Edge Vision Analytics SDK User's Manual

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LEADING EDGE COMPUTING

Preface

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Revision History

Revision	Description	Date
1.0	Initial release	2020-09-30
1.1	Release for EVA SDK R3 (Windows)	2021-04-12

Table of Contents

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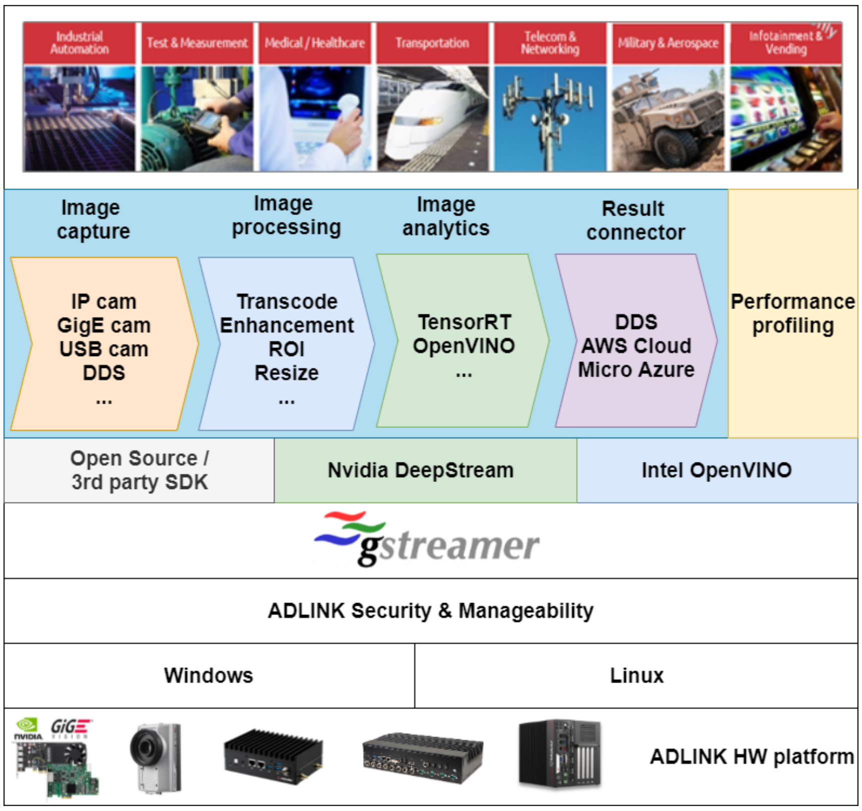
1 Introduction



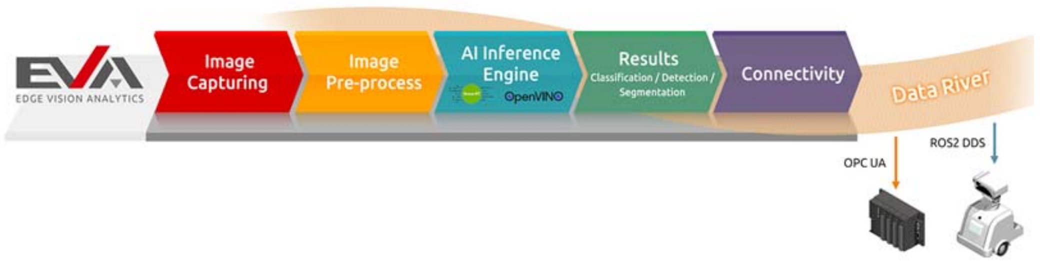
(EVA Architecture)

The ADLINK Edge Vision Analytics (EVA) SDK provides an integrated development environment (IDE) for developers wanting to build computer vision and video analytic solutions with deep learning technology. The SDK provides the required building blocks to help with the implementation of edge inference solutions. Customers can select either the Intel® Distribution of OpenVINO™ Toolkit, NVIDIA TensorRT™, or both to accelerate deep learning inference. This SDK can help customers easily migrate or integrate heterogeneous hardware platforms. ADLINK offers a selection of pre-verified platforms with specific hardware configurations optimized for vision and video analytic applications requiring little additional engineering effort by developers. The EVA SDK integrates and verifies different building blocks required for Edge Vision Analytic applications. The building blocks are implemented as GStreamer plugins. Customers can select a specific plugin based on their requirements, utilizing it in their development pipeline to quickly build their application. These plugins can be categorized as follows.

- Image/video capture: Supports different image capture solutions with different camera standards.
- Image processing: Provides the required algorithms needed before or after the inference.
- Image analytics: Provides an optimized INTEL/NVIDIA inference engine to accelerate deep learning inference.
- Connector plugin: Provides network connections for uploading images and inference results to a network service.

All the plugins can be easily assembled to become a pipeline that can form an application. There are three kinds of plugins: source providers (image/video capture), filters (image processing/image analytics), and data consumers (connector plugins). Source providers play a leading role in the pipeline, transmitting data to an intermediate filter that deals with the data for specific processing. The data can then be consumed by the final plugins for data storage and transmission.

Under the EVA platform, the image capture plugin provides the video stream data to the image preprocessing plugin, as shown in the figure below. The image processing plugin then delivers the processed data to the AI inference engine, and the AI inference engine delivers the result. After the intermediate filter process, the data is published to the data river via a plugin, where other edge devices like OPC UA or robots can subscribe to it.

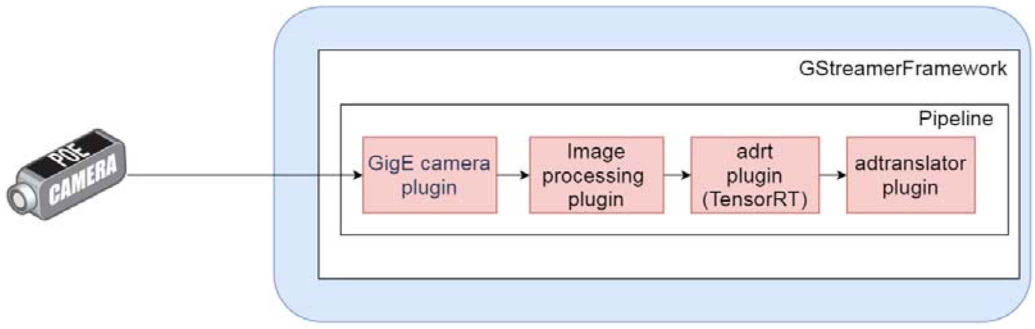


The EVA SDK supports application development in C/C++ as well as in Python, with the ability to implement customized plugins in both programming languages. (Sample code is included in the EVA SDK package.)

The following use scenarios demonstrate how the EVA SDK can be used to easily create vision analytic applications.

Use Scenario 1: Single pipeline in one application

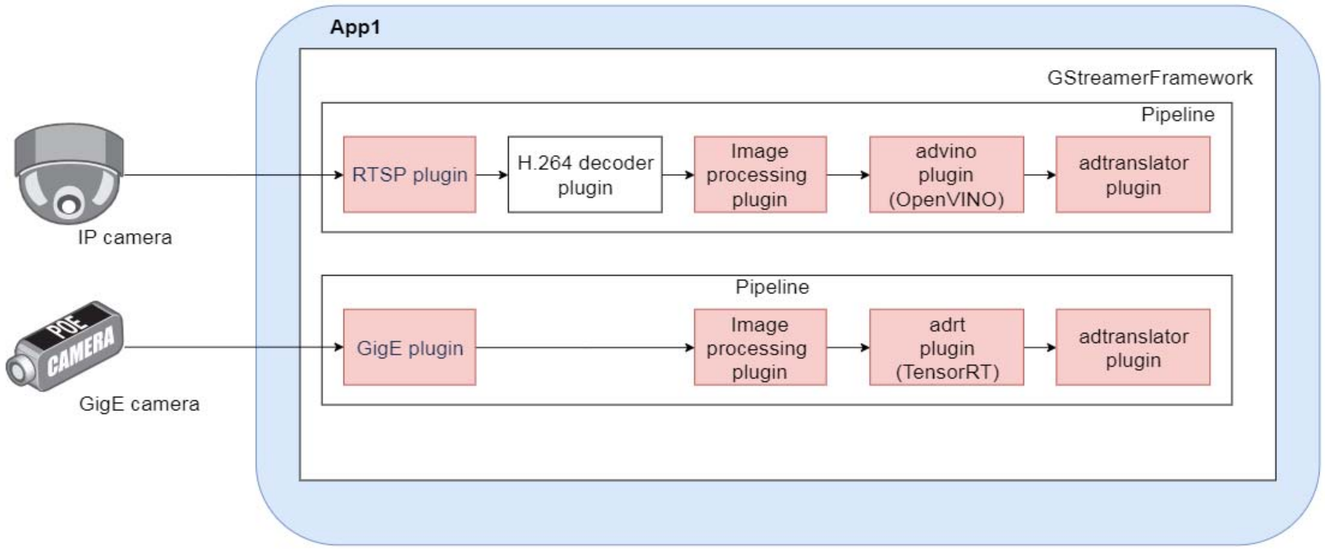
This scenario demonstrates a simple edge AI application. With the configured pipeline, the image inference can be made with a single image source on an ADLINK edge AI platform camera (e.g. Neon).



1. Application (1) captures the image from a GigE camera
2. Application (1) does AI inference on Nvidia TensorRT via adrt plugin
3. Application (1) does the inference result interpretation with the adtranslator plugin

Use Scenario 2: Multiple pipelines in one application

This scenario demonstrates an edge AI application. With multiple pipelines, the image inference can be captured with multiple image sources and the AI inference performed on both Nvidia and Intel hardware with an ADLINK edge AI platform (e.g. EOS-i).



1. Application (1) captures the image from the IP camera
2. Application (1) decodes the RTSP via NV H.264 HW accelerator

3. Application (1) does the AI inference for camera 1 on OpenVINO via the advino plugin
4. Application (1) does the inference result interpretation with the adtranslator plugin
5. Application (1) captures the image from the GigE camera
6. Application (1) does the AI inference for the GigE camera on TensorRT via the adrt plugin
7. Application (1) does the inference result interpretation with the adtranslator plugin

Notes:

- The examples using gst-launch in this User’s Manual are for reference only. The “property” values, such as the file name and path, must be modified according to the actual system environment.
- Support for the elements in the examples are operating system dependent. For example, ‘xvimagesink’ is only supported on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements instead. Note that only one glimagesink can be used in a pipeline.

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2 Setting Environment Variables

Before using EVA SDK, the environment must be installed and set up. For installation details, refer to the EVA Installation Guide.

On Linux (include x86 and ARM), after installing EVA SDK and required software, open a terminal and run the following command to set the environment variables.

```
$ source /opt/adlink/eva/scripts/setup_eva_envs.sh
```

If you have changed the install path (INSTALL_DIR), be sure to specify the path.

```
$ source INSTALL_DIR/scripts/setup_eva_envs.sh
```

The script will set up the environment variables of the following installed software.

- OpenVINO
- MediaSDK
- Pylon
- ADLINK EVA SDK

If the software has no corresponding libraries, the script will not set up the corresponding environment variables.

Note	The environment variables are removed when closing the terminal.

On Windows, after installing EVA SDK and required software, there are two ways to execute the EVA IDE.

Method 1: Manually run the environment variable settings.

Open a Windows command prompt and then run the following commands to set the environment variables; then enter the GStreamer command or your application to execute.

```
> C:\ADLINK\gstreamer\setupvars.bat

> C:\ADLINK\eva\scripts\setup_eva_envs.bat
```

Note: The environment variables are removed when closing the command prompt.

Method 2: Run the desktop shortcut.

On Windows, run EVACMD on the desktop. The shortcut will automatically set the environment and open the command prompt. You can then enter the GStreamer command.

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3 Image and Video Capture Plugins

The following table lists the elements of the supported image and video capture plugins.

Element Name	Plugin Name	Vendor	Version	Description
pylonsrc	Pylonsrc	PlayGineering	3.0	A GStreamer element that uses Basler's USB3 Vision cameras to capture images
filesrc	coreelements	GStreamer	1.16.2	Reads from an arbitrary point in a file
rtspsrc	rtsp	GStreamer	1.16.2	Receives network data via RTSP (RFC 2326)
v4l2src	video4linux2	GStreamer	1.16.2	Reads frames from a Video4Linux2 device
multifilesrc	multifile	GStreamer	1.16.2	Reads buffers from sequentially named files
ksvideosrc	winks	GStreamer	1.16.2	Provides low-latency video capture from WDM cameras on Windows
hikplugin	hikplugin	ADLINK	3.0	A GStreamer element that uses Hikrobot's USB & GigE vision cameras to capture images
flirplugin	flirplugin	ADLINK	3.0	A GStreamer element that uses FLIR's USB & GigE vision cameras to capture images

3.1 Element Descriptions

This section describes each element of the video capture plugin in greater detail.

3.1.1 pylonsrc

This is a GStreamer element that uses Basler's USB3 Vision cameras and Basler’s GigE Vision cameras for image capture.

When multiple cameras are available, use the camera parameter to specify the specific camera for image capture. To find out the IDs for each camera, launch the pipeline without specifying the `camera` parameter, and the plugin will output the camera IDs.

