748).
- Fixed missing source information in the numpy reader output (#4714).
- Fixed error message in assertion in `base_iterator.py` (#4726).

Breaking Changes
There are no breaking changes in this release.

 Deprecated Features
No features were deprecated in this release.

Known Issues
This DALI release includes the following known issues:
- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The experimental `VideoReaderDecoder` does not support open GOP.
  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.
The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.

To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.

As a workaround, you can manually synchronize the device before returning the data from the callback.

Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:

- `privileged=yes` in Extra Settings for AWS data points
- `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 7. DALI Release 1.24.0

Using DALI 1.24.0

DALI builds for CUDA 12 dynamically link the CUDA toolkit. To use DALI, install the latest CUDA toolkit.

To upgrade to DALI 1.24.0 from a previous version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Introduced an automatic augmentation module with AutoAugment, RandAugment, and TrivialAugment (#4694, #4699, #4696, #4702, #4704, #4706, #4710).
- Added CUDA 12.1 support (#4684).
- Added support for the and, or, and not boolean operators in pipelines (#4629, #4676).

Fixed Issues

The following issues were fixed in this release:

- Reduced memory consumption by the video decoder (#4682).

Breaking Changes

There are no breaking changes in this release.

Deprecated Features

No features were deprecated in this release.
Known Issues

This DALI release includes the following known issues:

- The `experimental.decoder.image` might sometimes hang during a pipeline build or a teardown.
  
  The issue will be fixed in release 1.25.0.

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP.

  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.

  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.

  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 8. DALI Release 1.23.0

Using DALI 1.23.0

DALI builds for CUDA 12 dynamically link the CUDA toolkit. To use DALI, install the latest CUDA toolkit.

To upgrade to DALI 1.23.0 from a previous version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Enabled conditional execution, which provides support for if/else statements with runtime predicates in the pipeline (#4561, #4618, #4602, #4589, #4617).
- Added a GPU VideoInput operator that supports encoding a large video across multiple iterations (#4613, #4584, #4603, #4564).
- Added support for lossless JPEG decoding on CPU and GPU with fn.experimental.decoders.image (#4625, #4600, #4587, #4572, #4592, #4548).
- Added the fn.experimental.tensor_resize operator (#4492).
- Added the fn.experimental.equalize operator (#4575, #4565).
- Added an API for pre-allocation and releasing of memory pools (#4563, #4556).

Fixed Issues

- Fixed the GPU fn.constant operator synchronization issue (#4643).
- Fixed the out-of-bounds access with a trailing wildcard in fn.reshape (#4631).
- Fixed the insufficient alignment issues in GPU video decoding (#4622).
Breaking Changes

There are no breaking changes in this release.

Deprecated Features

No features were deprecated in this release.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP.
  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  privileged=yes in Extra Settings for AWS data points
  --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 9. DALI Release 1.22.0

Using DALI 1.22.0

DALI builds for CUDA 12 dynamically link the CUDA toolkit. To use DALI, install the latest CUDA toolkit.

To upgrade to DALI 1.22.0 from a previous version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

‣ Added CUDA 12.0 support (#4502).
‣ Reduced binary size for CUDA 12 builds.
‣ Added CPU experimental.inputs.video operator that supports decoding video from memory buffer across multiple iterations to reduce memory usage (#4519).
‣ Added GPU fn.experimental.filter (convolution) operator (#4298, #4525).
‣ Added support for decoding raw H264 and H265 streams from memory (#4480).

Fixed Issues

No major issues were fixed in this release.

Breaking Changes

‣ DALI builds for CUDA 12 dynamically link the CUDA toolkit.
  To use DALI, install the latest CUDA toolkit.
‣ DALI 1.21.0 is the final release that will support CUDA 10.2.
**Deprecated Features**

No features were deprecated in this release.

**Known Issues**

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream. If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP. It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.

  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.

  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 10. DALI Release 1.21.0

Using DALI 1.21.0

To upgrade to DALI 1.21.0 from an older version of DALI, follow the installation and usage information in the [DALI User Guide](https://docs.nvidia.com/dali/). The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added experimental image decoding operators with support for the following higher dynamic ranges (#4223):
  - experimental.decoders.image
  - experimental.decoders.image_crop
  - experimental.decoders.image_random_crop
  - experimental.decoders.image_slice
- Added the GPU debayer operator (#4495, #4486).

Fixed Issues

Here are the fixed issues in this release:

- Fixed the issue where the GPU numpy reader was crashing on a DALI process teardown with cufile 1.4.0 (#4466).
- Fixed an issue with hint grid size in OpticalFlow (#4443).
- Fixed the issue where the GPU video decoder was failing in multi-GPU settings (#4517).

Breaking Changes

Here are no breaking changes in this release.
Deprecated Features

- DALI 1.21.0 is the final release that will support CUDA 10.2.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP.
  
  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  
  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 11. DALI Release 1.20.0

Using DALI 1.20.0

To upgrade to DALI 1.20.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added the fn.experimental.remap operator for the generic geometric transformation of images and video (#4379, #4419, #4365, #4374, 4425).
- Added MPEG4 support to the GPU video decoder (#4424, #4327).
- Added an inflate operator that enables the decompression of the LZ4 compressed input (#4366).
- Added support for broadcasting in arithmetic operators (CPU and GPU) (#4348).
- Added an experimental split and merged operators for conditional execution (#4359, #4405, #4358).
- The following optimizations in GPU operators:
  - MelScale kernel optimization.
  - Optimizations in the GPU decoder (#4351).
  - Simplified arithmetic operator GPU implementation (#4411).
  - Split reduction kernels (#4383).
  - Avoid copying from non-pinned memory in PreemphasisFilter operator (#4380).
  - Refactored the ConvertTimeMajorSpectrogram kernel.

Fixed Issues

Here are the fixed issues in this release:
- Fixed TensorList copy synchronization issues (#4458, #4453).
- Fixed an issue with hint grid size in OpticalFlow (#4443).
- Fixed the ES synchronization issues in integrated memory devices (#4321, #4423).
- Added a missing CUDA stream synchronization before cuvidUnmapVideoFrame in nvDecoder (#4426).
- Fixed the pipeline initialization in Python after deserialization (#4350).
- Fixed issues with the serialization of functions in recent notebook versions (#4406).
- Fixed the integration with new TensorFlow version by replacing Status::OK() with Status() in the TensorFlow plugin (#4442).

Breaking Changes

Here are the breaking changes in this release:

- Removed the Pipeline/Executor completion callback APIs (#4345).
- C++ API] Workspace unification: C++ workspace is no longer templated with backend type (#4339).

Deprecated Features

- DALI will drop support for CUDA 10.2 in an upcoming release.

Known Issues

This DALI release includes the following known issues:

- The GPU numpy reader might crash during the DALI process teardown with cufile 1.4.0.
- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The experimental VideoReaderDecoder does not support open GOP.
  It will not report an error and might produce invalid frames. VideoReader uses a heuristic approach to detect open GOP and should work in most common cases.
- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 12. DALI Release 1.19.0

Using DALI 1.19.0
To upgrade to DALI 1.19.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements
This DALI release includes the following key features and enhancements:

‣ Added the experimental.decoders.video stand-alone video decoder to decode video on GPU and CPU feeds as an in-memory buffer (for example, through an external source) (#4354, #4296).
‣ Added support to decode indexless videos (#4347, #4302, and #4335).

Fixed Issues
Here are the fixed issues in this release:
‣ Fixed the handling of Caffe LMDB empty samples (without data or labels) (#4266).

Breaking Changes
There are no breaking changes in this release.

Deprecated Features
DALI will drop support for CUDA 10.2 in an upcoming release.

Known Issues
This DALI release includes the following known issues:
- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The experimental VideoReaderDecoder does not support open GOP.
  It will not report an error and might produce invalid frames. VideoReader uses a heuristic approach to detect open GOP and should work in most common cases.
- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  As a workaround, you can manually synchronize the device before returning the data from the callback.
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 13. DALI Release 1.18.0

Using DALI 1.18.0
To upgrade to DALI 1.18.0 from an older version of DALI, follow the installation and usage information in the [DALI User Guide](#).

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements
This DALI release includes the following key features and enhancements:

- Unified batch representation in the GPU and CPU stages of the pipeline (effort towards conditional execution) (#4253, #4236, #4220, #4189).
- Added support to specify the `fill_value` argument for each sample in the `fn.erase` operator (#4182).
- Added support for the memory video file in `FramesDecoder` (#4184).
- Moved the `audio_resample` operator out of experimental module (#4194).

Fixed Issues
Here are the fixed issues in this release:

- Fixed an unnecessary synchronization in `MakeContiguous`. (#4248).
- Fixed the Python tool to create the webdataset index (#4226).
- Added a fix to prevent DALI from allocating GPU memory when constructing CPU `TensorList` (#4203).
- Fixed a PyTorch example to comply with the new PyTorch (#4213).

Breaking Changes
There are no breaking changes in this release.
Deprecation Features

There are no deprecated features in this release.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The experimental `VideoReaderDecoder` does not support open GOP.
  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.
- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  As a workaround, you can manually synchronize the device before returning the data from the callback.
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 14. DALI Release 1.17.0

Using DALI 1.17.0

To upgrade to DALI 1.17.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

‣ Added CUDA 11.8 support (RC48).
‣ Improved the color conversion performance and precision (#4139).
‣ Laid the groundwork for ongoing conditional execution effort (#4149, #4124, #4083, #3827, #4049).
‣ Laid the groundwork for ongoing effort on improved decoding and processing of images.
‣ Documentation improvements (#4168, #4102, #4059, #4094).

Fixed Issues

The following issues were fixed in this release:

‣ Fixed default dtype in color twist family of operators (#4067).
‣ Fix handling of TIFFs with palette (#4089).

Breaking Changes

There are no breaking changes in this release.

Deprecated Features

There are no deprecated features in this release.
Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream. If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP. It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.

  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.

  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:

  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 15. DALI Release 1.16.1

Using DALI 1.16.1

To upgrade to DALI 1.16.1 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This release includes bug fixes, so there are no key features and enhancements.

Fixed Issues

Here are the fixed issues in this release:

- Fixed an issue where fn.decoders.image was leaking memory on corrupted images (#4138).
  - Fixed a memory leak in the libjpeg-turbo decoder implementation to handle corrupted images (#4138).
- Fixed a crash in the fn.readers.numpy, when pad_last_batch is set, and more then one thread is used by DALI (#4056).
- Fixed a faulty check that prevented the feed_input method from working after the pipeline was deserialized (#4096).

Breaking Changes

There are no breaking changes in this release.

Deprecated Features

There are no deprecated features in this release.
Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental VideoReaderDecoder does not support open GOP.
  It will not report an error and might produce invalid frames. VideoReader uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  As a workaround, you can manually synchronize the device before returning the data from the callback.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 16. DALI Release 1.16.0

Using DALI 1.16.0

To upgrade to DALI 1.16.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added a GPU non-silent region detection operator (#3944, #4001).
- Added experimental support for the eager execution of stateful and arithmetic operators (#4016, #3952, #3969, #3990).
- Added an antialias flag to the resize operator for improved control over the resampling mode that is used (#4032).
- Added experimental support for custom GPU Numba operators (#3891, #3998, #4006, #4013).
- Added support for the processing video and the handling of temporal arguments to color-manipulation operators and affine transform operators (#3937, #3946, #3917).

Fixed Issues

Here are the fixed issues in this release:

- Fixed the DALI + PyTorch Lightning iterator issue where subsequent epochs were terminating too early (#3923, #4048).
- Fixed scalars handling by the readers.tfrecord operator (#4024).
- Fixed the variable batch size handling by the crop and coord_transform operators (#4045, #3958).
Breaking Changes

This DALI release includes the following breaking changes:

- The shape of scalars that are read by the `readers.tfrecord` operator is now () instead of (1,).
- For the cubic and linear interpolation modes, by default, the `resize` operator applies the antialiasing filter.
  The antialiasing can be disabled by using the `antialias` flag.

Deprecated Features

The following feature has been deprecated in this release:

- The triangular interpolation for the `resize` operator is identical to the linear interpolation with antialiasing enabled, so it has been deprecated.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The experimental `VideoReaderDecoder` does not support open GOP.
  It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.
- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- In experimental debug and eager modes, the GPU external source is not properly synchronized with DALI internal streams.
  As a workaround, you can manually synchronize the device before returning the data from the callback.
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 17. DALI Release 1.15.0

Using DALI 1.15.0

To upgrade to DALI 1.15.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

‣ Added the GPU audio resampling operator (#3884, #3914, and #3911).
‣ Improved the performance of the GPU fn.readers.numpy by custom GDS staging (#3894, #3905).
‣ Added support for video processing and per-frame (temporal) arguments to the warp_affine operator (#3879, #3900).
‣ Added HEVC support to the GPU frames decoder (#3896).
‣ Added experimental support for the eager execution of stateless operators as Python functions and readers as iterators (#3887, #3930).
‣ Added CUDA 11.7 support (#3906).
‣ Profiling improvements:
  ‣ Added more NVTX ranges to the executor (#3928).
  ‣ Added thread names to all DALI threads (#3912).

Fixed Issues

Here are the fixed issues in this release:

‣ Added the missing device/device synchronization when copying pipeline outputs with copy_to_external (#3953).
Fixed the buffer synchronization between the default and custom stream in a multi-GPU case (#3957).

**Breaking Changes**

There are no breaking changes in this DALI release.

**Deprecated Features**

There are no deprecated features in this DALI release.

**Known Issues**

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream. If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The experimental `VideoReaderDecoder` does not support open GOP. It will not report an error and might produce invalid frames. `VideoReader` uses a heuristic approach to detect open GOP and should work in most common cases.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later. To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 18. DALI Release 1.14.0

Using DALI 1.14.0

To upgrade to DALI 1.14.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added HEVC support to the CPU frames decoder (#3885).
- Added the CPU audio resampling operator (#3840).
- Added support for video processing and per-frame (temporal) arguments to the rotate operator (#3820).
- Added support for variable batch size in the debug mode (#3799).
- Performance optimizations:
  - Optimized tiled transposition algorithm on small data types (#3730).
  - Improved CropMirrorNormalize operator performance (#3771).

Fixed Issues

Here are the fixed issues in this release:

- Fixed the compatibility with TensorFlow 2.9 by adding a propagation type to DALIDataset (#3875).
- Added a missing check when the number of files and labels match in the experimental video reader (#3903).
- Added a missing check when the number of samples is greater or equal to the number of shards in readers (#3856).
- Fixed scalars handling in the GPU cast operator (#3924).
Breaking Changes
There are no breaking changes in this DALI release.

Deprecated Features
There are no deprecated features in this DALI release.

Known Issues
This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The experimental VideoReaderDecoder does not support open GOP.
  It will not report an error and might produce invalid frames. VideoReader uses a heuristic approach to detect open GOP and should work in most common cases.
- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 19. DALI Release 1.13.0

Using DALI 1.13.0

To upgrade to DALI 1.13.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added support for per-frame (temporal) arguments to the Gaussian Blur and Laplacian operators (#3715 and #3723).
- Optimized audio decoder resampling for ARM (#3745).
- Improved the debug (immediate execution) mode:
  - Added direct operator calls in debug mode (#3734).
  - Added a debug mode benchmark (#3762).
- Added support for GPU positional arguments in the Slice operator (#3741).
- Documentation improvements:
  - Split the operator documentation into separate pages (#3794).
  - Added a mechanism for cross-referencing examples and operators (#3748).
  - Added an FAQ section to the DALI user guide (#3761).
  - Added new GTC talks (#3757).
  - Added shuffling and shards handling snippets to the parallel external source examples (#3744).
Fixed Issues

Breaking Changes
There are no breaking changes in this DALI release.

Fixed Issues
The following issues were fixed in this release:
Fixed the handling of samples that exceed 2GBs in the parallel external source (#3768).

Deprecated Features
There are no deprecated features in this DALI release.

Known Issues
This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  privileged=yes in Extra Settings for AWS data points
  --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 20. DALI Release 1.12.0

Using DALI 1.12.0

To upgrade to DALI 1.12.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that allows using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

‣ Added support for the GPU-accelerated decoding of videos with a variable frame rate (experimental.readers.video) (#3668).
‣ Reduced the binary size (#3680 and #3682).
‣ Improved the TensorFlow plug-in installation even when none of the prebuilt binaries matches the exact TensorFlow version (#3720).
‣ Improved performance by increasing the usage of pinned memory in argument input buffers (#3728).
‣ Documentation improvements (#3722, #3684, and 3674).

Fixed Issues

The following issues were fixed in this release:

‣ Fixed the TensorFlow plug-in issue that prevented it from working in the CPU-only mode (#3719).

Breaking Changes

There are no breaking changes in this DALI release.
Deprecated Features

There are no deprecated features in this DALI release.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.

  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.

  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:

  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 21. DALI Release 1.11.1

Using DALI 1.11.1

To upgrade to DALI 1.11.1 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- This release includes only bug fixes, so there are no new features or enhancements.

Fixed Issues

The following issues were fixed in this release:

- Fixed the incorrect handling of input data by the GPU external source in a multi-GPU scenario.
- Fixed the incorrect usage of streams in the C API.

Breaking Changes

There are no breaking changes in this DALI release.

Deprecated Features

There are no deprecated features in this DALI release.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.

To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 22. DALI Release 1.11.0

Using DALI 1.11.0
To upgrade to DALI 1.11.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements
This DALI release includes the following key features and enhancements:

‣ Added the GPU laplacian operator (#3644, #3618).
‣ Updated the optical_flow operator to use the latest SDK capabilities (#3625).
‣ Extended the readers.webdataset operator to support pax POSIX.1-2001 tar format. (#3645).
‣ Improved the performance of the slice operator (#3604, #3600).
‣ Improved the debug (immediate execution) mode:
  ‣ Added the direct use of external sources (#3605).
  ‣ Extended the API and added a string representation and the .shape method to data nodes (#3647, #3591).
  ‣ Added support for deterministic seed generation (#3589).
  ‣ Added a tutorial notebook (#3648).

Fixed Issues
The following issues were fixed in this release:

‣ Fixed the incorrect construction of TensorList from a list of tensors (#3626).
‣ Fixed an issue in the CPU readers.video operator that prevented it from working in the CPU-only mode (#3660).
Breaking Changes
There are no breaking changes in this DALI release.

Deprecated Features
There are no deprecated features in this DALI release.

Known Issues
This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 23. DALI Release 1.10.0

Using DALI 1.10.0

To upgrade to DALI 1.10.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- New operators:
  - The `get_property` operator (CPU and GPU), which is used to fetch tensor metadata, such as the source file name (#3572).
  - The `laplacian` operator (CPU) (#3563).
- Color-based augmentations were extended to support video data (#3580).
- Improved performance of the `slice` operator (#3584, #3573, and #3568).
- Added an experimental debug (immediate execution) mode (#3586 and #3531).

Fixed Issues

No major issues were fixed in this release.

Breaking Changes

There are no breaking changes in this DALI release.

Deprecated Features

There are no deprecated features in this DALI release.
Known Issues

This DALI release includes the following known issues:

‣ The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.

If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

‣ The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.

To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

‣ Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:

  ‣ `privileged=yes` in Extra Settings for AWS data points
  ‣ `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 24. DALI Release 1.9.0

Using DALI 1.9.0

To upgrade to DALI 1.9.0 from an older version of DALI, follow the installation and usage information in the [DALI User Guide](#).

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Extended the `jpeg_compression_distortion` operator to support video inputs ([#3482](#) and [#3447](#)).
- Added the `file_filter` argument to the `readers.file` operator that allows you to filter files by names ([#3459](#)).
- Extended the `slice` operator to support per-sample axes arguments and negative axis indexing ([#3516](#)).
- Extended the `pad` operator to support per-sample axes, `fill_value` arguments, and negative axis indexing ([#3534](#)).
- Improved the performance of the `slice` operator for small batch sizes ([#3557](#)).
- Added the Laplacian CPU kernel ([#3565](#), [#3535](#), and [#3518](#)).

Fixed Issues

This DALI release includes the following fixes:

- Fixed a race condition that randomly caused incorrect outputs in the TensorFlow plug-in ([#3547](#)).
- Fixed synchronization issues in the PaddlePaddle plug-in that may have caused incorrect results ([#3498](#) and [#3487](#)).
Breaking Changes
There are no breaking changes in this DALI release.

Deprecated Features
There are no deprecated features in this DALI release.

Known Issues
This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plug-in might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have the prebuilt plug-in binary that is shipped with DALI, ensure that the compiler that is used to build TensorFlow exists on the system during the plug-in installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 25. DALI Release 1.8.0

Using DALI 1.8.0

To upgrade to DALI 1.8.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

‣ Added batch mode support to the external_source operator with parallel callback (#3420 and #3397).
‣ Extended the crop_mirror_normalize operator to support per-sample normalization parameters (#3455).
‣ Improved error messages when trying to decode images with an unsupported format (#3445).
‣ Documentation improvements (#3448 and #3439).

Fixed Issues

This DALI release includes the following fixes:

‣ Fixed the unsound interpretation of the aspect ratio parameter in the random_bbox_crop operator that occurs when an input shape is provided. (#3425).
‣ Fixed the incorrect output shape in the experimental.readers.video operator. (#3460).

Breaking Changes

There are no breaking changes in this DALI release.
**Deprecated Features**

There are no deprecated features in this DALI release.

**Known Issues**

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 26. DALI Release 1.7.0

Using DALI 1.7.0

To upgrade to DALI 1.7.0 from an older version of DALI, follow the installation and usage information in the [DALI User Guide](#).

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- **New operators:**
  - `Readers.webdataset`, which is a reader for the Webdataset format (#3395, #3385, #3375, #3372, #3360, and #3306).
  - `experimental.readers.video` (CPU), which is an experimental video reader and decoder that includes support for the variable frame rate (#3412, #3411, #3391, and #3362).

- **Performance improvements:**
  - `warp_affine` performance has been improved for some common cases (#3370).
  - Other minor general performance improvements (#3363 and #3338).

- **Added the** `DALI_DISABLE_NVML` **and** `DALI_RESTRICT_PINNED_MEM` **environment variables** (#3404 and #3382).

  These variables allow you to limit the use of NVML and pinned memory and enable DALI on more platforms.

Fixed Issues

This DALI release includes the following fixes:

- Fixed an issue in the `pad` operator that caused a crash when the operator was used with a variable batch size (#3354).
Fixed a race condition that occurred in the `readers.video` operator (#3355).
Fixed a bug in the C API that caused invalid memory access in some use cases (#3350).

**Breaking Changes**

There are no breaking changes in this DALI release.

**Deprecated Features**

There are no deprecated features in this DALI release.

**Known Issues**

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 27. DALI Release 1.6.0

Using DALI 1.6.0

To upgrade to DALI 1.6.0 from an older version of DALI, follow the installation and usage information in the Dalil User Guide.