The `width` and `height` parameters are used to set a custom resolution. To find out the maximum resolution of the camera, refer to the camera's technical specifications, or launch the plugin with logging tuned to loglevel4 (GST_DEBUG=pylonsrc:4). Note that the camera saves the manually set resolution. Launching a pipeline with a camera while specifying a resolution will result in the following runs using the same resolution unless the device is reconnected or a different resolution is specified.

Resolution offsets can be specified to move the image. Possible offsets are calculated by `max(width|height)` – `current(width|height)`. The parameters to specify offsets are `offsetx` and `offsety`. To center the image, use `centerx` and `centery`. Note that setting the centering parameters will cause the plugin to ignore the offset values.

The ADLINK EVA SDK uses the pylonsrc source code included in gst-plugins-vision.
https://github.com/joshdoe/gst-plugins-vision/tree/master/sys/pylon

For more details, refer to the gst-pylonsrc documentation at https://gitlab.com/zingmars/gst-pylonsrc/-/blob/master/README.MD. Note that use ‘pixel-format’ property instead of ‘imageformat’ property when referencing this document.

Note: Download and install the ADLINK EVA SDK to access the pylonsrc plugin. For more details, refer to the ADLINK EVA Installation Guide.

3.1.1.1 Examples Using gst-launch

Displaying a pylon video with ycbcr422_8 format.

```
gst-launch-1.0 pylonsrc pixel-format=ycbcr422_8 ! videoconvert ! xvimagesink
```

Recording a pylon video at 150fps.

```
gst-launch-1.0 pylonsrc limitbandwidth=false sensorreadoutmode=fast fps=150 !
videoconvert ! matroskamux ! filesink location='recording.mkv'
```

Setting the resolution width and height to 960x540 and displaying the pylon video.

```
gst-launch-1.0 pylonsrc width= 960 height=540 ! videoconvert ! xvimagesink
```

Centering the pylon video and display.

```
gst-launch-1.0 pylonsrc centerx=true centery=true ! videoconvert ! xvimagesink
```

Note: It is recommended to use xvimagesink to display the window on Linux and use glimagesink or d3dvideosink to display the window on Windows.

3.1.1.2 Hierarchy

```
GObject
    ╰──GInitiallyUnowned
        ╰──GstObject
            ╰──GstElement
                ╰──GstBaseSrc
                    ╰──GstPushSrc
                        ╰──GstPylonsrc
```

3.1.1.3 Pad Templates

src

```
ANY
```

Presence – *always*

Direction – *src*

3.1.1.4 Properties

camera

```
"camera" gint
```

(Number) Camera ID as defined by Basler's API. If only one camera is connected this parameter will be ignored and the camera will be used. If there are multiple cameras and this parameter is not defined, the plugin will output a list of available cameras and their IDs. Note that if there are multiple cameras available to the API and the camera parameter is not defined then this plugin will not run. Range: 0 to 100

Flags: Read, Write

Default value: 9999

height

```
"height" gint
```

(Pixel) The height of the picture. Note that the camera will remember this setting, and will use values from the previous runs if you relaunch without specifying this parameter. Reconnect the camera or use the reset parameter to reset. Range: 0 to 10000

Flags: Read, Write

Default value: 0

width

```
"width" gint
```

(Pixels) The width of the picture. Note that the camera will remember this setting, and will use values from the previous runs if you relaunch without specifying this parameter. Reconnect the camera or use the reset parameter to reset. Range: 0 to 10000

Flags: Read, Write

Default value: 0

binningh

```
"binningh" gint
```

(Pixels) The number of pixels to be binned in the horizontal direction. Note that the camera will remember this setting, and will use values from the previous runs if you relaunch without specifying this parameter. Reconnect the camera or use the reset parameter to reset. Range: 1 to 6

Flags: Read, Write

Default value: 1

binningv

```
"binningv" gint
```

(Pixels) The number of pixels to be binned in the vertical direction. Note that the camera will remember this setting, and will use values from the previous runs if you relaunch without specifying this parameter. Reconnect the camera or use the reset parameter to reset. Range: 1 to 6

Flags: Read, Write

Default value: 1

limitbandwidth

```
"limitbandwidth" gboolean
```

(true/false) Bandwidth limit mode. CAUTION! Disabling this will allow the camera to reach higher frames per second, but can damage the camera. Running the plugin without specifying this parameter will reset the value stored on the camera to `true`.

Flags: Read, Write

Default value: true

maxbandwidth

```
"maxbandwidth" gint64
```

(Bytes per second) This property sets the maximum bandwidth the camera can use. The camera will only use as much as it needs for the specified resolution and framerate. This setting will have no effect if limitbandwidth is set to off. Note that the camera will remember this setting, and will use values from the previous runs if you relaunch without specifying this parameter. Reconnect the camera or use the reset parameter to reset. Range: 0 to 999999999

Flags: Read, Write

Default value: 0

sensorreadoutmode

```
"sensorreadoutmode" gchararray
```

(normal/fast) This property changes the sensor readout mode. Fast will allow for faster framerates but might cause quality loss. It might be required that either increasing the maximum bandwidth or disabling bandwidth limits be configured for this to cause any noticeable change. Running the plugin without specifying this parameter will reset the value stored on the camera to "normal".

Flags: Read, Write

Default value: "normal"

acquisitionframerateenable

```
"acquisitionframerateenable" gboolean
```

(true/false) Enables the use of custom fps values. This parameter will be set to true if the fps property is set. Running the plugin without specifying this parameter will reset the value stored on the camera to false.

Flags: Read, Write

Default value: false

fps

```
"fps" gdouble
```

(Frames per second) Sets the framerate of the video coming from the camera. Setting the value too high might cause the plugin to crash. Note that if the pipeline causes the computer to hang, or stall, then the resulting video will not be in the resolution that was set. Setting this parameter will set acquisitionframerateenable to true. The value of this parameter will be saved to the camera, but it will have no effect unless either this or the acquisitionframerateenable parameters are set. Reconnect the camera or use the reset parameter to reset. Range: 0.0 to 1024.0

Flags: Read, Write

Default value: 0.0

lightsource

```
“lightsource” gchararray
```

(off, 2800k, 5000k, 6500k) Changes the color balance settings to those defined by the presets. For best results, select a color balance setting closest to the environment's lighting. Running the plugin without specifying this parameter will reset the value stored on the camera to "5000k".

Flags: Read, Write

Default value: "5000k"

autoexposure

```
“autoexposure” gchararray
```

(off, once, continuous) Controls whether the camera will try to adjust the exposure settings. Setting this parameter to anything but "off" will override the exposure parameter. Running the plugin without specifying this parameter will reset the value stored on the camera to "off".

Flags: Read, Write

Default value: "off"

exposure

```
“exposure” gdouble
```

(Microseconds) Exposure time for the camera in microseconds, but only has an effect if autoexposure is set to off (default). Higher numbers will cause a lower frame rate. Note that the camera will remember this setting, and will use values from the previous runs if you relaunch without specifying this parameter. Reconnect the camera or use the reset parameter to reset. Range: 0.0 to 1000000.0

Flags: Read, Write

Default value: 0.0

autowhitebalance

```
“autowhitebalance” gchararray
```

(off, once, continuous) Controls whether the camera will try to adjust the white balance settings. Setting this parameter to anything but "off" will override the exposure parameter. Running the plugin without specifying this parameter will reset the value stored on the camera to "off".

Flags: Read, Write

Default value: "off"

balancered

```
“balancered” gdouble
```

Specifies the red color balance. The autowhitebalance setting must be set to "off" for this property to have any effect. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 15.9

Flags: Read, Write

Default value: 999

balancegreen

```
"balancegreen" gdouble
```

Specifies the green color balance. The autowhitebalance setting must be set to "off" for this property to have any effect. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 15.9

Flags: Read, Write

Default value: 999

balanceblue

```
"balanceblue" gdouble
```

Specifies the blue color balance. The autowhitebalance setting must be set to "off" for this property to have any effect. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 15.9

Flags: Read, Write

Default value: 999

colorredhue

```
"colorredhue" gdouble
```

Specifies the red hue. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: -4.0 to 3.9

Flags: Read, Write

Default value: 999

colorredsaturation

```
"colorredsaturation" gdouble
```

Specifies the red saturation. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 1.9

Flags: Read, Write

Default value: 0.0

coloryellowhue

```
"coloryellowhue" gdouble
```

Specifies the yellow hue. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: -4.0 to 3.9

Flags: Read, Write

Default value: 999

coloryellowsaturation

```
"coloryellowsaturation" gdouble
```

Specifies the yellow saturation. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 1.9

Flags: Read, Write

Default value: 999

colorgreenhue

```
"colorgreenhue" gdouble
```

Specifies the green hue. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: -4.0 to 3.9

Flags: Read, Write

Default value: 999

colorgreensaturation

```
"colorgreensaturation" gdouble
```

Specifies the green saturation. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 1.9

Flags: Read, Write

Default value: 999

colorcyanhue

```
"colorcyanhue" gdouble
```

Specifies the cyan hue. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: -4.0 to 3.9

Flags: Read, Write

Default value: 999

colorcyansaturation

```
"colorcyansaturation" gdouble
```

Specifies the cyan saturation. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 1.9

Flags: Read, Write

Default value: 999

colorbluehue

```
"colorbluehue" gdouble
```

Specifies the blue hue. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: -4.0 to 3.9

Flags: Read, Write

Default value: 0.0

colorbluesaturation

```
"colorbluesaturation" gdouble
```

Specifies the blue saturation. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 1.9

Flags: Read, Write

Default value: 999

colormagentahue

```
"colormagentahue" gdouble
```

Specifies the magenta hue. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: -4.0 to 3.9

Flags: Read, Write

Default value: 999

colormagentasaturation

```
"colormagentasaturation" gdouble
```

Specifies the magenta saturation. Note that this value gets saved on the camera, and running this plugin again without specifying this value will cause the previous value to be used. Use the reset parameter or reconnect the camera to reset. Range: 0.0 to 1.9

Flags: Read, Write

Default value: 999

autogain

```
"autogain" gchararray
```

(off, once, continuous) Controls whether the camera will try to adjust the gain settings. Setting this parameter to anything but "off" will override the exposure parameter. Running the plugin without specifying this parameter will reset the value stored on the camera to "off".

Flags: Read, Write

Default value: "off"

gain

```
“gain” gdouble
```

(dB) Sets the gain added on the camera before sending the frame to the computer. The value of this parameter will be saved to the camera, but it will be set to 0 every time this plugin is launched without specifying gain, or it will be overridden if the autogain parameter is set to anything that is not "off". Reconnect the camera or use the reset parameter to reset the stored value. Range: 0.0 to 12.0

Flags: Read, Write

Default value: 0.0

blacklevel

```
“blacklevel” gdouble
```

(DN) Sets the stream's black level. This parameter is processed on the camera before the picture is sent to the computer. The value of this parameter will be saved to the camera, but it will be set to 0 every time this plugin is launched without specifying this parameter. Reconnect the camera or use the reset parameter to reset the stored value. Range: 0.0 to 63.75

Flags: Read, Write

Default value: 0.0

gamma

```
“gamma” gdouble
```

Sets the gamma correction value. This parameter is processed on the camera before the picture is sent to the computer. The value of this parameter will be saved to the camera, but it will be set to 1.0 every time this plugin is launched without specifying this parameter. Reconnect the camera or use the reset parameter to reset the stored value. Range: 0.0 to 3.9

Flags: Read, Write

Default value: 1.0

reset

```
“reset” gchararray
```

(off, before, after). Controls whether or when the camera's settings will be reset. Setting this to "before" will wipe the settings before the camera initialization begins. Setting this to "after" will reset the device once the pipeline closes. This can be useful for debugging or when using the camera with other software that does not reset the camera settings before use (such as PylonViewerApp).

Flags: Read, Write

Default value: "off"

testimage

```
“testimage” gint
```

(1 to 6) Specifies a test image to show instead of a video stream. It is useful for debugging and is disabled by default. Range: 0 to 6

Flags: Read, Write

Default value: 0

continuous

```
"continuous" gboolean
```

(true/false) Used to switch between triggered and continuous mode. Set to “false” to switch to triggered mode.

Flags: Read, Write

Default value: True

pixel-format

```
"pixel-format" gchararray
```

(Mono8 / BayerBG8 / BayerGR8 / BayerRG8 / BayerGB8 / RGB8 / BGR8 / YCbCr422_8 / YUV422Packed). Determines the pixel format for sending frames. The default is auto which will query the camera for supported pixel formats and allow GStreamer to negotiate the format with downstream elements.

Flags: Read, Write

Default value: "auto"

userid

```
"userid" gchararray
```

(<string>) Sets the device custom ID.

Flags: Read, Write

Default value: NULL

demosaicing

```
"demosaicing" gboolean
```

(true/false) Switches between simple and Basler's demosaicing (PGI) mode. This does not work if bayer output is used.