The internal DALI C++ API used for operator's implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Added support for lambdas and local functions as callback in parallel external_source operators (#3270, #3269).
- Added the following tutorials:
  - TensorFlow DALI Dataset input handling (#3212).
  - Parallel external_source operators (#3199).
- Added DALI preprocessing to the EfficientDet example (#3118).

Fixed Issues

This DALI release includes the following fixes:

- Fixed a crash that happened in the gaussian_blur operator for inputs where one of the dimensions equals 1 (#3291).
- Fixed random Python crashes on the process teardown when the external_source operator was used (#3245).
- Fixed readers.video from hanging on some HEVC samples (#3247).

Breaking Changes

There are no breaking changes in this DALI release.
Deprecated Features

There are no deprecated features in this DALI release.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 28. DALI Release 1.5.0

Using DALI 1.5.0

To upgrade to DALI 1.5.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Extended `decoders.image` to support WebP decoding (#3206).
- Added an indexing (NumPy-like) API for Tensor slicing (#3200 and #3195).
- Extended `external_source` to support the source argument in the TensorFlow DALI Dataset (#3215, #3193, #3177, and #3176).
- Added the following examples:
  - Tensorflow YOLOv4 (#2883).
  - WebDataset usage with `external_source` (#3153).

Fixed Issues

This DALI release includes the following fixes:

- Fixed the include paths that prevented the inclusion of some parts of DALI in other C/C++ projects (#3210).
- Fixed a crash that occurred only when anchors and no shapes were provided in `multi_paste` (#3166).
- Fixed an issue in the `spectrogram` operator when the `nfft` argument was bigger than the length of the window.
  The extracted windows is now correctly centered before the FFT calculation (#3180).
- Fixed a minor memory leak in `decoders.image` (#3148).
Breaking Changes
There are no breaking changes in this DALI release.

Deprecated Features
There are no deprecated features in this DALI release.

Known Issues
This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 29. DALI Release 1.4.0

Using DALI 1.4.0

To upgrade to DALI 1.4.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- **Readers.numpy improvements:**
  - Added ROI support in the GPU operator (#3034 and #3040).
  - Parallelized reading in the CPU operator (#3077).
  - Added a tutorial (#3095 and #3139).

- **DALI Dataset improvements:**
  - Added batch support (#3063 and #3089).
  - Enabled no_copy mode (#3041, #3058, and #3097).

- **Video reader improvements:**
  - Added an option to pad missing frames at the end of sequence (#3002).
  - Added support for the VP8 and MJPEG formats (#3045).
  - Added CPU parallelization to the Slice and SliceFlipNormalizePermutePad kernels (#3062, #3068, and #3080).
  - Added an option to readers.nemo_asr to return indices of the entries in the manifest (#3085).
  - Improved the performance in the GPU image decoder by optimizing the memory allocations. (#3067).
Fixed Issues

This DALI release includes the following fixes:

- Fixed a crash that happened when a functools.partial result was passed as a `source` to external_source (#3143).
- Fixed the hardware image decoder to fall back to the hybrid implementation for unsupported file formats instead of throwing an error (#3086).

Breaking Changes

There are no breaking changes in this DALI release.

Deprecated Features

There are no deprecated features in this DALI release.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 30. DALI Release 1.3.0

Using DALI 1.3.0

To upgrade to DALI 1.3.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- New operator:
  - Salt and Pepper noise (noise.salt_and_pepper) for CPU and GPU (#2889, #2934, #2956, and #2976).
  - Added experimental support for inputs via external_source in TensorFlow DALIDataset (#2949, #2993, and #2997).

- Numpy reader improvements:
  - ROI reading for CPU (#3011).
  - intra-sample threading on GPU (#3010).
  - Improved CPU color_space_conversion operator performance (#2987).
  - Improved brightness and contrast operators performance (#2981).
  - Added a C API call to check backend of an operator (#3031 and #3050).
  - Documentation improvements (#2936, #2960, #2979, #2972, #3013, and #3035).

Fixed Issues

This DALI release includes the following fixes:

- Fixed an issue in readers.nemo_asr that caused a system error due to keeping too many open files (#3003).
- Fixed a bug that caused out of bound memory access in `mel_filter_bank` (#2986).
- Fixed a `cudaErrorLaunchOutOfResources` error that appeared in transpose operator on some GPUs (#2971).
- Fixed handling of non-existing entries in `readers.tfrecord` (#2952).

**Breaking Changes**

There are no breaking changes in this DALI release.

**Deprecated Features**

There are no deprecated features in this DALI release.

**Known Issues**

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream. If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later. To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 31. DALI Release 1.2.0

Using DALI 1.2.0

To upgrade to DALI 1.2.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- New operators:
  - `noise.shot` CPU and GPU operators (#2861).
  - `noise.gaussian` CPU and GPU operators (#2846).
  - `jpeg_compression_distortion` CPU and GPU operators (#2823).

- New mathematical operations (#2853):
  - Square and cubic root (`sqrt`, `rsqrt`, and `cbrt`).
  - Logarithms of different bases (`log2` and `log10`)
  - Power (`**` operator and `pow` functions).
  - Absolute value (`abs` and `fabs`).
  - Roundings (`ceil` and `floor`).
  - Trigonometric functions (`sin`, `cos`, and `tan`).
  - Inverse trigonometric functions (`asin`, `acos`, `atan`, and `atan2`).
  - Hyperbolic functions (`sinh`, `cosh`, and `tanh`).
  - Inverse hyperbolic functions (`asinh`, `acosh`, and `atanh`).

- Added a Python wrapper for the `fn.experimental.numba_function (#2886, #2835, #2903, #2893, and #2887).

- Image decoder improvements:
- Enabled ROI decoding in the hardware decoder (#2734).
- Added support for the Alpha channel in PNG and JP2 decoding (#2867).
- Added support for YCbCr and BGR in JP2 decoding (#2867).
- Updated the CUDA version to 11.3 (#2870).
- Improved the documentation (#2915, #2911, #2927, #2862, and #2858).

**Fixed Issues**

This DALI release includes the following fixes:

- Fixed the readers.numpy cache issue (#2932).
- Fixed an error in readers.nemo_asr (#2928).
- Fixed a bug that caused the video reader to hang (#2916).

**Breaking Changes**

There are no breaking changes in this DALI release.

**Deprecated Features**

There are no deprecated features in this DALI release.

**Known Issues**

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.

To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  privileged=yes in Extra Settings for AWS data points

  --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 32. DALI Release 1.1.0

Using DALI 1.1.0

To upgrade to DALI 1.1.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- Documentation improvements (#2834, 2824, #2758, #2820, and #2822).
- The following operators were added:
  - The experimental `numba_func` operator that allows the use of Numba functions in the DALI pipeline (#2804).
  - The `expand_dims` and `squeeze` operators for shape manipulation (GPU and CPU) (#2800, #2791, #2792).
  - The `multi_paste` operator (GPU) (#2681).
- The following kernels were added:
  - JPEG compression distortion (GPU) (#2801, #2830, and #2839).
  - JPEG color conversion and chroma subsampling (GPU) (#2771).
  - Enabled CUDA kernels compression to decrease the DALI binaries size (#2833).
  - Added the `src_dims` argument to the reshape operator (#2788).

Fixed Issues

This DALI release includes the following fixes:

- Fixed a race condition in `readers.nemo_asr` when `pad_last_batch` is set to True (#2828).
Fixed the optical flow initialization issue (#2816).
Fixed a race condition in the data loader (#2773).

**Breaking Changes**

There are no breaking changes in this DALI release.

**Deprecated Features**

There are no deprecated features in this DALI release.

**Known Issues**

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.

  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 33. DALI Release 1.0.0

Using DALI 1.0.0

To upgrade to DALI 1.0.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

- The API documentation has been improved:
  - The functional API became the main DALI API (#2653).
  - Rewrote all examples to use the functional API (#2761, #2755, #2744, #2748, #2745, and #2716).
  - Applied layout and editorial changes (#2729, #2730, #2713, #2710, #2703, and #2694).

- New operators:
  - A GridMask GPU operator for GridMask data augmentation (#2652).
  - A RandomObjectBBox operator with caching to randomly select a bounding box (#2718, #2696, #2677, and #2657).
  - A MultiPaste operator, which is required to implement Mosaic augmentation (#2583).

- External Source can now run the per-sample callbacks in parallel. (#2543)

- Added `pipeline_def decorator`, which is an easier way to define a pipeline with the functional API (#2757 and #2629).

- Moved all decoders to a dedicated Python module (#2741, #2743, and #2725).

- Moved all readers to a dedicated Python module (#2720, #2721, #2717, #2715, and #2722).
Exposed the pipeline output names in the C API (#2665).
Introduced the following named Slice operator arguments (#2625):
- `start/rel_start`
- `end/rel_end`
- `shape/rel_shape`
Enabled additional codecs and demuxers in FFmpeg (#2651).
Added an option to disable the first batch preparation during the iterator construction (#2664).

Fixed Issues
This DALI release includes the following fixes:
- Fixed the JPEG 2000 ROI decoding (#2692).
- Fixed the layout length check in Transpose (#2693).
- Fixed the `.gpu()` usage detection and error for CPU-only pipelines (#2682).

Breaking Changes
- There are no breaking changes in this DALI release.

Deprecated Features
The following features have been deprecated in this DALI release:
- `fn.audio_decoder/ops.AudioDecoder` has been renamed to `fn.decoders.audio/ops.decoders.Audio`.
- `fn.image_decoder/ops.ImageDecoder` has been renamed to `fn.decoders.image/ops.decoders.Image`.
- `fn.image_decoder_crop/ops.ImageDecoderCrop` has been renamed to `fn.decoders.image_crop/ops.decoders.ImageCrop`.
- `fn.image_decoder_random_crop/ops.ImageDecoderRandomCrop` has been renamed to `fn.decoders.image_random_crop/ops.decoders.ImageRandomCrop`.
- `fn.image_decoder_slice/ops.ImageDecoderSlice` has been renamed to `fn.decoders.image_slice/ops.decoders.ImageSlice`.
- `fn.caffe2_reader/ops.Caffe2Reader` has been renamed to `fn.readers.caffe2/ops.readers.Caffe2`.
- `fn.caffe_reader/ops.CaffeReader` has been renamed to `fn.readers.caffe/ops.readers.Caffe`.
- `fn.coco_reader/ops.CocoReader` has been renamed to `fn.readers.coco/ops.readers.Coco`.
- `fn.file_reader/ops.FileReader` has been renamed to `fn.readers.file/ops.readers.File`.
- fn.mxnet_reader/ops.MXNetReader has been renamed to fn.readers.mxnet/ops.readers.MXNet.
- fn.numpy_reader/ops.NumpyReader has been renamed to fn.readers.numpy/ops.readers.Numpy.
- fn.sequence_reader/ops.SequenceReader has been renamed to fn.readers.sequence/ops.readers.Sequence.
- fn.tfrecord_reader/ops.TFRecordReader has been renamed to fn.readers.tfrecord/ops.readers.TFRecord.
- fn.video_reader/ops.VideoReader has been renamed to fn.readers.video/ops.readers.Video.
- fn.video_reader_resize/ops.VideoReaderResize has been renamed to fn.readers.video_resize/ops.readers.VideoResize.
- The split implementation of decoders.image was removed, and the split_stages and use_chunk_allocator arguments have been deprecated.

Known Issues

This DALI release includes the following known issues:

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 34. DALI Release 0.31.0

The DALI 0.31 is not a major release, so the features, functionality, and performance might be limited.

Using DALI 0.31

To upgrade to DALI 0.31 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- New operators:
  - ROIRandomCrop CPU, where an operator is required to perform the biased random crop in segmentation applications (#2638).
- Added support for the variable batch size in ExternalSource (#2481, #2641).
- Added support for the time-major layout in the following spectrogram processing operators:
  - GPU and CPU Spectrogram (#2619, #2617)
  - GPU and CPU MelFilterBank (#2620)
- Refactored and unified the following RNG operators:
  - Uniform (#2531)
  - CoinFlip (#2577)
- Reworked the custom operators documentation (#2568).
- Applied performance improvements in the JPEG decoder (#2655, #2610).
Fixed Issues

This DALI release includes the following fixes:

‣ Fixed the length that was reported by DALI firmware iterators when the DROP policy is used (#2611).
‣ Provided a workaround for a compiler problem that caused an Invalid device function error. (#2656)
‣ Fixed RandomBBoxCrop errors that occurred while using the crop_shape argument (#2605)

Breaking Changes

‣ There are no breaking changes in this release.

Deprecated Features

Here are the features that were deprecated in this release:

‣ ops.Uniform was moved to ops.random.Uniform.
‣ ops.CoinFlip was moved to ops.random.CoinFlip.

Known Issues

‣ The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.

  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
‣ The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.

  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
‣ Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:

  ‣ privileged=yes in Extra Settings for AWS data points
  ‣ --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 35. DALI Release 0.30.0

The DALI 0.30.0 is not yet a major release, so the features, functionality, and performance might be limited.

Using DALI 0.30.0

To upgrade to DALI 0.30.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator's implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Optimized CPU resampling (#2540).
- Added the following mathematical expressions:
  - Disallowed unwanted __bool__ conversions (#2538).
  - Added the exp and log math functions (#2555).
- Added the images argument for the COCOReader, which allows for the custom ordering of images and fixed a bug in the segmentation data parsing (#2548, #2597).
- Added support for the nvJPEG preallocate API for a batched hardware decoder (#2544).
- Added support surfaces with strides over 2G (#2600).
- Enabled CUDA 11.2 builds (#2553).
- Documentation improvements:
  - Added a supported matrix to the documentation (#2519).
  - Added a geometric transform tutorial (#2530).
- Allowed DALI to be compiled with Clang (#2416).
- Added CUDA API checks in utility functions (#2517) and tests (#2516).
Fixed Issues
This DALI release includes the following fixes.

‣ Fixed the autoreset option in the iterator for the DROP policy (#2567).

Breaking Changes
‣ There are no breaking changes in this release.

Deprecated Features
There are no deprecated features in this release.

Known Issues
‣ The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.

If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

‣ The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.

To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

‣ Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:

‣ privileged=yes in Extra Settings for AWS data points
‣ --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 36. DALI Release 0.29.0

The DALI 0.29.0 is not yet a major release, so the features, functionality, and performance might be limited.

Using DALI 0.29.0

To upgrade to DALI 0.29.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- New operators:
  - Added the NumpyReader GPU Operator based on GPUDirect Storage (#2477).
  - CUDA-accelerated JPEG2000 image decoding was enabled in the ImageDecoder operator that uses the nvJpeg2k library(#2501).
  - Added the segmentation.RandomMaskPixel operator to create random masks that contain foreground pixels (#2445).
  - Added OneHot for GPUs (#2436).
- Moved all NVTX infrastructure into core and create the DALI domain (#2472).
- New Examples:
  - Added mask processing to the COCO reader with an Augmentations example (#2426).
  - Added a reductions example (#2457).
  - An example of random_mask_pixel was updated to perform biased random crop (#2474).
  - Updated the ExternalSource framework examples (#2482).
- Operator Improvements:
• Pad: Added support for the per-sample shape and alignment requirements (#2432)
• RandomResizedCrop: Enabled channel-first and video support + add tests (#2430)
• PythonFunction operator: Added support for output layouts (#2486).
• Optimized the DCT GPU kernel (#2471).
• COCOReader: Added support for uncompressed RLE masks (#2478).
• Improved transforms.Rotation to accept scalar inputs (#2494).
• DALI now supports CUDA 11.1 update 1 (#2419).

Fixed Issues
This DALI release includes the following fixes.
• NumpyReader: To fix ABI incompatibility issues, replaced the std::regex with custom implementation (#2489).
• Fixed the dimensionality of labels in SSDRandomCrop (#2488)

Breaking Changes
• Python 3.5 is no longer supported by the official DALI wheels.

Deprecated Features
Deprecate the squeeze_labels option from MXNet iterator and enhanced the .squeeze function to match the numpy-style interface (#2450)

Known Issues
• The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
• The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
• Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  • privileged=yes in Extra Settings for AWS data points
  • --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 37. DALI Release 0.28.0

The DALI 0.28.0 is not yet a major release, so the features, functionality, and performance might be limited.

Using DALI 0.28.0

To upgrade to DALI 0.28.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- New operators:
  - Affine transform generators, which are operators that generate scale, rotate, shear, translate, and crop transform matrices (#2309) and crop transform matrices.
    - You can use the transform.Combine operator to combine these matrices (#2317).
    - These transformations can be applied to the data by using the CoordTransform operator (#2317).
  - Added min, max, and clamp arithmetic operators (#2298).
  - Cat and Stack Operators to concatenate and stack Tensors for the CPU and the GPU (#2301, #2339, #2350).
  - The following reductions for the CPU and the GPU (#2342, #2379, #2395):
    - Min
    - Max
    - Sum
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- Mean
- MeanSquare
- RootMeanSquare
- Std
- Variance
- The MFCC operator for the GPU (#2423).
- The SelectMasks operator (#2381).
- Add operators for batch reordering:
  - BatchPermutation for generating random reordering of the batch.
  - PermuteBatch, which reorders tensors in a batch, based on a list of provided indices (#2417).
- Operator Compose: PyTorch-style API to compose the operators (#2393).
- Improvements in existing operators:
  - Added SeekFrames to the audio decoder.
    The redesign allows you to decide the decoded data type at runtime (#2334).
  - Added the ability to handle UTF8 text to the NemoAsrReader (#2358).
  - Added explicit file list support to the FileReader (#2389).
  - Improvements in the COCO reader API (#2406).
    - The COCOReader API now outputs relative mask polygon coordinates when the option ratio is set to True (#2375).
    - RandomBBoxCrop now optionally outputs the indices of the bounding boxes that passed the centroid filter (#2374).
  - The late initialization of torch_gpu_device in the Pytorch plugin (#2411).
  - The automatic constant-to-input promotion (#2361) and generalized handling of operator arguments (#2393).
  - Added a MNIST example for DALI and PyTorch Lightning (#2360).
  - Added the last_batch_policy to the framework iterator (#2269).
- New builds:
  - Python 3.9 is now enabled (#2333).
  - The DALI wheels for CUDA 11 are built with CUDA 11.1 and use Enhanced Compatibility to work with CUDA 11.0 (#2302, #2367, #2356, and #2413).
  - Added support for the SM_86 architecture (#2364).
  - Added the ability to cross-build Python wheels for Jetson (#2313).

Fixed Issues

This DALI release includes the following fixes.
Preserved the shape of pseudoscalars in the arithmetic operators (#2359).
Fixed the CPU-only mode for arithmetic operators (#2400).
Fixed the problem of the output outliving the pipeline in Python (#2341).
Fixed the lack of a correct layout setting in the VideoReader (#2346).
Fixed the uniform generator operator (#2352).

Breaking Changes

- Python 3.5 is no longer supported by the official DALI wheels.

Deprecated Features

There are no breaking changes in this release.

Known Issues

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  privileged=yes in Extra Settings for AWS data points
  --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 38. DALI Release 0.27.0

The DALI 0.27.0 is not yet a major release, so the features, functionality, and performance might be limited.

Using DALI 0.27.0

To upgrade to DALI 0.27.0 from an older version of DALI, follow the installation and usage information in the [DALI User Guide](#).

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- New operators:
  - CoordTransform Operator for applying a linear transformation to points or vectors (#2288).
  - GaussianBlur Gpu Operator (#2314, #2311).
  - Nemo ASR Reader (#2234).
  - Resize 3D - operator can now process 3D inputs (#2226).
  - Add Translate affine transform generator (#2297).
    
    In the next release, it will be moved to a dedicated module.
  - Use true scalars (except in classification readers) - 0-dim Tensors represent scalar values (#2318).
  - Adjust documentation after review (#2175).
  - Support for ZSTD compression for TIFF files (#2273).
  - Support for Run-Length Encodings and Pixelwise Masks in COCO Reader (#2248).
  - Support more types in Lookup table (#2290).
Fixed Issues
This DALI release includes the following fixes.

‣ Fixes crash in RandomBBoxCrop when no labels are provided (#2265).
‣ Fix minor issues reported by static analysis (#2276).
‣ Fix detection pipeline test on Ampere (#2304).

Breaking Changes
There are no breaking changes in this release.

Deprecated Features
There are no breaking changes in this release.

Known Issues

‣ The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
‣ The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
‣ Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  ‣ privileged=yes in Extra Settings for AWS data points
  ‣ --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 39. DALI Release 0.26.0

The DALI 0.26.0 is not yet a major release, so the features, functionality, and performance might be limited.

Using DALI 0.26.0

To upgrade to DALI 0.26.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- New operators:
  - To learn the decoded image shape, added the *PeekShape* operator (#2205).
  - Added the ability to run DALI without a GPU (#2165).
  - Optimized single-channel audio resampling with SSE2 (#2240).
  - Added the ability to pass a DALI TensorList or a list of DALI Tensors to an external source (#2244).
  - Enhanced error messages to handle unsupported data types in the operators (#2211).
  - Added a more verbose message about unsupported videos (#2203).
  - If users requested it, used the copy kernel when making a contiguous batch during the *ShareUserDatea* process (#2200).

Fixed Issues

This DALI release includes the following fixes.

- Fixed the lack of input type checking in a GPU variant of the Spectrogram operator (#2192).
Fixed the `hw_decoder_load=0.0` for ImageDecoder-related tests that require deterministic results (#2232).

Fixed the NVTX annotations (#2215).

Fixed the `VideoReader` error checking when opening files (#2223).

**Breaking Changes**

There are no breaking changes in this release.

**Deprecated Features**

There are no breaking changes in this release.

**Known Issues**

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 40. DALI Release 0.25.1

The DALI 0.25.1 is not yet a major release, so the features, functionality, and performance might be limited.

Using DALI 0.25.1

To upgrade to DALI 0.25.1 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

Key Features and Enhancements

This DALI release includes the following key features and enhancements:

This is a patch release that contains only fixes.

Fixed Issues

This DALI release includes the following fixes.

- Fixed a crash that occurred when DALI CUDA 11 runs on pre 450.x driver with the compatibility layer (#2208, #2230).

Breaking Changes

There are no breaking changes in this release.

Deprecated Features

There are no deprecated features in this release.

Known Issues

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.

To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 41. DALI Release 0.25.0

The DALI 0.25.0 is not yet a major release, so the features, functionality, and performance might be limited.

Using DALI 0.25.0

To upgrade to DALI 0.25.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

‣ Added support for the `aarch64 Server Base System Architecture` (#2110).
  Refer to Installing prebuilt DALI packages in the DALI user guide for more information.
‣ New operators:
  ‣ Normal Distribution GPU Operator (#2125)
  ‣ Video reader resize (#2097)
‣ Improvements to `ExternalSource` Op:
  ‣ Added the `no_copy` option, which allows DALI to borrow a user’s memory instead of copying it (#2024).
  ‣ Removed the redundant copy in the `ExternalSource` operator (#2124)
‣ Reworked the Resize operator family, including video, channel-first, RoI, and multiple-type support (#2164) with the new Resize tutorial (#2189).
‣ Bundled all python versions into one wheel (#2096).
  One DALI wheel can be used with all supported Python versions, including 3.5, 3.6, 3.7 and 3.8.
Improved error messages and added information about the Operator of origin (#2065).