Flags: Read, Write

Default value: False

noisereduction

```
"noisereduction" gdouble
```

Specifies the amount of noise reduction to apply. To use this, Basler's demosaicing mode must be enabled. Setting this will enable demosaicing mode. Range: 0.0 to 2.0

Flags: Read, Write

Default value: 999

sharpnessenhancement

```
"sharpnessenhancement" gdouble
```

Specifies the amount of sharpness enhancement to apply. To use this, Basler's demosaicing mode must be enabled. Setting this will enable demosaicing mode. Range: 1.0 to 3.98

Flags: Read, Write

Default value: 999

offsetx

```
"offsetx" gint
```

(0 to 10000) Determines the horizontal offset. Note that the maximum offset value is calculated during initialization, and will not be shown in this output.

Flags: Read, Write

Default value: 99999

centerx

```
"centerx" gboolean
```

(true/false) Setting this to true will center the horizontal offset and cause the plugin to ignore the offsetx value.

Flags: Read, Write

Default value: False

offsety

```
"offsety" gint
```

(0 to 10000) Determines the vertical offset. Note that the maximum offset value is calculated during initialization, and will not be shown in this output.

Flags: Read, Write

Default value: 99999

centery

```
"centery" gboolean
```

(true/false) Setting this to true will center the vertical offset and cause the plugin to ignore the offsety value.

Flags: Read, Write

Default value: False

flipx

```
"flipx" gboolean
```

(true/false) Setting this to true will flip the image horizontally.

Flags: Read, Write

Default value: False

flipy

```
"flipy" gboolean
```

(true/false) Setting this to true will flip the image vertically.

Flags: Read, Write

Default value: False

exposureupperlimit

```
"exposureupperlimit" gdouble
```

(105 to 1000000) Sets the upper limit for the auto exposure function.

Flags: Read, Write

Default value: 999

exposurelowerlimit

```
"exposurelowerlimit" gdouble
```

(105 to 1000000) Sets the lower limit for the auto exposure function.

Flags: Read, Write

Default value: 999

gainupperlimit

```
"gainupperlimit" gdouble
```

(0 to 12.00921) Sets the upper limit for the auto gain function.

Flags: Read, Write

Default value: 999

gainlowerlimit

```
"gainlowerlimit" gdouble
```

(0 to 12.00921) Sets the lower limit for the auto gain function.

Flags: Read, Write

Default value: 999

autoprofile

```
"autoprofile" gchararray
```

(gain/exposure) When the auto functions are on, this determines whether to focus on minimizing gain or exposure.

Flags: Read, Write

Default value: "default"

autobrightnesstarget

```
"autobrightnesstarget" gdouble
```

(0.19608 to 0.80392) Sets the auto exposure brightness target value.

Flags: Read, Write

Default value: 999

transformationselector

```
"transformationselector" gchararray
```

(RGBRGB, RGBYUV, YUVRGB) Sets the type of color transformation done by the color transformation selectors.

Flags: Read, Write

Default value: "default"

transformation00

```
"transformation00" gdouble
```

Gain00 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

transformation01

```
"transformation01" gdouble
```

Gain01 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

transformation02

```
"transformation02" gdouble
```

Gain02 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

transformation10

```
"transformation10" gdouble
```

Gain10 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

transformation11

```
"transformation11" gdouble
```

Gain11 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

transformation12

```
"transformation12" gdouble
```

Gain12 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

transformation20

```
"transformation20" gdouble
```

Gain20 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

transformation21

```
"transformation21" gdouble
```

Gain21 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

transformation22

```
"transformation22" gdouble
```

Gain22 transformation selector. Range: -8.0 to 7.96875

Flags: Read, Write

Default value: 999

maxtransfersize

```
"maxtransfersize" gdouble
```

The default value is appropriate for most applications. Reducing the value may cause a higher CPU load. USB host adapter drivers may require decreasing the value in case the application fails to receive the image stream. The maximum value for the Maximum Transfer Size depends on the operating system version and may be limited by the host adapter drivers. Range: 65536 to 4194304

Flags: Read, Write

Default value: 1045876

3.1.2 filesrc

This element reads data from a file on the local system. For more details, refer to the official GStreamer documentation at: https://gstreamer.freedesktop.org/documentation/coreelements/filesrc.html?gi-language=c#filesrc

3.1.2.1 Examples Using gst-launch

Play the song.ogg audio file located in the current working directory.

```
gst-launch-1.0 filesrc location=song.ogg ! decodebin ! audioconvert !
audioresample ! autoaudiosink
```

Play the song.ogg audio file located in the current working directory.

```
gst-launch-1.0 filesrc location=video.avi ! decodebin ! videoconvert ! xvimagesink
```

The following file formats are supported in GStreamer: avi, m4v, mov, mp4, mpg (MPEG-1/MPEG-2), flv, mkv, and wmv.

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

3.1.3 rtspsrc

This element receives data over a network via RTSP (RFC 2326). For more details, refer to the official documentation at: https://gstreamer.freedesktop.org/documentation/rtsp/rtspsrc.html?gi-language=c#rtspsrc-page

3.1.3.1 Examples Using gst-launch

Establish a connection to an RTSP server and send the raw RTP packets to a fakesink.

```
gst-launch-1.0 rtspsrc location=rtsp://some.server/url ! fakesink
```

Launch an RTSP video stream from a Bosch camera with the H.264 codec. The example specifies the IP address as 192.168.1.20 with a user ID of ooo, and xxx as the password.

```
gst-launch-1.0 rtspsrc location=rtsp://192.168.1.20 user-id=ooo user-pw=xxx !
rtph264depay ! h264parse ! avdec_h264 ! xvimagesink sync=false
```

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

3.1.4 v4l2src

This element can be used to capture video from v4l2 devices, such as webcams and TV tuner cards.

Note: Only supported on Linux.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/video4linux2/v4l2src.html?gi-language=c#v4l2src-page

3.1.4.1 Examples Using gst-launch

This pipeline shows the video captured from a webcam with jpeg images.

```
gst-launch-1.0 v4l2src ! jpegdec ! xvimagesink
```

This pipeline shows the video captured from a webcam with jpeg images and the buffer number set to output before sending EOS. For auto-function testing, the output automatically stops when the buffer is reached.

```
gst-launch-1.0 v4l2src num-buffers=100 ! jpegdec ! xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

3.1.5 multifilesrc

This element reads buffers from sequentially named files. If used together with an image decoder, the “caps” property or a capsfilter must be used to force to caps containing a framerate, otherwise the image decoders send EOS after the first frame. A videorate element is needed to set timestamps on all buffers after the first one in accordance with the corresponding framerate.

File names are created by replacing "%d" with the index using printf().

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/multifile/multifilesrc.html?gi-language=c#multifilesrc-page

3.1.5.1 Example Using gst-launch

This pipeline displays a video by joining multiple sequentially named PNG files (img.0000.png, img.0001.png, etc.)..

```
gst-launch-1.0 multifilesrc location="img.%04d.png" index=0
caps="image/png,framerate=\(fraction\)12/1" ! pngdec ! videoconvert ! videorate !
xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

3.1.6 ksvideosrc

This element provides low-latency video capture from WDM cameras on Windows.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/winks/index.html?gi-language=c

3.1.6.1 Example Using gst-launch

This pipeline shows the video captured from a webcam.

```
gst-launch-1.0 ksvideosrc num-buffers=1000 ! glimagesink sync=false
```

3.1.7 hikplugin

This is a GStreamer element that uses Hikrobot's USB3 and GigE vision cameras. When multiple cameras are available, use the camera property to specify the specific camera for image capture.

Note: Hikrobot MVC can access other vendor USB3 cameras with the HIK USB filter driver.

3.1.7.1 Examples Using gst-launch

This pipeline shows the video captured from a Hikrobot camera.

```
gst-launch-1.0 hikplugin ! videoconvert ! glimagesink
```

Use the pixel-format property if the camera module supports other pixel fomats. The example is YUV422_8_UYVY.

```
Gst-launch-1.0 hikplugin pixel-format=YUV422_8_UYVY ! videoconvert ! glimagesink
```

This pipeline use BayerBG8 format to display a Hikrobot video.

```
gst-launch-1.0 hikplugin pixel-format=BayerBG8 ! bayer2rgb ! videoconvert !
glimagesink
```

Use the camera property to set the camera ID if the system has multiple camera modules.

```
gst-launch-1.0 hikplugin camera=0 ! videoconvert ! glimagesink
```

Note: The avalible pixel formats are:

BayerRG8\BayerGR8\BayerGB8\BayerBG8\YUV422_8_UYVY\RGB8Packed\Mono8

3.1.7.2 Hierarchy

```
GObject
    ╰──GInitiallyUnowned
        ╰──GstObject
            ╰──GstElement
                ╰──GstBaseSrc
                    ╰──GstPushSrc
                        ╰──AdCamerahik
```

3.1.7.3 Pad Templates

src

```
ANY
```

Presence – *always*

Direction – *src*

3.1.7.4 Properties

autoexposure

```
"autoexposure" gchararray
```

(Off/Continuous/Once) Controls whether the camera can adjust the exposure settings.

Flags: Read, Write

Default value: Once

autogain

```
"autogain" gchararray
```

(Off/Continuous/Once) Controls whether the camera can adjust the gain settings.

Flags: Read, Write

Default value: Off

binningh

```
"binningh" gint
```

Number of pixels to be binned in the horizontal direction. (GigE: 1,2,4/USB3: 1,2) Range: 0 to10000

Flags: Read, Write

Default value: 0

binningv

```
"binningv" gint
```

Number of pixels to be binned in the vertical direction. (GigE: 1,2,4/USB3: 1,2) Range: 0 to10000

Flags: Read, Write

Default value: 1

blacklevel

```
"blacklevel" gdouble
```

This will adjust the black level amount in an image. Range: 0 to 4095.0

Flags: Read, Write

Default value: 1

camera

```
"camera" gint
```

If multiple cameras are enumerated, this will allow selection of a specific camera. Range: 0 to 10000

Flags: Read, Write

Default value: -1

continuous

```
"continuous" gboolean
```

(true/false) Toggles between triggered and continuous mode. True is for continuous mode.

Flags: Read, Write

Default value: false

exposure

```
"exposure" gdouble
```

Sets the custom exposure value. (GigE: 21 – 1000000/USB3: 24 – 2500000) Range: 0 to 30000000.0

Flags: Read, Write

Default value: 0

flipx

```
"flipx" gboolean
```

(true/false) Setting this flips the image horizontally.

Flags: Read, Write

Default value: false

flipy

```
"flipy" gboolean
```

(true/false) Setting this flips the image vertically.

Flags: Read, Write

Default value: false

fps

`"fps" gdouble`

Sets a custom fps value. (GigE: 0.96 – 100000 /USB3:0.4 – 1000) Range: 0 – 100000.0

Flags: Read, Write

Default value: 0

gain

`"gain" gdouble`

Sets the gain added to a camera before sending a frame to the computer.
(GigE: 0.96 – 100000/USB3: 0.4 – 1000) Range: 0 – 100000.0

Flags: Read, Write

Default value: 0

Note: Set autogain off before using gain.

gamma

`"gamma" gdouble`

Sets the gamma correction value. (GigE: 0 – 4/USB3: 0 – 4) Range: 0 – 1000.0

Flags: Read, Write

Default value: 1

width

`"gain" gint64`

Sets the image width. Range: 0 to 10000

Flags: Read, Write

Default value: 0

height

`"height" gint64`

Sets the image height. Range: 0 to 10000

Flags: Read, Write

Default value: 0

offsetx

`"offsetx" gint64`

Sets the horizontal offset. The maximum offset will be calculated during initialization. Range: 0 to 10000

Flags: Read, Write

Default value: 99999

offsety

```
"offsety" gint64
```

Sets the vertical offset. The maximum offset will be calculated during initialization. Range: 0 to 10000

Flags: Read, Write

Default value: 99999

pixel-format

```
"pixel-format" gchararray
```

Sets the camera output data pixel format value. Valid values include: YUV422_8_UYVY, BayerRG8, BayerBG8, BayerGB8, BayerGR8, RGB8Packed, and Mono8. If an invalid value is passed, the plugin will print a list of the supported formats. The default pixel format is NULL and is retrieved from the camera during initialization.

Flags: Read, Write

Default value: NULL

setfps

```
"setfps" gboolean
```

(true/false) Setting this will enable custom fps.

Flags: Read, Write

Default value: false

triggerselector

```
"triggerselector" gchararray
```

Selects the trigger for camera capture. This is valid only when the "continuous" property is set to false.

Flags: Read, Write

Default value: FrameBrustStart

triggersource

```
"triggersource" gchararray
```

Sets the camera capture trigger source. This is valid only when the "continuous" property set to false.

Flags: Read, Write

Default value: Software

3.1.8 flirplugin

This is a GStreamer element that uses FLIR's USB3 and GigE vision cameras When multiple cameras are available, use the camera property to specify the specific camera for image capture.