Extended the following C APIs to copy output and input samples:

- `daliOutputCopy (#2145)
- `daliOutputCopySamples (#2161, #2186).

These APIs allow you to use the copy kernel and reduce the amount of copied memory and to use the copy kernel in `ShareUserData (#2200).

Performance improvements:

- Arithmetic Ops GPU (#2137).
- Priorities in CPU thread pool allowing for better load balancing with uneven samples (#2092, #2102).

Fixed Issues

This DALI release includes the following fixes.

- Fixed the missing layouts in the operators (#2118, #2133, #2136).

Breaking Changes

There are no breaking changes in this release.

Deprecated Features

- Removed the deprecated use of ltrb in `BboxRandomCrop (#2141).

Known Issues

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.
- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.
  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, you can use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes in Extra Settings for AWS data points
  - `--privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 42. DALI Release 0.24.0

The DALI 0.24.0 is not yet a major release, so the features, functionality, and performance might be limited.

Using DALI 0.24.0

To upgrade to DALI 0.24.0 from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- The DALI package name now adds -cuda110 and -cuda100 suffixes to indicate the CUDA version and allows the hosting of all packages under one pip index.

  This is important only for installation, and the DALI module in Python is still `nvidia.dali` regardless of the CUDA version. Refer to the Installation section in the DALI User Guide for more information.

- New Operators:
  - Preemphasis (#2025)
  - GaussianBlur CPU (#1987, #2009, and #2038)

- Operator Improvements:
  - Extended the Slice and Crop family of operators with out-of-bounds policies, which provides support for padding and trimming to existing shape (#2000, #2056, #2044).
  - Moved the memory hint allocation in the Resize to the build phase (#2033).
  - Optimized the Transpose GPU operator to improve the performance on non-uniform data batches (#2011, #2032).
  - Support for GPU data input data in the ExternalSource operator (#1997).
Add built-in support for GPU CuPy and PyTorch tensors in `ExternalSource` (#2050).

- Added the ability to provide an external stream, stream 0, or automatic stream selection for GPU data access (#2050).
- Added DLpack input support to the `ExternalSource` operator (#2023).
- Add an ability to dump info about operator output buffer size (#2039).
- Improved error checking with external libraries (#2062, #2063).

**Fixed Issues**

This DALI release includes the following fixes.

- Fixed the performance regression for a heterogeneous batch in the Transpose GPU.
- Fixed the global state problems when there is more than one Transpose GPU operator (#2032).

**Breaking Changes**

Empty for now.

**Deprecated Features**

- Added a deprecation warning for Python 3.5 (#2021).
- Deprecated `output_dtype` and use `dtype` (#2051).
- Added an argument deprecation mechanism and deprecated "image_type" in Crop, Slice, and CropMirrorNormalize (#2061).

**Known Issues**

- The video loader operator requires that the key frames occur, at a minimum, every 10 to 15 frames of the video stream.
  
  If the key frames occur at a frequency that is less than 10-15 frames, the returned frames might be out of sync.

- The DALI TensorFlow plugin might not be compatible with TensorFlow versions 1.15.0 and later.

  To use DALI with the TensorFlow version that does not have a prebuilt plugin binary that is shipped with DALI, make sure that the compiler that is used to build TensorFlow exists on the system during the plugin installation. (Depending on the particular version, use GCC 4.8.4, GCC 4.8.5, or GCC 5.4.)

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows the best performance when running in Docker with escalated privileges, for example:

  - `privileged=yes` in Extra Settings for AWS data points
- --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 43. DALI Release 0.23.0 Beta

The DALI 0.23.0 is a beta release, therefore, all features, functionality, and performance will likely be limited.

Using DALI 0.23.0 Beta

To upgrade to DALI 0.23.0 beta from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

‣ The DALI package name now adds -cuda110 and -cuda100 suffixes to indicate the CUDA version and allows the hosting of all packages under one pip index. This is important only for installation, and the DALI module in Python is still `nvidia.dali` regardless of the CUDA version. Refer to the Installation section in the DALI User Guide for more information.

‣ New and improved Operators:
  ‣ Normalize the Operator for GPU (#1974, #1981, #1986)
  ‣ Support for epsilon and delta degrees of freedom arguments for the Normalize Operator (#1964)
  ‣ SequenceRearrange Operator (#465)
  ‣ Erase the Operator for GPU (#1971)

‣ Improve how iterators count padded samples based on the reader (#1831) - the provided iterators can now query reader for the epoch size and sharding and handle the shard size changing from epoch-to-epoch when it’s not evenly divisible by number of shards (rank) and batch size. Refer to Advanced topics for more information.

‣ CUDA 11 build scripts for DALI were added (#2008)
Fixed Issues

This DALI release includes the following fixes.

- Fix GPU spectrogram when window_length != nfft (#1999)
- Fix MelFilterBank bug: setup block descriptors when changing shape between iterations. (#2001)

Breaking Changes

- The DALI package name now adds -cuda110 and -cuda100 suffixes to indicate the CUDA version and allows the hosting of all packages under one pip index.
- CUDA 9 is no longer supported.
  DALI 0.22.0 was the final release that provided a CUDA 9 build.

Known Issues

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
- The DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with the TensorFlow version which doesn’t have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
The DALI 0.22.0 is a beta release, therefore, all features, functionality, and performance will likely be limited.

Using DALI 0.22.0 Beta

To upgrade to DALI 0.22.0 beta from an older version of DALI, follow the installation and usage information in the DALI User Guide.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- DALI now support CUDA 11:
  - DALI builds for CUDA 11 are now available.
  - CUDA 9 support has been deprecated.
    DALI 0.22.0 is final release that provides a CUDA 9 build.
- Support is now available for the Ampere Hardware JPEG decoder.
  Refer to Loading Data Fast with DALI and the New Hardware JPEG Decoder in NVIDIA A100 GPUs for more information.
- The following new operators are now available:
  - NumpyReader, which allows you to read standard .npy (NumPy) files (#1858).
  - CoordFlip for CPU and GPU (#1894 and #1895).
- Readers can be set to read files directly instead of using mmap, which improves network filesystem performance (#1909).
- DALI can be built as CMake subproject (#1924).
Fixed Issues

This DALI release includes the following fixes.

‣ Fixed the jitter operator illegal memory access issue (#1914).

Deprecated Features

‣ CUDA 9 support has been deprecated.
   DALI 0.22.0 is the last release that provides a CUDA 9 build.

Known Issues

‣ The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.

‣ The DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with the TensorFlow version which doesn’t have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.

‣ Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows best performance when running in Docker with escalated privileges, for example:

  ▪ privileged=yes in Extra Settings for AWS data points
  ▪ --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 45. DALI Release 0.21.0 Beta

The DALI 0.21.0 is a beta release, therefore, all features, functionality, and performance will likely be limited.

Using DALI 0.21.0 Beta

To upgrade to DALI 0.21.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide. Refer to the DALI Developer Guide for usage details.

The internal DALI C++ API used for operator's implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Introduced experimental Functional API (1598)
  - Operators can be used directly with a single call, no need to create an instance with a constructor.
  - #DALI pipeline can be used in Context Manager.
  - #There is no need to subclass Pipeline.
- Simplified usage of ExternalSource (#1598, #1832) - it accepts callbacks or generators as a parameter.
- Added Python 3.8 build and support (#1782).
- Allowed seed to be set for serialized pipeline (#1844).
- New operators:
  - ToDecibels GPU operator (#1837)
  - One hot encoding CPU operator (#1807)
Fixed Issues

This DALI release includes the following fixes.

‣ Fixed transpose bugs - degenerate dims and non-uniform batch on GPU (#1817)
‣ Fixed a leak of the last created DALI pipeline instance (#1845)
‣ Make SSDRandomCrop calculate crop window in double precision (#1848)

Deprecated Features

‣ CUDA 9 support will soon end in a future release.

Known Issues

‣ The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.

‣ The DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with the TensorFlow version which doesn’t have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.

‣ Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 46. DALI Release 0.20.0 Beta

The DALI 0.20.0 is a beta release, therefore, all features, functionality, and performance will likely be limited.

Using DALI 0.20.0 Beta

To upgrade to DALI 0.20.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide. Refer to the DALI Developer Guide for usage details.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Added operators:
  - Spectrogram for GPU (#1786)
  - MelFilterBank for GPU (#1796)
  - Allow align-only behavior in Pad operator by treating shape argument as minimum shape (#1764)
  - Added data_ptr method to Tensor and TensorList (#1773) - it enables __array_interface__ and __cuda_array_interface__ support.
  - Extended shape support in DALI Dataset for TensorFlow (#1723)
  - Documentation improvements: layouts, Python API.
  - Added Gluon iterator plugin (#1683)

Fixed Issues

This DALI release includes the following fixes.

- Implemented several fixes in the documentation and build system.
Fixed precision loss in CropWindowGenerator (#1735)
Fixed BBFlip stream synchronization issue (#1738)

Deprecated Features
CUDA 9 support will soon end in a future release

Known Issues
The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.

The DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with the TensorFlow version which doesn’t have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.

Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows best performance when running in Docker with escalated privileges, for example:
privileged=yes in Extra Settings for AWS data points
--privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 47. DALI Release 0.19.0 Beta

The DALI 0.19.0 is a beta release, therefore, all features, functionality, and performance will likely be limited.

Using DALI 0.19.0 Beta

To upgrade to DALI 0.19.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

The internal DALI C++ API used for operator’s implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Reduced the size of the underlying allocation for non-pinned host buffers when the new size is less than 90% of current allocation size. Added several options for memory usage configuration (#1712, #1719) - up to 50% reduction in some cases.
- New Operators:
  - Erase CPU (#1609)
  - Transpose CPU (#1677)
  - Audio non silence CPU (#1701)
  - Constant CPU & GPU (#1699)
  - Normalize (sample/batch wide) (#1670)
- Improved Operators:
  - Reshape (#1634, #1691, #1714)
  - Python operators for GPU with examples (#1655, #1681, #1685, #1715)
  - Mitigate the OS file-mhax limit in the VideoReader (#1659)
  - Support for array subscript operator [] for TensorList in Python API (#1682)
Fixed Issues

This DALI release includes the following fixes.

‣ Updated examples with COCO data set and fix reader behavior for padding (#1557)
‣ Fixed formatting of the example in the FW iterators docs (#1649)
‣ Fixed torch stream initialization in TorchPythonFunction (#1681)
‣ Fixed multi-channel fill value check in Erase operator (#1675)
‣ Added synchronization to read/write operations in image decoder cache (#1702)
‣ Fixed Buffer linkage and Reshape bug (#1714)
‣ Fixed Pad operator bug (#1713)

Deprecated Features

‣ CUDA 9 support will end in several releases (#1684)
‣ Access to Tensors of TensorListCPU and TensorListGPU with at was replaced by array subscript operator. (#1682)

Known Issues

‣ The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
‣ The DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with the TensorFlow version which doesn’t have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.
‣ Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows best performance when running in Docker with escalated privileges, for example:
  ▪ privileged=yes in Extra Settings for AWS data points
  ▪ --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 48. DALI Release 0.18.0 Beta

The DALI 0.18.0 is a beta release, therefore, all features, functionality, and performance will likely be limited.

Using DALI 0.18.0 Beta

To upgrade to DALI 0.18.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.
Refer to the DALI Developer Guide for usage details.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Documentation improvements: `explicit __call__` operator docstring, arithmetic expressions, and formatting.
- New audio operators functionality:
  - Audio decoder extended with resampling and downmixing (#1582)
  - MFCC CPU Operator (#1577)
- New signal processing kernels:
  - Extract windows GPU kernel (#1538)
  - Added DCT 1D CPU kernel (#1569)
- Arithmetic expressions improvements:
  - Added comparison operators and bool handling in arithmetic ops (#1541)
  - Added bitwise operators: & , | , ^ (#1594)
  - Added support for Unary Ops: + and - (#1392)
- Video support improvements:

The internal DALI C++ API used for operator's implementation, and the C++ API that enables using DALI as a library from native code, is not yet officially supported. Hence these APIs may change in the next release without advance notice.
- Improved support for labels in VideoReader - now the user can provide labels for selected frame ranges as well as obtain frame numbers and timestamps. (#1500)
- Added an ability to return duplicate outputs from the DALI pipeline. (#1556)
- Removed the need to have GPU available when DALI is just imported. (#1601)

**Fixed Issues**

This DALI release includes the following fixes.

- Fixed `ToContiguousXXX` for more than 2 inputs. (#1572)
- Fixed a race condition in `GetGPUAllocator`. (#1575)
- Used a different stream base for different videos so it is possible to decode videos with a different time base at the same time. (#1592)
- Fixed `Transpose` operator for batch size 1 as well as 1 channel images. (#1624)

**Breaking Changes**

- Python 2.7 is no longer available. To stay up-to-date with DALI, upgrade to Python 3.5 or later.

**Known Issues**

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
- The DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with the TensorFlow version which doesn’t have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows best performance when running in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 49. DALI Release 0.17.0 Beta

The DALI 0.17.0 is a beta release, therefore, all features, functionality, and performance will likely be limited.

Using DALI 0.17.0 Beta

To upgrade to DALI 0.17.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide. Refer to the DALI Developer Guide for usage details.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- New operators:
  - NormalDistribution (#1529)
- New operators (CPU backend) with accompanying kernels for audio and signal processing:
  - AudioDecoder (#1481)
  - PowerSpectrum (#1460)
  - Spectrogram (#1468)
  - Preemphasis (#1515)
  - ToDecibels (#1518)
  - MelFilterBank (#1535)
- Improvements to existing operators:
  - Sequence and 3D support in Flip operator (#1439)
  - Warp 3D (#1366, #1442)
  - Improve the accuracy of 3D rotation (#1466)
Various fixes and improvements to ColorTwist, BrightnessContrast and HSV operators

Added integration with PaddlePaddle.

Added Jupyter Notebooks with example usage of arithmetic ops (#1438)

Fixed Issues

This DALI release includes the following fixes.

- Fixed race between consecutive invocations of Mixed-stage. (#1493)
- Fixed ExternalSource for GPU (#1452)
- Fixed stream usage in HSV and BrightnessContrast. (#1566)
- Added wait for thread pool to finish work in BrightnessContrast (#1549)

Breaking Changes

- The asCPU method is no longer available and has been replaced with as_cpu.

Deprecated Features

- DALI 0.17 is the last official release for Python 2.7, which reaches the end of life on January 1st, 2020. To stay up to date with DALI, upgrade to Python 3.5 or later.
- ColorTwist operator was deprecated and replaced by BrightnessContrast and HSV operators cleanup (#1532)

Known Issues

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
- The DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with the TensorFlow version which doesn’t have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.
- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows best performance when running in Docker with escalated privileges, for example:
  - privileged=yes in Extra Settings for AWS data points
  - --privileged or --security-opt seccomp=unconfined for bare Docker
Chapter 50. DALI Release 0.16.0 Beta

The DALI 0.16.0 is a beta release, therefore, all features, functionality, and performance will likely be limited.

Using DALI 0.16.0 Beta

To upgrade to DALI 0.16.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- SupportOps are removed and CPU operators can now be used in their place (#1423)
  - Allows for more generic shapes to be provided as argument inputs
  - Allows to return the data previously generated by support Op (like `ops.Uniform`) from pipeline
  - Internally Argument Inputs accept TensorVector instead of Tensor.
- Extended support for TensorFlow dataset API:
  - GPU (#1354) and initial multi-GPU (#1382) support
  - TensorFlow 1.15 and 2.0 support for TensorFlow dataset (#1395)
- New operators:
  - HSV manipulation operator for GPU and CPU (#1338)
  - GPU `dtensor` operator (#1261)
  - Pad operator (#1180)
- Initial support for arithmetic operators (#1322, #1355, #1426, #1449):
Regular Python arithmetic expressions inside DALI pipeline definition

- Supported binary operators: +, -, *, /, //

- Improvements to current operators:
  - Support float16 in Cast GPU operator (#1368)
  - Rotate operator using a new Warp kernel (#1403)
  - Optimized implementation for WarpAffine (#1387)
  - Added additional_decode_surfaces parameter to videoreader (#1393)

- New and updated examples:
  - BrightnessContrast operator example (#1414)
  - New warp example (#1158)
  - Build system improvements for architectures other than x86
  - Operators moved to separate library (#1380, #1384, #1406)

Fixed Issues

This DALI release includes the following fixes.

- Fixed DALI TensorFlow plugin CXX11 ABI issue (#1361)
- Fixed DALI TensorFlow installation for TensorFlow 2.0 (#1386)

Breaking Changes

- Support operators were removed and their usage replaced with CPU operators. Old support operators were converted to CPU operators.
- DALI operators were moved into a separate library to detach them from the pipeline. It is linked into the target DALI library.

Deprecated Features

- Removed the following deprecated operators:
  - HostDecoder and nvJPEGDecoder (generic ImageDecoder should be used instead) (#1398)
  - NormalizePermute (CropMirrorNormalize should be used instead) (#1402)
  - DALI 0.17 is the last official release for Python 2.7, which reaches the end of life on January 1st, 2020. To stay up to date with DALI, upgrade to Python 3.5 or later.
  - Crop, CropMirrorNormalize and Slice operator possible output types are limited to one of uint8_t, int16_t, uint16_t, int32_t, float, float16 or passing through the input type (#1418).
Known Issues

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.

- DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with TensorFlow version which doesn’t have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.

- Due to some known issues with meltdown/spectra mitigations and DALI, DALI shows best performance when run in Docker with escalated privileges, for example:
  - `privileged=yes` in Extra Settings for AWS data points
  - `--privileged` or `--security-opt seccomp=unconfined` for bare Docker
Chapter 51. DALI Release 0.15.0 Beta

The DALI 0.15.0 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Using DALI 0.15.0 Beta

To upgrade to DALI 0.15.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- New operators and extended functionality of the following:
  - CPU DLTensor operator (#1233)
  - Added Lookup table operator (#1251)
  - BrightnessContrast operator (#1188)
  - Added CropMirrorNormalize 3D support (#1326)
  - Added Reshape operator (#1327)

- New kernels:
  - Linear transformation GPU kernel (#1262)
  - Linear Transformation kernel for CPU (#1300)

- Video reader improvements:
  - Improved heuristic for variable frame rate detection (#1242)
  - Added support for decoding multiple resolution videos in the same pipeline (#1144)
Tensor layout (#1237) and Layout refactor (#1250) - new, domain agnostic, flexible description of a tensor layout that is compatible with string representation.

Multi channel image decoding - supporting more than 3 channels:
- ImageDecoder libtiff implementation (#1264)
- Handle nchannels>3 in ImageDecoder (#1285)
- Parse number of channels in PNGImage::PeekShape (#1288)
- TiffImage::PeekShapeImpl parse and return number of channels (#1304)
- Add parsing of number of channels in JpegImage::PeekShapeImpl (#1306)

DALI TensorFlow plugin installation improvements.

Fixed Issues
This DALI release includes the following fixes.
- Fixed Transpose operator when data shape with dimension of size 1 (#1244)
- Fixed problems with seeking when stream start_time is != 0. (#1287)
- Suppressed warning when FileReader encounters dot and dot-dot entries (#1318)
- Fixed last_batch_padded docs (#1314)
- Fixed DALI TensorFlow plugin CXX11 ABI issue (#1361)

Breaking Changes
- Changed Outputs and SharedOuputs return type to tuple (#1243)

Known Issues
- The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration. To enable the functionality, run the container with the video capability enabled, as shown below:
  ```
  -e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
  ```
- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
- DALI TensorFlow plugin may not be compatible with TensorFlow versions 1.15.0 and/or later. If the user wants to use DALI with TensorFlow version which doesn't have prebuilt plugin binary shipped with DALI it requires the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc, 4.8.5 or 5.4, depending on the particular version) is present on the system.
Chapter 52. DALI Release 0.14.0 Beta

Using DALI 0.14.0 Beta

The DALI 0.14.0 can be used with the 19.09 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow.

To upgrade to DALI 0.14.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

‣ Added an example for using DALI with multiple GPUs.
‣ Added a Shapes operator which returns the input shape as a tensor.
‣ Added conda recipes for DALI used for pre-built packages in Watson Machine Learning Community Edition (IBM Power and x86 systems).
‣ Extended the ExternalSource operator so it can hold more than one batch of inputs at a time.

Fixed Issues

This DALI release includes the following fixes.

‣ Fixed FP16 bug from #1129 and added FP16 test case. (#1160)
‣ Fixed framework iterators behavior when iter_setup raises StopIteration. (#1136)
‣ Fixed nvjpeg legacy API. (#1179)
‣ Fixed conversions to INT64 and UINT64. (#1205)
‣ Fixed DALI TensorFlow install for conda environments. (#1214)
Breaking Changes

- Extended external source operator capacity [#1127] - it now requires input to be set for every iteration.
- Adjusted `Operator::Run` to take reference instead of pointer [#1168] (C++ Backend API).

Deprecated Features

- Python `.cpu()` function for `EdgeReference` was removed to reduce confusion. [#1181]

Known Issues

- The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration. To enable the functionality, run the container with the "video" capability enabled, as shown below:
  
  ```bash
  -e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
  ```

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.

- DALI TensorFlow plugin may be not compatible with TensorFlow 1.14.0 release. The DALI TensorFlow plugin requires that the `gcc` compiler that matches the one used to build TensorFlow (`gcc 4.8.4` or `gcc 4.8.5`, depending on the particular version) be present on the system.
Chapter 53. DALI Release 0.13.0 Beta

The DALI 0.13.0 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

**Using DALI 0.13.0 Beta**

The DALI 0.13.0 can be used with the 19.08 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow. Also, the 19.08 container will be shipped with DALI 0.13.0.

To upgrade to DALI 0.13.0 beta from an older version of DALI, follow the installation instructions in the [DALI Quick Start Guide](#).

Refer to the [DALI Developer Guide](#) for usage details.

![Note]

The internal DALI C++ API used for operators implementation, and the C++ API that enables using DALI as a library from native code, are not yet officially supported. Hence these APIs may change in the next release without advance notice.

**Key Features and Enhancements**

This DALI release includes the following key features and enhancements.

- **Added new:**
  - Fast coco reader
  - TorchPythonFunction operator
  - Sink operators
- **Reworked how the reader pick samples from the shuffling buffer.**
- **Used DALI_extra for test data.**
- **Added checks to see if Python API is not mixed between simple, scheduled and iterator APIs.**
- **Added support for reading video files with labels using file_list argument.**
Fixed Issues
This DALI release includes the following fixes.

- Restored support of `use_batched_decode` argument in `nvJPEGDecoder` operator (only for legacy `nvJPEGDecoder` implementation).
- Fixed FP16 support in DALI TensorFlow plugin.
- Fixed Python operator with side effects.
- Fixed a race condition in async pipeline executor.
- Disabled `video_reader_op` test when NVDEC is disabled.
- Fixed sampling of chroma in the `VideoReader` operation.
- Fix detection pipeline example.