3.1.8.1 Examples Using gst-launch

This pipeline launches the plugin.

```
gst-launch-1.0 flirplugin ! videoconvert ! glimagesink
```

Use the pixel-format property if the camera module supports other pixel fomats. The example is YUV422_8_UYVY.

```
gst-launch-1.0 flirplugin pixel-format= YUV422_8_UYVY ! videoconvert ! glimagesink
```

This pipeline uses the BayerBG8 format to display a Hikrobot video.

```
gst-launch-1.0 flirplugin pixel-format=BayerBG8 ! bayer2rgb ! videoconvert !
glimagesink
```

Use the camera property to set the camera ID if the system has multiple camera modules.

```
gst-launch-1.0 flirplugin camera=0 ! videoconvert ! glimagesink

gst-launch-1.0 flirplugin camera=1 ! videoconvert ! glimagesink
```

Note: The avalible pixel formats are:
BayerRG8\BayerGR8\BayerGB8\BayerBG8\YUV422Packed\YCbCr422_8\RGB8Packed\BGR8\Mono8

3.1.8.1 Hierarchy

```
GObject
    ╰──GInitiallyUnowned
        ╰──GstObject
            ╰──GstElement
                ╰──GstBaseSrc
                    ╰──GstPushSrc

 ╰──AdCameraflir
```

3.1.8.2 Pad Templates

src

`ANY`

Presence – *always*

Direction – *src*

3.1.8.3 Properties

autoexposure

```
"autoexposure" gchararray
```

(Off/Continuous/Once) Controls whether the camera can adjust the exposure settings.

Flags: Read, Write

Default value: Once

autogain

```
"autogain" gchararray
```

(Off/Once/Continoust) Controls whether the camera can adjust the gain settings.

Flags: Read, Write

Default value: Off

binningh

```
"binningh" gint
```

Number of pixels to be binned in horizontal direction. (GigE: 1-4 /USB3:1-4) Range: 0 to10000

Flags: Read, Write

Default value: 1

binningv

```
"binningv" gint
```

Number of pixels to be binned in vertical direction. (GigE: 1-4/USB3: 1-4) Range: 0 to10000

Flags: Read, Write

Default value: 1

blacklevel

```
"blacklevel" gdouble
```

This will adjust the black level amount in an image. (GigE: 0-10/USB3: 1.37-7.42) Range:0 to 10.0

Flags: Read, Write

Default value: 0

camera

```
"camera" gint
```

If multiple cameras are enumerated, this will allow selection of a specific camera. Range:0 to 10000

Flags: Read, Write

Default value: 0

continuous

```
"continuous" gboolean
```

(true/false) Toggles between triggered and continuous mode. True is for continuous mode.

Flags: Read, Write

Default value: false

exposure

```
"exposure" gdouble
```

Sets the custom exposure value. (GigE: 45.6-32754.12/USB3: 12-30000000) Range: 0 to 30000000.0

Flags: Read, Write

Default value: 0

Note: Set autoexposure to off before using exposure.

flipx

```
"flipx" gboolean
```

(true/false) Setting this flips the image horizontally.

Flags: Read, Write

Default value: false

flipy

```
"flipy" gboolean
```

(true/false) Setting this flips the image vertically.

Flags: Read, Write

Default value: false

fps

```
"fps" gdouble
```

Sets a custom fps value. (GigE: 1-30/USB3: 1-76.18) Range: 0 to 1000.0

Flags: Read, Write

Default value: 0

gain

```
"gain" gdouble
```

Sets the gain added to a camera before sending a frame to the computer. Range: 0 – 1000.0

Flags: Read, Write

Default value: 0

gamma

```
"gamma" gdouble
```

Sets the gamma correction value. (GigE: 0.5-4/USB3: 0.25-4) Range: 0 to 1000.0

Flags: Read, Write

Default value: 1

width

```
"gain" gint64
```

Sets the image width. Range: 0 to 10000

Flags: Read, Write

Default value: 0

height

```
"height" gint64
```

Sets the image height. Range: 0 to 10000

Flags: Read, Write

Default value: 0

offsetx

```
"offsetx" gint64
```

Sets the horizontal offset. The maximum offset will be calculated during initialization. Range: 0 to 10000

Flags: Read, Write

Default value: 99999

offsety

```
"offsety" gint64
```

Sets the vertical offset. The maximum offset will be calculated during initialization. Range: 0 to 10000

Flags: Read, Write

Default value: 99999

pixel-format

```
"pixel-format" gchararray
```

Sets the camera output data pixel format value. Valid values include: YUV422Packed, BayerRG8, BayerBG8, BayerGB8,BayerGR8, RGB8Packed, BGR8, and Mono8. If an invalid value is passed, the plugin will print a list of the supported formats. The default pixel format is NULL and is retrieved from the camera during initialization.
Flags: Read, Write

Default value: NULL

setfps

```
"setfps" gboolean
```

(true/false) Setting this will enable custom fps

Flags: Read, Write

Default value: false

triggerselector

```
"triggerselector" gchararray
```

Selects the trigger for camera capture. This is valid only when the “continuous” property is set to false.

Flags: Read, Write

Default value: FrameBurstStart

triggersource

```
"triggersource" gchararray
```

Sets the camera capture trigger source. This is valid only when the “continuous” property set to false.

Flags: Read, Write

Default value: Software

4 Image Processing Plugins

The following table lists the element of the supported image processing plugins.

Element Name	Plugin Name	Vendor	Version	Description
jpegdec	jpeg	GStreamer	1.16.2	Decodes jpeg images
jpegenc	jpeg	GStreamer	1.16.2	Encodes jpeg images
pngdec	png	GStreamer	1.16.2	Decodes png images. If there is no framerate set on sink caps, it sends EOS after the first picture.
pngenc	png	GStreamer	1.16.2	Encodes png images
gdkpixbufdec	gdkpixbuf	GStreamer	1.16.2	Decodes images in a video stream using GdkPixbuf
avenc_tiff	libva	GStreamer	1.16.2	libav tiff encoder
avdec_tiff	libva	GStreamer	1.16.2	libav tiff decoder
avenc_bmp	libva	GStreamer	1.16.2	libav bmp encoder
avdec_bmp	libva	GStreamer	1.16.2	libav bmp decoder
videorate	gstvideorate	GStreamer	1.16.2	Drops/duplicates/adjusts timestamps on video frames to make a perfect stream
videoconvert	videoconvert	GStreamer	1.16.2	Converts video frames between video formats
x264enc	x264	GStreamer	1.16.2	H264 encoder
x265enc	x265	GStreamer	1.16.2	HEVC encoder
msdkh264enc	msdk	GStreamer	1.16.2	Intel MSDK H264 encoder in gst-pulings-bad mode
msdkh265enc	msdk	GStreamer	1.16.2	Intel MSDK H265 encoder in gst-pulings-bad mode
msdkh264dec	msdk	GStreamer	1.16.2	Intel MSDK H264 decoder in gst-pulings-bad mode
msdkh265dec	msdk	GStreamer	1.16.2	Intel MSDK H265 encoder in gst-pulings-bad mode
avdec_h264	libva	GStreamer	1.16.2	libav h264 decoder
avdec_h265	libva	GStreamer	1.16.2	libav hevc decoder
videoscale	videoscale	GStreamer	1.16.2	Resizes video frame
videocrop	videocrop	GStreamer	1.16.2	Crops video to a user-defined region
admetawriter	admetadata	ADLINK	3.0	Writes admeta data to stream

Element Name	Plugin Name	Vendor	Version	Description
admetadrawer	admetadata	ADLINK	3.0	Draws admeta data to stream
admetadumper	admetadata	ADLINK	3.0	Dumps admeta data to console
admetadebuger	admetadata	ADLINK	3.0	Writes fake admeta data to stream
nvv4l2decoder	nvvideo4linux2	NVIDIA DeepStream	-	Decodes video streams via V4L2 API
nvv4l2h264enc	nvvideo4linux2	NVIDA DeepStream	-	Encodes H.264 video streams via V4L2 API
nvv4l2h265enc	nvvideo4linux2	NVIDA DeepStream	-	Encodes H.265 video streams via V4L2 API
rotate	geometrictransform	GStreamer	1.16.2	Transforms the image by rotating it by a specified angle
gamma	videofilter	GStreamer	1.16.2	Performs gamma correction on a video stream
videobalance	videofilter	GStreamer	1.16.2	Adjusts brightness, contrast, hue, saturation on a video stream
videoflip	videofilter	GStreamer	1.16.2	Flips and rotates video
videomedian	videofilter	GStreamer	1.16.2	Applies a median filter to an image
nvdec	nvdec	GStreamer	1.16.2	NVENC H.264 Video Decoder
nvh264enc	nvenc	GStreamer	1.16.2	NVENC H.264 Video Encoder
nvh265enc	nvenc	GStreamer	1.16.2	NVENC HEVC Video Encoder

4.1 Element Descriptions

This section describes each element of the image processing plugin in greater detail.

4.1.1 jpegdec

This element decodes jpeg images.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/jpeg/jpegdec.html?gi-language=c

4.1.1.1 Examples Using gst-launch

This pipeline transcodes a jpeg to png and saves it as a png file.

```
gst-launch-1.0 filesrc location="frameJ1.jpeg" ! jpegdec ! videoconvert ! pngenc !
filesink location="frameJP1.png"
```

Similarly, jpeg images can be transcoded to tiff, bmp, or raw image formats.

```
gst-launch-1.0 filesrc location="frameJ1.jpeg" ! jpegdec ! videoconvert !
avenc_tiff ! filesink location="frameJT1.tiff"

gst-launch-1.0 filesrc location="frameJ1.jpeg" ! jpegdec ! videoconvert !
avenc_bmp ! filesink location="frameJB1.bmp"

gst-launch-1.0 filesrc location="frameJ1.jpeg" ! jpegdec ! videoconvert ! filesink
location="frameJR1.raw"
```

The "idct-method" property controls the jpeg transcoding method.

1. islow (0) – Slow, but accurate integer algorithm
2. ifast (1) – Faster, but less accurate integer method
3. float (2) – Floating-point: accurate, but faster speed depends on better hardware

For example,

```
gst-launch-1.0 filesrc location="frame1.jpeg"  ! jpegdec idct-method=float !
videoconvert ! filesink location="frameP1.raw"
```

4.1.2 jpegenc

This element encodes jpeg images.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/jpeg/jpegenc.html?gi-language=c

4.1.2.1 Example Using gst-launch

This pipeline encodes the video test pattern to jpeg images and saves them.

```
gst-launch-1.0 videotestsrc ! queue ! jpegenc ! multifilesink
location="frame%d.jpeg"
```

The "idct-method" property controls the jpeg encoding method.

1. islow (0) – Slow, but accurate integer algorithm
2. ifast (1) – Faster, but less accurate integer method
3. float (2) – Floating-point: accurate, but faster speed depends on better hardware

The "quality" property sets the encoding quality within a range of 0 to 100, with a default setting of 85.

4.1.3 pngdec

This element decodes png images.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/png/pngdec.html?gi-language=c

4.1.3.1 Examples Using gst-launch

This pipeline transcodes a png to jpeg and saves it as a jpeg file.

```
gst-launch-1.0 filesrc location="frameP1.png" ! pngdec ! videoconvert ! jpegenc !
filesink location="framePJ1.jpeg"
```

Similarly, png images can be transcoded to tiff, bmp, or raw image formats.

```
gst-launch-1.0 filesrc location="frameP1.png" ! pngdec ! videoconvert !
avenc_tiff ! filesink location="framePT1.tiff"

gst-launch-1.0 filesrc location="frameP1.png" ! pngdec ! videoconvert !
avenc_bmp ! filesink location="frameB1.bmp"

gst-launch-1.0 filesrc location="frameP1.png" ! pngdec ! videoconvert ! filesink
location="framePR1.raw"
```

4.1.4 pngenc

This element encodes png images.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/png/pngenc.html?gi-language=c

4.1.4.1 Example Using gst-launch

This pipeline encodes the video test pattern to png images and saves them.

```
gst-launch-1.0 videotestsrc ! queue ! pngenc ! multifilesink
location="frame%d.png"
```

The "compression-level" property sets the PNG compression level within a range of 0 to 9, with a default setting of 6. A higher number creates a smaller file size..

4.1.5 gdkpixbufdec

This element decodes images in a video stream using GdkPixbuf.

Note: Only supported on Linux.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/gdkpixbuf/gdkpixbufdec.html?gi-language=c#gdkpixbufdec-page

4.1.5.1 Examples Using gst-launch

These pipelines transcode a tiff or bmp to png and saves it as a png file.

```
gst-launch-1.0 filesrc location="frameT1.tiff" ! gdkpixbufdec ! videoconvert !
pngenc ! filesink location="frameTP1.png"

gst-launch-1.0 filesrc location="frameB1.bmp" ! gdkpixbufdec ! videoconvert !
pngenc ! filesink location="frameBP1.png"
```

Similarly, tiff or bmp images can be transcoded to other image formats.

```
gst-launch-1.0 filesrc location="frameB1.bmp" ! gdkpixbufdec ! videoconvert !
avenc_tiff ! filesink location="frameBT1.tiff"

gst-launch-1.0 filesrc location="frameT1.tiff" ! gdkpixbufdec ! videoconvert !
avenc_bmp ! filesink location="frameTB1.bmp"

gst-launch-1.0 filesrc location="frameT1.tiff" ! gdkpixbufdec ! videoconvert !
filesink location="frameTR1.raw"

gst-launch-1.0 filesrc location="frameB1.bmp" ! gdkpixbufdec ! videoconvert !
filesink location="frameBR1.raw"
```

4.1.6 avenc_tiff

This element encodes images in tiff format (based on libav).

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/libav/avenc_tiff.html?gi-language=c#avenc_tiff-page

4.1.6.1 Example Using gst-launch

This pipeline encodes the video test pattern to tiff images and saves them.

```
gst-launch-1.0 videotestsrc ! queue ! avenc_tiff ! multifilesink
location="frame%d.tiff"
```

4.1.7 avdec_tiff

This element decodes tiff format images (based on libav).

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/libav/avdec_tiff.html?gi-language=c

Note: It is recommended to use gdkpixbufdec to decode tiff files in Linux.

4.1.7.1 Example Using gst-launch

This pipeline transcodes a tiff to jpeg and saves it as a jpeg file.

```
gst-launch-1.0 multifilesrc location=frame3.tiff caps=image/tiff stop-index=10 !
avdec_tiff ! videoconvert ! jpegenc ! filesink location=frameT2J.jpeg
```

4.1.8 avenc_bmp

This element encodes images in bmp format (based on libav).

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/libav/avenc_bmp.html?gi-language=c#avenc_bmp-page

4.1.8.1 Example Using gst-launch

This pipeline encodes the video test pattern to bmp images and saves them.

```
gst-launch-1.0 videotestsrc ! queue ! avenc_bmp ! multifilesink
location="frame%d.bmp"
```

4.1.9 avdec_bmp

This element decodes bmp format images (based on libav).

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/libav/avdec_bmp.html?gi-language=c

Note: It is recommended to use gdkpixbufdec to decode tiff files in Linux.

4.1.9.1 Example Using gst-launch

This pipeline transcodes a bmp to jpeg and saves it as a jpeg file.

```
gst-launch-1.0 multifilesrc location=frame.bmp caps=image/bmp stop-index=1 !
avdec_bmp ! videoconvert ! jpegenc ! filesink location=frameB2J.jepg
```

4.1.10 videorate

This element takes an incoming stream of timestamped video frames and produces a perfect stream that matches the source pad's frame rate.

The operation is performed by dropping and duplicating frames. No algorithm is used to interpolate frames.

By default the element will simply negotiate the same frame rate on its source and sink pad.

This operation is useful to link to elements that require a perfect stream. Typical examples are formats that do not store timestamps for video frames, but only store a frame rate, like Ogg and AVI.

A conversion to a specific frame rate can be forced by using filtered caps on the source pad.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/videorate/index.html?gi-language=c#videorate

4.1.10.1 Examples Using gst-launch

There are two ways to set the stream frame rate.

1. Directly use caps types to define the properties of the stream. The syntax is:

<type>[,<property>=<value>]...

The supported video types are listed in "***List of Defined Media Types***" from the GStreamer documentation at: https://gstreamer.freedesktop.org/documentation/plugin-development/advanced/media-types.html?gi-language=c#table-of-video-types

The following example shows how to directly set the stream frame rate.

```
gst-launch-1.0 videotestsrc ! video/x-raw, framerate=25/1 ! xvimagesink
```

This will set the stream frame rate to 25. This frame rate setting method is only supported when the pipeline is generated at the beginning of the stream, meaning there is no opportunity to have two different frame rates in the pipeline. To set two different frame rates in the pipeline, follow the example below.

2. The "videorate" element is used to adjust the frame rate of the video in the pipeline.

For example, the following pipeline has a framerate of 25.

```
gst-launch-1.0 videotestsrc ! video/x-raw, framerate=25/1 ! gaussianblur !
videoconvert ! xvimagesink
```

To change the frame rate to 5 before applying xvimagesink, add the videorate element before it. The videorate will change the frame rate to adopt the coming media type setting in its src pad.

```
gst-launch-1.0 videotestsrc ! video/x-raw, framerate=25/1 ! gaussianblur !
videorate ! video/x-raw, framerate=5/1 ! videoconvert ! xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.11 videoconvert

This element converts from one color space to another (e.g. RGB to YUV). It can also convert between different YUV formats (e.g. I420, NV12, YUY2…) or RGB format arrangements (e.g. RGBA, ARGB, BGRA…).

This is normally the first choice when solving negotiation problems. When not needed, because its upstream and downstream elements can already understand each other, it acts in pass-through mode having minimal impact on performance.

As a general rule, always use `videoconvert` whenever you use elements whose Caps are unknown at design time, like `autovideosink`, or that can vary depending on external factors, like decoding a user-provided file.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/videoconvert/index.html?gi-language=c#videoconvert-page

4.1.11.1 Example Using gst-launch

This pipeline outputs a test video generated in YUY2 format in a video window.

```
gst-launch-1.0 videotestsrc ! video/x-raw,format=YUY2 ! videoconvert ! xvimagesink
```

If the video sink selected does not support YUY2, `videoconvert` will automatically convert the video to a format understood by the video sink.

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.12 videoscale

This element resizes video frames. By default the element will try to negotiate to the same size on the source and sinkpad so that no scaling is needed. It is therefore safe to insert this element in a pipeline to get more robust behavior without any cost if no scaling is needed.

This element supports a wide range of color spaces including various YUV and RGB formats and is therefore generally able to operate anywhere in a pipeline.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/videoscale/index.html?gi-language=c#videoscale-page

4.1.12.1 Example Using gst-launch

This pipeline resizes the frames from videotestsrc to 720x576 and displays it via xvimagesink.

```
gst-launch-1.0 videotestsrc ! videoscale ! video/x-raw,width=720,height=576 !
xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.13 videocrop

This element crops video frames, meaning it can remove parts of the picture on the left, right, top or bottom of the picture and output a smaller picture with the unwanted parts removed.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/videocrop/videocrop.html?gi-language=c#videocrop

Note: No special effort is made to handle chroma-subsampled formats in the case of odd-valued cropping and compensation for sub-unit chroma plane shifts in the case where the left or top property is set to an odd number.

4.1.13.1 Example Using gst-launch

```
gst-launch-1.0 videotestsrc ! videocrop top=42 left=1 right=4 bottom=0 !
xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.14 x264enc

This element encodes raw video into H264 compressed data, otherwise known as MPEG-4 AVC (Advanced Video Codec).

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/x264/?gi-language=c

4.1.14.1 Example Using gst-launch

This pipeline encodes a test video source to H264 using fixed quantization, and muxes it in a Matroska container.

```
gst-launch-1.0 videotestsrc num-buffers=1000 ! x264enc pass=quant ! matroskamux !
filesink location=x264enc.mkv
```

Note: Some settings, including the default settings, may lead to considerable latency (i.e. frame buffering) in the encoder. This may cause problems with pipeline stalling in non-trivial pipelines, because the encoder latency is often considerably higher than the default size of a simple queue element. Such problems are caused by one of the queues in the other non-x264enc streams/branches filling up and blocking upstream. They can be fixed by relaxing the default time/size/buffer limits on the queue elements in the non-x264 branches, or using a (single) multiqueue element for all branches. Another workaround for this problem is setting the tune=zerolatency property, but this will affect overall encoding quality so may not be appropriate for every use case.

4.1.15 x265enc

This element encodes raw video into H265 compressed data.

Note: Only supported on Linux.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/x265/?gi-language=c

4.1.15.1 Example Using gst-launch

This pipeline encodes a test video source to H265 and muxes it in a Matroska container.

```
gst-launch-1.0 videotestsrc num-buffers=2000 ! x265enc ! h265parse ! matroskamux !
filesink location=x265enc.mkv
```

4.1.16 avdec_h264

This element is a libav h264 decoder.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/libav/avdec_h264.html?gi-language=c

4.1.16.1 Example Using gst-launch

This pipeline decodes an H.264 video file.

```
gst-launch-1.0 filesrc location=sample_1080p_h264.mp4 ! qtdemux ! h264parse !
queue ! avdec_h264 ! xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.17 avdec_h265

This element is a libav HEVC decoder.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/libav/avdec_h265.html?gi-language=c

4.1.17.1 Example Using gst-launch

This pipeline decodes an HEVC video file.

```
gst-launch-1.0 filesrc location=4K_h265.mkv ! matroskademux ! h265parse !
avdec_h265 ! videoconvert ! xvimagesink sync=false
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.18 msdkh264enc

This element is an Intel® Media SDK H.264 encoder.

Note:

- Only supported on Intel platforms.
- Refer to the EVA SDK Installation Guide to install OpenVino toolkits and Media SDK for GStreamer before using the MSDK plugin.

4.1.18.1 Example Using gst-launch

This pipeline encodes the video test pattern as H.264 image and saves it as an mkv file.

```
gst-launch-1.0 videotestsrc num-buffers=1000 ! msdkh264enc ! h264parse !
matroskamux ! filesink location=msdkh264enc.mkv
```

4.1.18.2 Hierarchy

```
GObject
    ╰──GInitiallyUnowned
        ╰──GstObject
            ╰──GstElement
                ╰──GstVideoEncoder
                    ╰──GstMsdkEnc
                        ╰──GstMsdkH264Enc
```

4.1.18.3 Pad Templates

sink

```
video/x-raw:
         format: { (string)NV12, (string)I420, (string)YV12, (string)YUY2, (string)UYVY, (string)BGRA }
      framerate: [ 0/1, 2147483647/1 ]
          width: [ 16, 2147483647 ]
         height: [ 16, 2147483647 ]
 interlace-mode: progressive
```

Presence – *always*

Direction – *sink*

src

```
video/x-h264:
      framerate: [ 0/1, 2147483647/1 ]
          width: [ 1, 2147483647 ]
         height: [ 1, 2147483647 ]
  stream-format: byte-stream
      alignment: au
        profile: { (string)high, (string)main, (string)baseline, (string)constrained-baseline }
```

Presence – *always*

Direction – *src*

4.1.18.4 Properties

hardware

```
"hardware" gboolean
```

Enables hardware encoders

Flags: Read, Write

Default value: True

async-depth

```
"async-depth" guint
```

Depth of asynchronous pipeline. Range: 1 to 20

Flags: Read, Write

Default value: 4

target-usage

```
"target-usage" guint
```

1: Best quality, 4: Balanced, 7: Best speed. Range: 1 to 7

Flags: Read, Write

Default value: 4

rate-control

```
"rate-control" GstMsdkEncRateControl
```

Rate control method

Flags: Read, Write

Default value: cbr (1)

GstMsdkEncRateControl

Members

`cbr` *(1)* – Constant Bitrate
vbr *(2)* – Variable Bitrate
cqp *(3)* – Constant Quantizer
avbr *(4)* – Average Bitrate
la_vbr *(8)* – VBR with look ahead (Non HRD compliant)
icq *(9)* – Intelligent CQP
`vcm` *(10)* – Video Conferencing Mode (Non HRD compliant)
`la_icq` *(11)* – Intelligent CQP with LA (Non HRD compliant)
`la_hrd` *(13)* – HRD compliant LA
`qvbr` *(14)* – VBR with CQP

bitrate

```
"bitrate" guint
```

Bitrate in kbit/sec. Range: 1 to 2048000

Flags: Read, Write

Default value: 2048

max-frame-size

```
"max-frame-size" guint
```

Maximum possible size (kb) of any compressed frames (0: auto-calculate). Range: 0 to 65535

Flags: Read, Write

Default value: 0

max-vbv-bitrate

```
"max-vbv-bitrate" guint
```

Maximum bitrate (kbit/sec) at which data enters the video buffering verifier (0: auto-calculate). Range: 0 to 65535

Flags: Read, Write

Default value: 0

accuracy

```
"accuracy" guint
```

The AVBR accuracy per one tenth of one percent. Range: 0 to 65535

Flags: Read, Write

Default value: 0

convergence

```
"convergence" guint
```

The AVBR convergence per 100 frames. Range: 0 to 65535

Flags: Read, Write

Default value: 0

rc-lookahead

```
"rc-lookahead" guint
```

Number of frames to look ahead for rate control. Range: 0 to 100

Flags: Read, Write

Default value: 0

qpi

```
"qpi" guint
```

Constant quantizer for I frames (0 unlimited). Also used as ICQQuality or QVBRQuality for different RateControl methods. Range: 0 to 51

Flags: Read, Write

Default value: 0

qpp

```
"qpp" guint
```

Constant quantizer for P frames (0 unlimited). Range: 0 to 51

Flags: Read, Write

Default value: 0

qpb

`“qpb” guint`

Constant quantizer for B frames (0 unlimited) Range: 0 to 51

Flags: Read, Write

Default value: 0

gop-size

`“gop-size” guint`

GOP Size. Range: 0 to 2147483647

Flags: Read, Write

Default value: 256

ref-frames

`“ref-frames” guint`

Number of reference frames. Range: 0 to 2147483647

Flags: Read, Write

Default value: 1

i-frames

`“i-frames” guint`

Number of I frames between IDR frames. Range: 0 to 2147483647

Flags: Read, Write

Default value: 0

b-frames

`“b-frames” guint`

Number of B frames between I and P frames. Range: 0 to 2147483647

Flags: Read, Write

Default value: 0

num-slices

`“num-slices” guint`

Number of slices per frame. Zero tells the encoder to choose any slice partitioning allowed by the codec standard. Range: 0 to 2147483647

Flags: Read, Write

Default value: 0

mbbrc