Breaking Changes
- Reader sampling from shuffling buffer was adjusted. Now samples are not mixed between epochs.

Deprecated Features
- Deprecated `NormalizePermute` in favor of `CropMirrorNormalize`
- Multiple Input Sets handling was removed from backend and is only Python level syntactic sugar.

Known Issues
- The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration. To enable the functionality, run the container with the "video" capability enabled, as shown below:
  ```
  -e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
  ```
- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
- DALI TensorFlow plugin may be not compatible with TensorFlow 1.14.0 release. The DALI TensorFlow plugin requires that the `gcc` compiler that matches the one used to build TensorFlow (`gcc 4.8.4` or `gcc 4.8.5`, depending on the particular version) be present on the system.
Chapter 54. DALI Release 0.12.0 Beta

The DALI 0.12.0 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Using DALI 0.12.0 Beta

The DALI 0.12.0 can be used with the 19.08 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow. Also, the 19.08 container will be shipped with DALI 0.12.0.

To upgrade to DALI 0.12.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

The internal DALI C++ API used for operators implementation, and the C++ API that enables using DALI as a library from native code, are not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

▶ Added a new optimized implementation for CropMirrorNormalize for CPU and GPU.
▶ Added the ability to read video files together with labels.

Fixed Issues

This DALI release includes the following fixes.

▶ Resumed shipping the prebuilt version of the TensorFlow plugin as a part of nvidia-dali-tf-plugin (as a result of fixing a compatibility issue). With this fix, the user must first install nvidia-dali-tf-plugin package. When this package is installed, one of the prebuilt binaries of the TensorFlow plugin is selected. See Binary Installation.
Breaking Changes

- Source code build now requires the compiler be at least C++14 capable.

Deprecated Features

- Deprecated the following as noted below:
  - _run: use schedule_run instead
  - _share_outputs: use share_outputs instead, and
  - _release_outputs: use release_outputs instead.

- Replaced HostDecoder and nvJPEGDecoder with generic ImageDecoder. ImageDecoder is the recommended function for the image decoding, and the replaced APIs HostDecoder and nvJPEGDecoder will be removed in the future.

- NormalizePermute is replaced by the new CropMirrorNormalize.

Known Issues

- The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration. To enable the functionality, run the container with the “video” capability enabled, as shown below:
  - e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.

- DALI TensorFlow plugin may be not compatible with TensorFlow 1.14.0 release. The DALI TensorFlow plugin requires that the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc 4.8.5, depending on the particular version) be present on the system.
Chapter 55. DALI Release 0.11.0 Beta

The DALI 0.11.0 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Using DALI 0.11.0 Beta

The DALI 0.11.0 can be used with the 19.07 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow. Also, the 19.07 container will be shipped with DALI 0.11.0.

To upgrade to DALI 0.11.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Added the ability to provide more than one input to, and return more than one output from, a Python-based operator.
- Extended the bounding box encoder for SSD to return offsets also. See nvidia.dali.ops.BoxEncoder.
- Added the ability to build DALI by mounting the source code to the Docker so consecutive rebuilds are much faster.
- Added experimental support for aarch64 (ARM) platform. Note that this support is added only for the native part—Python is not supported yet.
- Re-implemented the flip operator to increase its performance. See nvidia.dali.ops.Flip.
- Improved the performance of nvJPEG Decoder with new internal API to match the previous implementation. See nvidia.dali.ops.nvJPEGDecoder.
Fixed Issues

This DALI release includes the following fixes.

‣ Fixed an issue wherein loading a plugin could break other operators that were already registered.
‣ Fixed an interoperability issue with PyCUDA. Now DALI will not interfere with PyCUDA’s CUDA context management.

Breaking API Changes

‣ CPU operators have moved from per-sample processing (pipeline process sample after sample, all the way through the pipeline) to batch-processing (all samples are processed by the first operator before moving to the next operator). This may result in a small performance degradation for some use cases. However, in the long term it will make some currently unavailable optimizations possible, for example: operations that need to view the whole batch during the processing (like random sample blending inside a batch).
‣ CropCastPermute is removed. CropMirrorNormalize should be used instead (with the default values for normalization).

Deprecated Features

‣ Removed the prebuilt version of TensorFlow plugin for DALI. Now it is always necessary to install a separate nvidia-dali-tf-plugin package. See Binary Installation.

Known Issues

‣ The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration. To enable the functionality, run the container with the ‘video’ capability enabled, as shown below:

```
-e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
```
‣ The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
‣ DALI TensorFlow plugin may be not compatible with TensorFlow 1.14.0 release. The DALI TensorFlow plugin requires that the gcc compiler that matches the one used to build TensorFlow (gcc 4.8.4 or gcc 4.8.5, depending on the particular version) be present on the system.
Chapter 56. DALI Release 0.10.0 Beta

The DALI 0.10.0 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Using DALI 0.10.0 Beta

The DALI 0.10.0 can be used with the 19.06 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow. Also, the 19.06 container will be shipped with DALI 0.10.0.

To upgrade to DALI 0.10.0 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide. Refer to the DALI Developer Guide for usage details.

The internal DALI C++ API used for operators implementation, and the C++ API that enables using DALI as a library from native code, are not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Reduced peak memory consumption. DALI tends to do new allocation before releasing the old memory during buffer resize. As it does not copy the old memory content, the old memory can be freed before allocating the new memory.
- Started publishing DALI nightly builds for CUDA 9 and CUDA 10, and weekly for CUDA 10.
- Added Python function operator. Now the user can create a Python-based operator that accepts one input and produces one output.

Breaking API Changes

- None.
Deprecated Features

- None.

Known Issues

- The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration. To enable the functionality, run the container with the “video” capability enabled, as shown below:
  ```bash
  -e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
  ```

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
Chapter 57. DALI Release 0.9.1 Beta

The DALI 0.9.1 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Using DALI 0.9.1 Beta

The DALI 0.9.1 can be used with the 19.05 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow. Also, the 19.05 container will be shipped with DALI 0.9.1.

To upgrade to DALI 0.9.1 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

The internal DALI C++ API used for operators implementation, and the C++ API that enables using DALI as a library from native code, are not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Added Optical Flow example.
- Added full support for .pnm (.ppm/.pgm/.pbm) (in case of nvJPEG, fallback to CPU is done).
- Added the ability to do the lazy initialization of DALI. It is now possible to separate touching the data during the actual run, and at the time of all the necessary allocations during the build of the pipeline.
- Reduced the resize operator scratch buffer size by processing the data in mini batches.
- Added the ability to set the DALI CUDA streams priority.
- Fixed the sync issue in the DALI Python iterators.
- Fixed the initialization of CUDA context on the default device during pipeline creation.
Breaking API Changes

- Internal Python pipeline API has changed. If any function `...` was used, then that function should be updated to reflect the new semantic.

Deprecated Features

- None.

Known Issues

- The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration. To enable the functionality, run the container with the "video" capability enabled, as shown below:
  ```bash
  -e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
  ```
- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
Chapter 58. DALI Release 0.8.1 Beta

The DALI 0.8.1 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Using DALI 0.8.1 Beta

The DALI 0.8.1 can be used with the 19.04 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow. Also, the 19.05 container will be shipped with DALI 0.9.

To upgrade to DALI 0.8.1 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide. Refer to the DALI Developer Guide for usage details.

The internal DALI C++ API used for operators implementation, and the C++ API that enables using DALI as a library from native code, are not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

‣ Fixed nvJPEGDecoder cache when using the new nvJPEG decoupled API.

Breaking API Changes

‣ None.

Deprecated Features

‣ None.

Known Issues

‣ The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack...
this functionality in the default configuration. To enable the functionality, run the container with the `video` capability enabled, as below:

```bash
-e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
```

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
Chapter 59. DALI Release 0.8 Beta

The DALI 0.8 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Using DALI 0.8 Beta

The DALI 0.8 can be used with the 19.03 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow. Also, the 19.04 container will be shipped with DALI 0.8.

To upgrade to DALI 0.8 beta from an older version of DALI, follow the installation instructions in the [DALI Quick Start Guide](#).

Refer to the [DALI Developer Guide](#) for usage details.

The internal DALI C++ API used for operators implementation, and the C++ API that enables using DALI as a library from native code, are not yet officially supported. Hence these APIs may change in the next release without advance notice.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Provides the CUDA 10-based DALI prebuilt binary.
- Added the customizable and decoupled executor stages. The CPU and GPU prefetch queues can now have different depths.
- The nvJPEG decoder now supports ROI-based decoding.
- The nvJPEG decoder now has split variants. The CPU and GPU part can be concurrently executed and independently prefetched.
- Improved the resize operator to support bilinear and triangular resampling. This improves the quality during aggressive down-scaling.
- Added the ability to return sparse tensor on CPU for TF DALI op.
- Fixed bugs in the detection pipeline operators. These bugs might have lead to inferior training accuracy.
Breaking API Changes

None.

Known Issues

- The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. Prior to 19.01, the NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration. To enable the functionality, run the container with the “video” capability enabled, as below:
  
  ```
  -e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
  ```

- The video loader operator requires that the key frames occur at a minimum every 10 to 15 frames of the video stream. If the key frames occur at a lesser frequency, then the returned frames may be out of sync.
Chapter 60. DALI Release 0.7 Beta

The DALI 0.7 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Using DALI 0.7 Beta

The DALI 0.7 can be used with the 19.03 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow.

To upgrade to DALI 0.7 beta from an older version of DALI, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Added new operators:
  - HostDecoderRandomCrop
  - Element Extract for sequences
- Added the API stub for incoming Optical Flow video operator.
- Introduced Python 3.7 based whl build.
- Added Docker-based “one click” build script.
- Added the ability to fine-tune the internal DALI buffers using per-operator presize hints to stage the output queues.
- Added step, stride and shuffling in SequenceReader.
- Added a new, internal test API.
- Added the ability to custom handle CPU affinity using the DALI_AFFINITY_MASK environment variable.
Breaking API Changes

‣ None.

Deprecated Features

‣ Dropped the Python 3.4 based whl build.

Known Issues

‣ The new video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. The NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration prior to the 19.01 version. To enable the functionality, run the container with the "video" capability enabled, as below:

  -e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"

‣ There is no clear distinction in the documentation between the operators supporting video sequences and the operators supporting images.
Chapter 61. DALI Release 0.6.1 Beta

The DALI 0.6.1 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

‣ Added the DALI TensorFlow plugin to improve out-of-the-box forward compatibility.
‣ Added a new package `nvidia-dali-tf-plugin` that allows user to compile DALI TensorFlow plugin using the locally installed version.
‣ Added the below examples:
  ▪ VideoReader
  ▪ PyTorch and MXNet examples with various readers
‣ Added a new operator variant `gpu box encoder`.
‣ Added a new JSON parser—now COCO reader start up time is significantly faster (~10x).
‣ Added the ability to automatically reset MXNet and PyTorch Python iterators.
‣ Enhanced the Video reader to link dynamically with the CUDA Driver API and `nvcuvid`.
‣ Added the ability to deliver exactly 1 epoch from `DALIGenericIterator` (PyTorch and MXNet).

Breaking API Changes

‣ PyTorch iterator returns the exact number of samples per epoch, so the final batch could be smaller if epoch size is not divisible by the batch size. To keep the old behaviour when data is wrapped up, use `stop_at_epoch` argument.

Using DALI 0.6.1 Beta

The 19.01 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow includes an older version of DALI.

To upgrade to DALI 0.6.1 beta, follow the installation instructions in the DALI Quick Start Guide.
Refer to the DALI Developer Guide for usage details.