```
"mbbrc" GstMsdkEncMbBitrateControl
```

Macroblock level bitrate control

Flags: Read, Write

Default value: 32, "off"

GstMsdkEncMbBitrateControl

Members

(0): auto - SDK decides what to do
(32): off - Disable Macroblock level bit rate control
(16): on - Enable Macroblock level bit rate control

i-adapt

```
"i-adapt" GstMsdkEncAdaptiveI
```

Adaptive I-Frame Insertion control

Flags: Read, Write

Default value: 32, "off"

GstMsdkEncAdaptiveI

Members

(0): auto - SDK decides what to do
(32): off - Disable Adaptive I frame insertion
(16): on - Enable Adaptive I frame insertion

b-adapt

```
"b-adapt" GstMsdkEncAdaptiveB
```

Adaptive B-Frame Insertion control

Flags: Read, Write

Default value: 32, "off"

GstMsdkEncAdaptiveB

Members

(0): auto - SDK decides what to do
(32): off - Disable Adaptive B Frame insertion
(16): on - Enable Adaptive B Frame insertion

cabac

```
"cabac" gboolean
```

Enable CABAC entropy coding

Flags: Read, Write

Default value: true

low-power

```
“low-power” gboolean
```

Enable low power mode

Flags: Read, Write

Default value: false

frame-packing

```
“frame-packing” GstMsdkH264EncFramePacking
```

Set frame packing mode for stereoscopic content.

Flags: Read, Write

Default value: Default: -1, "none"

GstMsdkH264EncFramePacking

Members

(-1): none (default)
(3): side-by-side
(7): top-bottom

rc-lookahead-ds

```
“rc-lookahead-ds” GstMsdkEncRCLookAheadDownsampling
```

Downsampling mode in look ahead bitrate control.

Flags: Read, Write

Default value: 0, "default"

GstMsdkEncRCLookAheadDownsampling

Members

(0): default	- SDK decides what to do
(1): off	- No downsampling
(2): 2x	- Downsample 2 times before estimation
(3): 4x	- Downsample 4 times before estimation

trellis

```
“trellis” GstMsdkEncTrellisQuantization
```

Enable Trellis Quantization

Flags: Read, Write

Default value: 0x00000000, "None"

GstMsdkEncTrellisQuantization

Members

(0x00000000): None	- Disable for all frames
(0x00000002): i	- Enable for I frames
(0x00000004): p	- Enable for P frames
(0x00000008): b	- Enable for B frames

max-slice-size

```
"max-slice-size" guint
```

Maximum slice size in bytes (if enabled MSDK will ignore the control over num-slices). Range: 0 to 4294967295

Flags: Read, Write

Default value: 0

b-pyramid

```
"b-pyramid" gboolean
```

Enable B-Pyramid reference structure

Flags: Read, Write

Default value: false

4.1.19 msdkh265enc

This element is an Intel® Media SDK H.265 encoder.

Note:

- Only supported on Intel platforms.
- Refer to the EVA SDK Installation Guide to install OpenVino toolkits and Media SDK for GStreamer before using the MSDK plugin.

4.1.19.1 Example Using gst-launch

This pipeline encodes the video test pattern as an H.265 image and saves it as an mkv file.

```
gst-launch-1.0 videotestsrc num-buffers=1000 ! msdkh265enc ! h265parse !
matroskamux ! filesink location=msdkh265enc.mkv
```

4.1.19.2 Hierarchy

```
GObject
    ╰──GInitiallyUnowned
        ╰──GstObject
            ╰──GstElement
                ╰──GstVideoEncoder
                    ╰──GstMsdkEnc
                        ╰──GstMsdkH265Enc
```

4.1.19.3 Pad Templates

sink

```
video/x-raw:
         format: { (string)NV12, (string)I420, (string)YV12, (string)YUY2, 
(string)UYVY, (string)BGRA }
      framerate: [ 0/1, 2147483647/1 ]
          width: [ 16, 2147483647 ]
         height: [ 16, 2147483647 ]
 interlace-mode: progressive
```

Presence – *always*

Direction – *sink*

src

```
video/x-h265:
      framerate: [ 0/1, 2147483647/1 ]
          width: [ 1, 2147483647 ]
         height: [ 1, 2147483647 ]
  stream-format: byte-stream
      alignment: au
        profile: main
```

Presence – *always*

Direction – *src*

4.1.19.4 Properties

hardware

```
"hardware" gboolean
```

Enables hardware encoders

Flags: Read, Write

Default value: True

async-depth

```
"async-depth" guint
```

Depth of asynchronous pipeline. Range: 1 to 20

Flags: Read, Write

Default value: 4

target-usage

```
“target-usage” guint
```

1: Best quality, 4: Balanced, 7: Best speed. Range: 1 to 7

Flags: Read, Write

Default value: 4

rate-control

```
“rate-control” GstMsdkEncRateControl
```

Rate control method

Flags: Read, Write

Default value: cbr (1)

GstMsdkEncRateControl

Members

`cbr` *(1)* – Constant Bitrate
vbr *(2)* – Variable Bitrate
cqp *(3)* – Constant Quantizer
avbr *(4)* – Average Bitrate
la_vbr *(8)* – VBR with look ahead (Non HRD compliant)
icq *(9)* – Intelligent CQP
`vcm` *(10)* – Video Conferencing Mode (Non HRD compliant)
`la_icq` *(11)* – Intelligent CQP with LA (Non HRD compliant)
`la_hrd` *(13)* – HRD compliant LA
`qvbr` *(14)* – VBR with CQP

bitrate

```
“bitrate” guint
```

Bitrate in kbit/sec. Range: 1 to 2048000

Flags: Read, Write

Default value: 2048

max-frame-size

```
“max-frame-size” guint
```

Maximum possible size (kb) of any compressed frames (0: auto-calculate). Range: 0 to 65535

Flags: Read, Write

Default value: 0

max-vbv-bitrate

```
“max-vbv-bitrate” guint
```

Maximum bitrate (kbit/sec) at which data enters the video buffering verifier (0: auto-calculate). Range: 0 to 65535

Flags: Read, Write

Default value: 0

accuracy

```
“accuracy” guint
```

The AVBR accuracy per one tenth of one percent. Range: 0 to 65535

Flags: Read, Write

Default value: 0

convergence

```
“convergence” guint
```

The AVBR convergence per 100 frames. Range: 0 to 65535

Flags: Read, Write

Default value: 0

rc-lookahead

```
“rc-lookahead” guint
```

Number of frames to look ahead for rate control. Range: 0 to 100

Flags: Read, Write

Default value: 0

qpi

```
“qpi” guint
```

Constant quantizer for I frames (0 unlimited). Also used as ICQQuality or QVBRQuality for different RateControl methods. Range: 0 to 51

Flags: Read, Write

Default value: 0

qpp

```
“qpp” guint
```

Constant quantizer for P frames (0 unlimited). Range: 0 to 51

Flags: Read, Write

Default value: 0

qpb

`“qpb” guint`

Constant quantizer for B frames (0 unlimited). Range: 0 to 51

Flags: Read, Write

Default value: 0

gop-size

`“gop-size” guint`

GOP Size. Range: 0 to 2147483647

Flags: Read, Write

Default value: 256

ref-frames

`“ref-frames” guint`

Number of reference frames. Range: 0 to 2147483647

Flags: Read, Write

Default value: 1

i-frames

`“i-frames” guint`

Number of I frames between IDR frames. Range: 0 to 2147483647

Flags: Read, Write

Default value: 0

b-frames

`“b-frames” guint`

Number of B frames between I and P frames. Range: 0 to 2147483647

Flags: Read, Write

Default value: 0

4.1.20 msdkh264dec

This element is an Intel® Media SDK H.264 decoder.

Note:

- Only supported on Intel platforms.
- Refer to the EVA SDK Installation Guide to install OpenVino toolkits and Media SDK for GStreamer before using the MSDK plugin.

4.1.20.1 Example Using gst-launch

This pipeline decodes and displays an H.264 format image.

```
gst-launch-1.0 filesrc location=sample_720p.h264 ! h264parse ! msdkh264dec !
videoconvert ! xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.20.2 Hierarchy

```
GObject
     ╰──GInitiallyUnowned
         ╰──GstObject
             ╰──GstElement
                 ╰──GstVideoDecoder
                     ╰──GstMsdkDec
                         ╰──GstMsdkH264Dec
```

4.1.20.3 Pad Templates

sink

```
video/x-h264:
          width: [ 1, 2147483647 ]
         height: [ 1, 2147483647 ]
  stream-format: byte-stream
      alignment: au
        profile: { (string)high, (string)main, (string)baseline,
(string)constrained-baseline }
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw:
         format: { (string)NV12 }
      framerate: [ 0/1, 2147483647/1 ]
          width: [ 16, 2147483647 ]
         height: [ 16, 2147483647 ]
 interlace-mode: progressive
```

Presence – *always*

Direction – *src*

4.1.20.4 Properties

hardware

```
"hardware" gboolean
```

Enables hardware decoders

Flags: Read, Write

Default value: True

async-depth

```
"async-depth" guint
```

Depth of asynchronous pipeline. Range: 1 to 20

Flags: Read, Write

Default value: 4

4.1.21 msdkh265dec

This element is an Intel® Media SDK H.265 decoder.

Note:

- Only supported on Intel platforms.
- Refer to the EVA SDK Installation Guide to install OpenVino toolkits and Media SDK for GStreamer before using the MSDK plugin.

4.1.21.1 Example Using gst-launch

This pipeline decodes and displays an H.265 format image.

```
gst-launch-1.0 filesrc location=4K_h265.mkv ! matroskademux ! h265parse !
avdec_h265 ! videoconvert ! xvimagesink sync=false
```

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

4.1.21.2 Hierarchy

```
GObject
    ╰──GInitiallyUnowned
        ╰──GstObject
            ╰──GstElement
                ╰──GstVideoDecoder
                    ╰──GstMsdkDec
                        ╰──GstMsdkH265Dec
```

4.1.21.3 Pad Templates

sink

```
video/x-h265:
          width: [ 1, 2147483647 ]
         height: [ 1, 2147483647 ]
  stream-format: byte-stream
      alignment: au
        profile: main
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw:
         format: { (string)NV12 }
      framerate: [ 0/1, 2147483647/1 ]
          width: [ 16, 2147483647 ]
         height: [ 16, 2147483647 ]
 interlace-mode: progressive
```

Presence – *always*

Direction – *src*

4.1.21.4 Properties

hardware

```
"hardware" gboolean
```

Enables hardware decoders.

Flags: Read, Write

Default value: True

async-depth

```
"async-depth" guint
```

Depth of asynchronous pipeline. Range: 1 to 20

Flags: Read, Write

Default value: 4

4.1.22 admetawriter

Writes admeta data to stream with device information read from a packed text file. Also provides the ability to count frames on an input stream to add to the admeta frame id field.

Note: This must be the first plugin to add metadata to the stream, so it must be used before any other plugins that add to admeta data (admetadrawer, admetadebuger, advino, adrt)

4.1.22.1 Example Using gst-launch

This pipeline decodes and displays an H.265 format image.

```
gst-launch-1.0 videotestsrc ! admetawriter devinfo=dev1.txt count-frame=TRUE !
videoconvert ! ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.22.2 Hierarchy

```
GObject
  ╰── GInitiallyUnowned
        ╰── GstObject
              ╰── GstElement
                    ╰──AdMetaWriter
```

4.1.22.3 Pad Templates

sink

```
video/x-raw:
         format: {RGBx, xRGB, BGRx, xBGR, RGBA, ARGB, BGRA, ABGR, RGB, BGR,
AYUV, YUY2, YVYU, UYVY, I420, YV12, RGB16, RGB15, GRAY8, NV12, NV21, GRAY16_LE,
GRAY16_BE}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw:
         format: {RGBx, xRGB, BGRx, xBGR, RGBA, ARGB, BGRA, ABGR, RGB, BGR,
AYUV, YUY2, YVYU, UYVY, I420, YV12, RGB16, RGB15, GRAY8, NV12, NV21, GRAY16_LE,
GRAY16_BE}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

4.1.22.4 Properties

devinfo

```
"devinfo" gchararray
```

Provides the location to the device information text file. The format of the device information text file is as follows.

```
0
0
10.9.2.1.2
8088
0
ADLINK2
0
0
0
0
0
0
0
```

The following table lists the data definitions represented by each line of the device information text file.

Row	Field name	Description	Sample Value
1	dev_id	Vision Device host interface (ex. /dev/video0 or /dev/ttyUSB0)	1006
2	fw_version	Vision Device firmware version	3.v.0
3	ip_address	Host machine IP Address	11.0.0.1.2
4	kind	Vision device kind enum(OASYS defined)	Vision
5	mac_address	Host address	00:11:22:33:44:55
6	manufacturer	Vision Device manufacturer	ADLINK2
7	model	Vision Device model	NEONi1000
8	port	Connection port	8088
9	protocol	ProtocolKind enum describing how the device communicates	V4L2
10	serial	Vision Device serial identifier	AD0123456
11	status	DeviceStatus enum(OASYS defined)	OK
12	stream_id	Stream publisher ID	Stream1
13	uri	Video Interface URI (rtsp://xx/h264)	0

Flags: Read / Write

Default value: NULL

count-frame

```
"count-frame" gboolean
```

Provides an option to add frame number counting to the stream. Some src plugins will use offset data to automatically generate this information.

Flags: Read / Write

Default value: false

4.1.23 admetadrawer

Draws admeta data to the stream.

4.1.23.1 Example Using gst-launch

```
gst-launch-1.0 videotestsrc ! admetadrawer ! videoconvert ! ximagesink
```

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

4.1.23.2 Hierarchy

```
GObject
 ╰── GInitiallyUnowned
      ╰── GstObject
           ╰── GstElement
                ╰──AdMetaDrawer
```

4.1.23.3 Pad Templates

sink

```
video/x-raw:
         format: {RGBx, xRGB, BGRx, xBGR, RGBA, ARGB, BGRA, ABGR, RGB, BGR,
AYUV, YUY2, YVYU, UYVY, I420, YV12, RGB16, RGB15, GRAY8, NV12, NV21, GRAY16_LE,
GRAY16_BE}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw:
         format: {RGBx, xRGB, BGRx, xBGR, RGBA, ARGB, BGRA, ABGR, RGB, BGR,
AYUV, YUY2, YVYU, UYVY, I420, YV12, RGB16, RGB15, GRAY8, NV12, NV21, GRAY16_LE,
GRAY16_BE}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *src*

4.1.24 admetadumper

Prints some admeta data to the console.

The following is an example of printing metadata fields.

```
"========== Adlink batch metadata =========="
"Device[$idx] ID: $stream_id"
"Frame[$idx] Num:$frame_id ($width, $height, $depth, $channels) for Device $device_idx"
"Class[$index] label:$label prop: $prob"
"Box[$obj_id] ($x1,$y1)-($x2,$y2) label:$obj_label prob:$prob"
"Seg[$s_idx] ($w,$h) label id:$label_id label:$label"
"========================================="
```

- Device information is from the DeviceInfoData structure. The ***$idx*** is the order of the input media device.
- Frame information is from the VideoFrameData structure. The ***$idx*** is the order of the input video frame.
- Class information is from the ClassificationResult structure.
- Box information is from the DetectionBoxResult structure.
- Seg information is from the SegmentResult structure. The ***$s_idx*** is the order of the segment number. The (***$w,$h***) are the width and height of the inference.

For more details, refer to the ADLINK EVA SDK Programming Guide.

4.1.24.1 Example Using gst-launch

```
gst-launch-1.0 videotestsrc ! admetadumper ! videoconvert ! ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.24.2 Hierarchy

```
GObject
    ╰── GInitiallyUnowned
            ╰── GstObject
                    ╰── GstElement
                          ╰──AdMetaDumper
```

4.1.24.3 Pad Templates

sink

```
ANY
```

Presence – *always*

Direction – *sink*

src

```
ANY
```

Presence – *always*

Direction – *src*

4.1.24.4 Properties

segment_num

```
"segment" guint
```

Number of segmentation results that will be printed on the Terminal. Range: 0 to 64.

Flags: Read, Write

Default value: 10

4.1.25 admetadebuger

Writes fake admeta data to the stream, but is currently only able to write box or class metadata.

Only one inference result can be written at a time. To write multiple inference results to metadata, the element can be duplicated as many times as necessary.

4.1.25.1 Example Using gst-launch

```
gst-launch-1.0 videotestsrc ! admetadebuger type=box x1=0.2 y1=0.4 x2=0.6 y2=0.8
class="foobar"  ! videoconvert ! ximagesink
```

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

4.1.25.2 Hierarchy

```
GObject
    ╰── GInitiallyUnowned
          ╰── GstObject
                ╰── GstElement
                      ╰──AdMetaDebuger
```

4.1.25.3 Pad Templates

sink

```
ANY
```

Presence – *always*

Direction – *sink*

src

```
ANY
```

Presence – *always*

Direction – *src*

4.1.25.4 Properties

type

```
"type" DataTypePattern
```

Type of written inference data.

Flags: Read, Write

Default value: 0, "class"

DataTypePattern

Members

(0): class - Class data (id, class, prob)
(1): box - Box data (id, x1, y1, x2, y2, prob)

id

```
"id" guint
```

Id of inference data.

Flags: Read, Write

Default value: 0

class

```
"class" gchararray
```

The class name of the inference result. If “class” is NULL, the class will be the string “test” with its suffix as a random integer between 0 and 1000.

Flags: Read, Write

Default value: NULL

x1

```
"x1" gfloat
```

The X-axis coordinate is at the left side of the bounding box. It should be a ratio of the width, so the value is between 0 and 1.

Flags: Read, Write

Default value: 0.0

y1

```
"y1" gfloat
```

The Y-axis coordinate is in the top of the bounding box. It should be a ratio of the width, so the value is between 0 and 1

Flags: Read, Write

Default value: 0.0

x2

```
"x2" gfloat
```

The X-axis coordinate is at the right side of the bounding box. It should be a ratio of the width, so the value is between 0 and 1.

Flags: Read, Write

Default value: 0.0

y2

```
"y2" gfloat
```

The Y-axis coordinate is in the bottom of the bounding box. It should be a ratio of the width, so the value is between 0 and 1

Flags: Read, Write

Default value: 0.0

prob

```
"prob" gfloat
```

Probability of inference result between 0 and 1.

Flags: Read, Write

Default value: 1.0

4.1.26 nvv4l2decoder

The OSS Gst-nvvideo4linux2 plugin leverages the hardware decoding engines on Jetson and DGPU platforms by interfacing with libv4l2 plugins. It supports H.264, H.265, JPEG and MJPEG formats. The plugin accepts an encoded bitstream and NVDEC hardware engine to decode the bitstream. The decoded output is in NV12 format.

For more details, refer to the official documentation at:

https://docs.nvidia.com/metropolis/deepstream/dev-guide/text/DS_plugin_gst-nvvideo4linux2.html#decoder

Note: Only supported on NVIDIA platforms. Only supported on Linux.

4.1.26.1 Example Using gst-launch

This pipeline decodes an H.264 video file.

```
gst-launch-1.0 filesrc location=sample_1080p_h264.mp4 ! qtdemux ! h264parse !
nvv4l2decoder ! nvvideoconvert ! xvimagesink
```

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

4.1.27 nvv4l2h264enc

The OSS Gst-nvvideo4linux2 plugin leverages the hardware accelerated encoding engine available on Jetson and dGPU platforms by interfacing with libv4l2 plugins. The plugin accepts RAW data in I420 format. It uses the NVENC hardware engine to encode RAW input. Encoded output is in elementary bitstream supported formats.

For more details, refer to the official documentation at:

https://docs.nvidia.com/metropolis/deepstream/dev-guide/text/DS_plugin_gst-nvvideo4linux2.html#encoder

Note: Only supported on NVIDIA platforms. Only supported on Linux.

4.1.27.1 Example Using gst-launch

This pipeline encodes video to the H.264 format.

```
gst-launch-1.0 videotestsrc num-buffers=1000 ! "video/x-raw,format=(string)I420" !
nvvideoconvert ! "video/x-raw(memory:NVMM)" ! nvv4l2h264enc ! h264parse !
matroskamux ! filesink location=x1.mkv
```

4.1.28 nvv4l2h265enc

The OSS Gst-nvvideo4linux2 plugin leverages the hardware accelerated encoding engine available on Jetson and dGPU platforms by interfacing with libv4l2 plugins. The plugin accepts RAW data in I420 format. It uses the NVENC hardware engine to encode RAW input. Encoded output is in elementary bitstream supported formats.

For more details, refer to the official documentation at:

https://docs.nvidia.com/metropolis/deepstream/dev-guide/text/DS_plugin_gst-nvvideo4linux2.html#encoder

Note: Only supported on NVIDIA platforms. Only supported on Linux.

4.1.28.1 Example Using gst-launch

This pipeline encodes video to the H.265 format.

```
gst-launch-1.0 videotestsrc num-buffers=2000 ! "video/x-raw,format=(string)I420" !
nvvideoconvert ! "video/x-raw(memory:NVMM)" ! nvv4l2h265enc ! h265parse !
matroskamux ! filesink location=nvv4l2h265enc.mkv
```

4.1.29 rotate

This element transforms the image by rotating it by a specified angle.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/geometrictransform/rotate.html?gi-language=c

4.1.29.1 Example Using gst-launch

```
gst-launch-1.0 -v videotestsrc ! rotate angle=0.78 ! videoconvert ! xvimagesink
```

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

4.1.30 gamma

This element performs gamma correction on a video stream. For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/videofilter/gamma.html?gi-language=c

4.1.30.1 Example Using gst-launch

This pipeline will make the image brighter.

```
gst-launch-1.0 videotestsrc ! gamma gamma=2.0 ! videoconvert ! xvimagesink
```

This pipeline will make the image darker.

```
gst-launch-1.0 videotestsrc ! gamma gamma=0.5 ! videoconvert ! xvimagesink
```

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

4.1.31 videobalance

This element adjusts brightness, contrast, hue, and saturation on a video stream. For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/videofilter/videobalance.html?gi-language=c

4.1.31.1 Example Using gst-launch

This pipeline converts the image to black and white by setting the saturation to 0.0.

```
gst-launch-1.0 videotestsrc ! videobalance saturation=0.0 ! videoconvert !
xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.32 videoflip

This element flips and rotates a video. For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/videofilter/videoflip.html?gi-language=c

4.1.32.1 Example Using gst-launch

This pipeline flips the test image 90 degrees clockwise.

```
gst-launch-1.0 videotestsrc ! videoflip method=clockwise ! videoconvert !
xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.33 videomedian

This element applies a median filter to an image.

For more details, refer to the official documentation at:

https://gstreamer.freedesktop.org/documentation/videofilter/videomedian.html?gi-language=c

4.1.33.1 Example Using gst-launch

This pipeline sets the median of 9 neighbouring pixels.

```
gst-launch-1.0 videotestsrc ! videomedian filtersize=9 ! videoconvert !
xvimagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

4.1.34 nvdec

NVDEC video decoder.

Note:

- Only supported on NVIDIA platforms.
- Refer to the EVA SDK Installation Guide to install NVIDIA Solution for GStreamer before using the MSDK plugin.

4.1.34.1 Example Using gst-launch

```
gst-launch-1.0 filesrc location=4k_h264.mkv ! matroskademux ! h264parse ! nvdec !
videoconvert ! glimagesink sync=false
```

4.1.34.2 Hierarchy

```
GObject
 ╰── GInitiallyUnowned
      ╰── GstObject
           ╰── GstElement
                ╰── GstVideoDecoder
                     ╰── GstNvDec
```

4.1.34.3 Pad Templates

sink

```
video/x-h264:
  stream-format: byte-stream
      alignment: au
video/x-h265:
  stream-format: byte-stream
      alignment: au
video/mpeg:
    mpegversion: {(int)1,(int)2,(int)4}
   systemstream: false
image/jpeg:
video/x-vp8:
video/x-vp9:
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw(memory:GLMemory):
         format: NV12
          width: [ 1, 2147483647 ]
         height: [ 1, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
 texture-target: 2D
```

Presence – *always*

Direction – *src*

4.1.35 nvh264enc

NVENC H.264 Video Encoder.

Note:

- Only supported on NVIDIA platforms.
- Refer to the EVA SDK Installation Guide to install NVIDIA Solution for GStreamer before using the MSDK plugin.

4.1.35.1 Example Using gst-launch

```
gst-launch-1.0 videotestsrc num-buffers=2000 ! nvh264enc ! h264parse !
matroskamux ! filesink location=videotestsrc.mkv
```

4.1.35.2 Hierarchy

```
GObject
    ╰── GInitiallyUnowned
          ╰── GstObject
                ╰── GstElement
                      ╰── GstVideoEncoder
                            ╰── GstNvBaseEnc
                                  ╰── GstNvH264Enc
```

4.1.35.3 Pad Templates

sink

```
video/x-raw:
         format: { (string)NV12, (string)I420}
          width: [ 16, 4096 ]
         height: [ 16, 4096 ]
      framerate: [ 0/1, 2147483647/1 ]
 interlace-mode: { (string)progressive, (string)mixed, (string)interleaved }
video/x-raw(memory:GLMemory):
         format: { (string)NV12, (string}Y444
          width: [ 16, 4096 ]
         height: [ 16, 4096 ]
      framerate: [ 0/1, 2147483647/1 ]
interlace-mode: { (string)progressive, (string)mixed, (string)interleaved }
```

Presence – *always*

Direction – *sink*

src

```
video/x-h264:
          width: [ 16, 4096 ]
         height: [ 16, 4096 ]
      framerate: [ 0/1, 2147483647/1 ]
  stream-format: byte-stream
        profile: (string)high, (string)main, (string)baseline
```

Presence – *always*

Direction – *src*

4.1.35.4 Properties

The properties of the nvh264enc element are inherited from GstNvBaseEnc.

For more details, refer to the *gst-inspect-1.0 nvh264enc* command, or the official documentation at:

https://gstreamer.freedesktop.org/documentation/nvcodec/nvh264enc.html?gi-language=c

4.1.36 nvh265enc

NVENC H.265 Video Encoder.

Note:

- Only supported on NVIDIA platforms.
- Refer to the EVA SDK Installation Guide to install NVIDIA Solution for GStreamer before using the MSDK plugin.

4.1.36.1 Example Using gst-launch

```
gst-launch-1.0 videotestsrc num-buffers=2000 ! nvh265enc ! h265parse !
matroskamux ! filesink location=videotestsrc.mkv
```

4.1.36.2 Hierarchy

```
GObject
  ╰── GInitiallyUnowned
        ╰── GstObject
              ╰── GstElement
                    ╰── GstVideoEncoder
                          ╰── GstNvBaseEnc
                                ╰── GstNvH265Enc
```

4.1.36.3 Pad Templates

sink

```
video/x-raw:
         format: { (string)NV12, (string)I420}
          width: [ 16, 4096 ]
         height: [ 16, 4096 ]
      framerate: [ 0/1, 2147483647/1 ]
video/x-raw(memory:GLMemory):
         format: { (string)NV12, (string}Y444
          width: [ 16, 4096 ]
         height: [ 16, 4096 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

src

```
video/x-h265:
          width: [ 16, 4096 ]
         height: [ 16, 4096 ]
      framerate: [ 0/1, 2147483647/1 ]
  stream-format: byte-stream
        profile: (string)main
```

Presence – *always*

Direction – *src*

4.1.36.4 Properties

The properties of the nvh265enc element are inherited from GstNvBaseEnc.