Known Issues

‣ The New Video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. The NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration prior to the 19.01 version, resulting in problem with loading libnvcuvid.so. To enable it, run the container with the 'video' capability enabled, as below:

-e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
Chapter 62. DALI Release 0.6 Beta

The DALI 0.6 is a beta release. Hence, for all the features, the functionality and performance will likely be limited.

**Key Features and Enhancements**

This DALI release includes the following key features and enhancements.

- Added the CPU variant of DALI TensorFlow operator. Now the DALI pipeline can be scheduled on the CPU also.
- Added the TensorFlow operator API to allow defining an arbitrary number of outputs and their types.
- Added full DALI detection pipeline sample for SSD.
- Added clear mapping between operators and the supported device types in the API documentation.
- Created initial support for the video-based pipeline - **NVVL** functionality is available as VideoReader.
- Added the below new operators:
  - BoxEncoder
  - VideoReader
  - SequenceCrop
  - SequenceReader
- Added new variants of the below existing operators:
  - For the GPU:
    - RandomBBoxCrop
    - BbFlip
    - Slice
  - For the CPU:
    - CropMirrorNormalize, and
    - BBoxPaste
Breaking API Changes

- DALI TensorFlow operator has a new API - check the examples for the reference.
- PyTorch and MXNet python iterators API have changed - check the examples for the reference.

Using DALI 0.6 Beta

The 19.01 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow includes an older version of DALI. To upgrade to DALI 0.6 beta, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

Known Issues

- The New Video reader operator requires NVIDIA VIDEO CODEC SDK support in the platform. The NVIDIA GPU Cloud (NGC) optimized containers lack this functionality in the default configuration prior to the 19.01 version, resulting in problem with loading libnvcuvid.so. To enable it, run the container with the ‘video’ capability enabled, as below:

  
  ```bash
  -e "NVIDIA_DRIVER_CAPABILITIES=compute,utility,video"
  ```
Chapter 63. DALI Release 0.5 Beta

This DALI 0.5 release is a beta release.

Key Features and Enhancements
This DALI release includes the following key features and enhancements.

‣ Fixed rare hangs during DALI pipeline destruction.
‣ Added ResNet50 example with TensorFlow.
‣ Added more verbose error messages to HostDecoder and nvJpegDecoder.
‣ Added pipelined execution completion callback setter.
‣ Added support for Tiff images.

Breaking API Changes

‣ Random seed type changed from INT to INT64, therefore, serialized pipelines from versions prior to 0.5 are not compatible with the current DALI version.

Using DALI 0.5 Beta
The 18.11 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow, includes an older version of DALI. To upgrade to DALI 0.5 beta, follow the installation instructions in the [DALI Quick Start Guide](#).

Refer to the [DALI Developer Guide](#) for usage details.

Known Issues

‣ This is a beta release. Hence, for all the features, the functionality and performance will likely be limited.
Chapter 64. DALI Release 0.4.1 Beta

This DALI 0.4.1 release is a beta release.

**Key Features and Enhancements**

This DALI release includes the following key features and enhancements.

- Added TensorFlow 1.11 and 1.12 compatibility.
- Adjusted PyTorch example to use new nvJPEG API.
- Reduced DALI memory footprint.
- Fixed lack of ability to customize pipeline processing length.

**Using DALI 0.4.1 Beta**

The 18.10 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow, includes an older version of DALI. To upgrade to DALI 0.4.1 beta, follow the installation instructions in the [DALI Quick Start Guide](#).

Refer to the [DALI Developer Guide](#) for usage details.

**Known Issues**

- The DALI integrated ResNet-50 samples in the 18.10 NGC TensorFlow and PyTorch containers may result in lower than expected performance results. We are working to address the issue in the next release.
- This is a beta release. All features are expected to be available, however, some aspects of functionality and performance will likely be limited compared to a non-beta release.
Chapter 65. DALI Release 0.4 Beta

This DALI 0.4 release is a beta release.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

‣ Added basic operators for detection (SSD), such as COCO dataset reader (COCOReader), random crop operator with bounding boxes (SSDRandomCrop), and flip operator for bounding boxes (BbFlip).

‣ Added CPU versions of Crop/CropCastPermute operators.

‣ Added a random Paste operator.

‣ Upgraded OpenCV to 3.4.3.

‣ Upgraded MXNet to 1.3.0.

‣ Fixed parsing of JPEG headers by the Host Decoder known issue. The Host Decoder now handles all images from the ImageNet dataset.

‣ Added fine grained control over output buffers in the pipeline

‣ Updated to nvJPEG 0.2.0

Breaking API Changes

The pipeline constructor signature has changed; an additional argument (prefetch_queue_depth) was added to allow defining depth of the prefetch queue at runtime.

Using DALI 0.4 Beta

The 18.09 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow, includes an older version of DALI. To upgrade to DALI 0.4 beta, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.
Deprecation Features

- DALI 0.4 is not compatible with TensorFlow 1.11. This will be addressed in the next release.

Known Issues

- The DALI integrated ResNet-50 samples in the 18.10 NGC TensorFlow and PyTorch containers may result in lower than expected performance results. We are working to address the issue in the next release.

- This is a beta release. All features are expected to be available, however, some aspects of functionality and performance will likely be limited compared to a non-beta release.
Chapter 66. DALI Release 0.3 Beta

This DALI 0.3 release is a beta release.

Key Features and Enhancements
This DALI release includes the following key features and enhancements.

‣ Updated PyTorch ResNet-50 example to obtain expected accuracy (Top1 76%).
‣ Introduced CPU variant of resize operator and added stand-alone flip operator.
‣ Added support for DALI to work with float16 data passed from Python.
‣ Added fallback to CPU for BMP images.
‣ Fixed training accuracy with TFRecord reader

Using DALI 0.3 Beta
The 18.08 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow, includes an older version of DALI. To upgrade to DALI 0.2 beta, follow the installation instructions in the DALI Quick Start Guide.

Refer to the DALI Developer Guide for usage details.

Known Issues
‣ HosDecoder cannot handle all jpeg files from ImageNet dataset. This will be fixed in the next release.
‣ On file systems where the directory entries are not stored in any order, the File Reader may assign different labels to the training and validation folders with the same name. This will be fixed in the next release.
‣ The DALI integrated ResNet-50 samples in the 18.09 NGC TensorFlow and PyTorch containers may result in lower than expected performance results. We are working to address the issue in the next release.
This is a beta release. All features are expected to be available, however, some aspects of functionality and performance will likely be limited compared to a non-beta release.
Chapter 67. DALI Release 0.2 Beta

This DALI 0.2 release is a beta release.

**Key Features and Enhancements**

This DALI release includes the following key features and enhancements.

- Added Sphinx based documentation that is in sync with the code on GitHub. For more information, see [DALI Master Branch User Guide](#).
- Build system has been refined, common errors have meaningful messages, improved localization and version detection of key dependency packages, such as, nvJPEG, libturbo-jpeg, and LMDB.
- Added **Unfused Crop** and **CropCastPermute operators**.
- Added improvements for TensorFlow plugin (polymorphism and shape argument for the output).
- Expanded examples of TensorFlow working with different readers, such as, MXNetReader, FileReader, and TFRecordReader.
- Updated nvJPEG to 0.1.4
- Added fallback to host decoder when image is not JPEG but PNG instead. For example, `n02105855_2933.JPG` from ImageNet.

**Breaking API Changes**

- The API for the **Resize** operator changed to match other similar operators like **ResizeCropMirror**.
- The API for the TensorFlow plugin changed to allow specifying the whole shape of the tensor instead of \(N, H,\) and \(W\) separately; which enables handling both **NCHW** and **NHWC** outputs.
- The type of labels produced by the TensorFlow plugin have changed. In DALI version 0.1.2, it was always `tf.float32`. In this release, a new optional parameter called **label_type** is introduced to the TensorFlow plugin to control the type of label.
The default value for `label_type` is `tf.int64` to better align with the label type in TFRecord.

**Using DALI 0.2 Beta**

The 18.08 NVIDIA GPU Cloud (NGC) optimized container for MXNet, PyTorch, and TensorFlow, includes an older version of DALI. To upgrade to DALI 0.2 beta, follow the installation instructions in the [DALI Quick Start Guide](https://docs.nvidia.com/deeplearning/dali/quickstart/).

Refer to the [DALI Developer Guide](https://docs.nvidia.com/deeplearning/dali/) for usage details.

**Known Issues**

- This is a beta release, therefore, not all functionality is fully supported and working. This beta release is meant for testing and research.

- The DALI integrated ResNet-50 samples in the 18.08 NGC TensorFlow and PyTorch containers have lower than expected accuracy and performance results. We are working to address the issue in the next release.

- This is a beta release. All features are expected to be available, however, some aspects of functionality and performance will likely be limited compared to a non-beta release.
Chapter 68. DALI Release 0.1.2 Beta

This DALI 0.1.2 release is a beta release.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

- Fixed compatibility with TensorFlow 1.9.
- Updated to nvJPEG v0.1.2 to fix batched decoding when a batch contains both grayscale and color images.
- Added Tensorflow 1.7 support.
- Improved overlap support when using DALI with multi-GPU in MXNet and PyTorch.

Using DALI 0.1.2 Beta

The 18.07 optimized container for MXNet, PyTorch, and TensorFlow, includes an older version of DALI. To upgrade to DALI 0.2 beta, follow the installation instructions in the DALI Quick Start Guide.

Refer to the the DALI Developer Guide for usage details.

Known Issues

- This is a beta release, therefore, not all functionality is fully supported and working. This beta release is meant for testing and research.
- This is a beta release. All features are expected to be available, however, some aspects of functionality and performance will likely be limited compared to a non-beta release.
Chapter 69. DALI Release 0.1.1 Beta

This is the first release of DALI. This DALI 0.1.1 release is a beta release.

Key Features and Enhancements

This DALI release includes the following key features and enhancements.

**Performance**
On dense GPU systems, deep learning applications can be significantly bottlenecked on the CPU, limiting the overall performance and scalability of training and inference tasks. DALI enables offloading key deep learning augmentation steps on to GPUs, alleviating CPU bottleneck on the deep learning preprocessing pipelines. This results in out-of-box performance of overall training workflow and efficient utilization of multi-GPU resources on the system.

**Drop-in Integration**
DALI comes with built-in plugins for key frameworks such as MXNet, TensorFlow, and PyTorch. This enables automatic integration with frameworks so that researchers and developers can get up and running with DALI easily and quickly.

**Flexibility**
DALI supports multiple input data formats that are commonly used in computer vision deep learning applications, for example, JPEG images, raw formats, Lightning Memory-Mapped Database (LMDB), RecordIO and TFRecord. The flexibility of input data formats allows portability of training workflows across different frameworks and models, and helps to avoid intermediate data conversion steps. DALI enables better code reuse and maintainability with optimized building blocks and support for different data formats.

Using DALI 0.1.1 Beta

Ensure you are familiar with the following notes when using this release.
To install DALI, see the DALI Quick Start Guide.

If you are using the 18.07 NGC optimized container for MXNet, PyTorch, or TensorFlow, you do not need to reinstall DALI. DALI now comes included in the container. Instead, start with the Getting Started Tutorial.

To interact with the code via GitHub, see the Getting Started Tutorial.

To learn how to define, build, and run a DALI pipeline, see the DALI Developer Guide.

**Known Issues**

- This is a beta release, therefore, not all functionality is fully supported and working. This beta release is meant for testing and research.

- This is a beta release. All features are expected to be available, however, some aspects of functionality and performance will likely be limited compared to a non-beta release.
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