For more details, refer to the *gst-inspect-1.0 nvh265enc* command, or the official documentation at:

https://gstreamer.freedesktop.org/documentation/nvcodec/nvh265dec.html?gi-language=c

5 Image Analytic Plugins

The following table lists the element of the supported image processing plugins.

Element Name	Plugin Name	Vendor	Version	Description
adtranslator	adtrans	ADLINK	3.0	Translates an inference result into human readable format
adtrans_classifier	adtrans	ADLINK	3.0	ADLINK inference's classification translator
adtrans_ssd	adtrans	ADLINK	3.0	ADLINK inference's ssd translator
adtrans_segment	adtrans	ADLINK	3.0	ADLINK inference's segmentation translator
adtrans_yolo	adtrans	ADLINK	3.0	ADLINK inference's yolo translator
adtrans_fcn	adtrans	ADLINK	3.0	ADLINK inference's fcn translator
adtrans_openpose_py	python	ADLINK	3.0	ADLINK inference’s openpose translator
adrt	adrt	ADLINK	3.0	Initializes TensorRT inference engine plugins to infer a data stream
advino	advino	ADLINK	3.0	Initializes OpenVINO inference engine plugins to infer a data stream
advideobatch	adbatch	ADLINK	3.0	Batch inputs video streams together
adsplitbatch	adbatch	ADLINK	3.0	Splits batched streams into a single stream

5.1 Element Descriptions

This section describes each element of the image analytic plugin in greater detail.

5.1.1 adtranslator

This element implements a buffer list chain function. Previous elements should push a buffer list into this element.

The last buffer the list will be seen as an inference result, passing buffer and dimension information assigned by the user to the translator function.

As the translator function is user-selected, it is important that the user understand the format of the inference result in order to avoid unexpected results from passing incorrect dimensions or using the wrong translator.

Some neural networks require users to provide a model input size to convert to the correct coordinates.

5.1.1.1 Examples Using gst-launch

The following pipeline translates the OpenVINO inference result using the classification type model with *classifier* topology into a human-readable format.

```
gst-launch-1.0 videotestsrc ! advino model=classification.xml device=GPU !
adtranslator dims=1,1000 topology=Classifier label=label.txt ! ximagesink
```

The following pipeline translates the OpenVINO inference result using the detection type model with *ssd* topology into a human-readable format.

```
gst-launch-1.0 videotestsrc ! advino model=ssd.xml device=GPU ! adtranslator
dims=1,1,200,7 topology=ssd label=label.txt ! ximagesink
```

The following pipeline translates the OpenVINO inference result using the segmentation type model with *segment* topology into a human-readable format.

```
gst-launch-1.0 videotestsrc ! advino model=segment.xml device=GPU ! adtranslator
dims=1,1024,2048 topology=segment label=label.txt ! ximagesink
```

The following pipeline translates the OpenVINO inference result using the detection type model with *yolov3* topology into a human-readable format. When using yolov3 topology for OpenVINO inference, the engine-type property needs to be set to “openvino”.

```
gst-launch-1.0 videotestsrc ! advino model=yolov3.xml device=GPU ! adtranslator
dims=1,255,26,26,1,255,52,52,1,255,13,13 input_width=416 input_height=416
topology=yolov3 engine-type=openvino label=label.txt ! ximagesink
```

The following pipeline translates the TensorRT inference result using the classification type model with *classifier* topology into a human-readable format.

```
gst-launch-1.0 videotestsrc ! adrt model=mobilenetv2.engine batch=1 scale=0.017 !
adtranslator topology=classifier dims=1,1000 label=labels.txt ! ximagesink
```

The following pipeline translates the TensorRT inference result using the detection type model with *ssd* topology into a human-readable format.

```
gst-launch-1.0 videotestsrc ! adrt model=ssd_mobilenetv2_tx2.engine batch=1
device=0 scale=0.0078 mean="0 0 0" ! adtranslator topology=ssd dims=1,1,100,7
label=ssd_mobilenetv2_RT_labels.txt ! ximagesink
```

The following pipeline translates the TensorRT inference result using the detection type model with *yolov3* topology into a human-readable format. When using yolov3 topology for TensorRT inference, the engine-type property needs to be set to “tensorrt”.

```
gst-launch-1.0 videotestsrc ! adrt model=yolov3_608_tx2.engine scale=0.004 mean="0
0 0" device=0 batch=1 ! adtranslator label=yolo_RT_labels.txt topology=yolov3
dims=1,255,19,19,1,255,38,38,1,255,76,76 input_width=608 engine-type=tensorrt !
ximagesink
```

The following pipeline translates the OpenVINO inference result using the segmentation type model with *fcn* topology into a human-readable format.

```
gst-launch-1.0 videotestsrc ! adrt model=FCN-Alexnet-Cityscapes-SD_tx2.engine
scale=1.0 mean="0 0 0" device=0 batch=1 ! adtranslator label=cityscapes-labels.txt
topology=fcn dims=1,3,512,1024,21,10,26 ! ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

The following table lists topologies and thier corresponding dimension formats.

Topology	Dimension
classifier	dims = n,X • n: batch size • X: output dimension, commonly equal to object classes
ssd	dims = n,1, X,7 • n: batch size • X: Number of detectable objects; depends on the training setting of the model. Common values are 100,200,400
yolov3	dims = n,a,x,x,n,a,y,y,n,a,z,z • n: batch size • a: a value related to the number of object classes (X). Calculated by a = (X + 5) x 3. i.e. 80 classes means a = (80 + 5) x 3 = 255 • x,y,z: value depends on output layer of the Yolov3 model; normal value is: input_layer_dimension/32, input_layer_dimension/16, input_layer_dimension/8. i.e. input layer is 416 x 416 so x,y,z is 13,26,52. Order depends on models.
segment	dims = n,h,w dims = n,c,h,w (get highest probability in each c channel for every pixel of width and height) • n: batch size • c: number of channels of output image • h: height of output layer dimension • w: width of output layer dimension
fcn	dims = n,c,h,w,X,a,b • n: batch size • c: number of channels of output image • h: height of output image • w: width of output image • X: number of object classes • a: height of output layer dimension • b: width of output layer dimension

5.1.1.2 Hierarchy

```
GObject
 ╰── GInitiallyUnowned
      ╰── GstObject
           ╰── GstElement
                ╰──Adtranslator
```

5.1.1.3 Pad Templates

sink

```
ANY
```

Presence – *always*

Direction – *sink*

src

```
ANY
```

Presence – *always*

Direction – *src*

5.1.1.4 Properties

topology

```
"topology" AdAITopologyPattern
```

Topology of neural network:

- classifier
- yolov3
- ssd
- segment
- fcn

Flags: Read, Write

Default value: 0, "none"

AdAITopologyPattern

Members

(0): none
(1): classifier
(2): yolov3
(3): ssd
(4): segment
(6): fcn

Engine-type

```
“engine-type” AdAIEnginePattern
```

Topology of neural network:

- openvino (1)
- tensorrt (2)

Flags: Read, Write

Default value: 0, "none"

Note: This parameter only works with the Yolov3 topology. Other topologies can be used with both types of engines, so there is no need to set this property.

AdAIEnginePattern

Members

(0): none - Non-specific engine
(1): openvino - OpenVINO inference engine
(2): tensorrt - TensorRT inference engine

label

```
“label” gchararray
```

The path of a label file.

The label file content needs to conform to the following format:

- Each line is one class
- Class can be string or number

Flags: Read, Write

Default value: 0, NULL

dims

```
“dims” gchar
```

Dimension of inference result, separated by a comma.

Flags: Read, Write

Default value: NULL

input-width

```
“input-width” gint
```

Neural network's input width. If the property isn’t assigned a value, it is the same as input-height. Required by Yolo model.

Flags: Read, Write

Default value: 0

Input-height

```
"input-height" gint
```

Neural network's input height. If the property isn't assigned a value, it is the same as input-width. Required by Yolo model.

Flags: Read, Write

Default value: 0

5.1.2 adtrans_classifier

This element implements a buffer list chain function. Previous elements should push a buffer list into this element.

The last buffer in the list will be seen as an inference result.

5.1.2.1 Examples Using gst-launch

The following pipeline translates the OpenVINO inference result using the classification type model into a human-readable format.

```
gst-launch-1.0 videotestsrc ! advino model=classification.xml device=GPU !
adtrans_classifier class-num=1000 label=label.txt ! ximagesink
```

The following pipeline translates the TensorRT inference result using the classification type model into a human-readable format.

```
gst-launch-1.0 videotestsrc ! adrt model=mobilenetv2.engine batch=1 scale=0.017 !
adtrans_classifier class-num=1000 label=labels.txt ! ximagesink
```

Note: The element 'xvimagesink' is only support on Linux. It is recommended to use the 'glimagesink' or 'd3dvideosink' elements to display the window on Windows.

5.1.2.2 Hierarchy

```
GObject
    ╰── GInitiallyUnowned
            ╰── GstObject
                    ╰── GstElement
                          ╰──AdtransClassifier
```

5.1.2.3 Pad Templates

sink

```
ANY
```

Presence – *always*

Direction – *sink*

src

```
ANY
```

Presence – *always*

Direction – *src*

5.1.2.4 Properties

batch-num

```
"batch-num" gint
```

The number of the deep learning model batches. Range: 1 to 256

Flags: Read, Write

Default value: 1

class-num

```
"class-num" gint
```

The classification number. Range: 1000 to 65535

Flags: Read, Write

Default value: 1000

label

```
"label" gchararray
```

The deep learning model label.

Flags: Read, Write

Default value: NULL

5.1.3 adtrans_ssd

This element implements a buffer list chain function. Previous elements should push a buffer list into this element. The last buffer in the list will be seen as an inference result.

5.1.3.1 Examples Using gst-launch

The following pipeline translates the OpenVINO inference result using the ssd type model into a human-readable format.

```
gst-launch-1.0 videotestsrc ! advino model=ssd.xml device=GPU ! adtrans_ssd max-
count=200 label=label.txt ! ximagesink
```

The following pipeline translates the TensorRT inference result using the ssd type model into a human-readable format.

```
gst-launch-1.0 videotestsrc ! adrt model=ssd_mobilenetv2_tx2.engine batch=1
device=0 scale=0.0078 mean="0 0 0" ! adtrans_ssd max-count=200 label=label.txt !
ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

5.1.3.2 Hierarchy

```
GObject
    └── GInitiallyUnowned
          └── GstObject
                └── GstElement
                     └──AdtransSSD
```

5.1.3.3 Pad Templates

sink

`ANY`

Presence – *always*

Direction – *sink*

src

`ANY`

Presence – *always*

Direction – *src*

5.1.3.4 Properties

batch-num

`“batch-num” gint`

The number of the deep learning model batch. Range: 1 to 256

Flags: Read, Write

Default value: 1

max-count

`“max-count” gint`

The maximum count of the SSD results. Range: 1 to 65535

Flags: Read, Write

Default value: 200

threshold

```
"threshold" gfloat
```

The threshold of the inference result. Range: 0 to 1

Flags: Read, Write

Default value: 0.8

label

```
"label" gchararray
```

The deep learning model label.

Flags: Read, Write

Default value: NULL

5.1.4 adtrans_segment

This element implements a buffer list chain function. Previous elements should push a buffer list into this element. The last buffer in the list will be seen as an inference result.

5.1.4.1 Examples Using gst-launch

The following pipeline translates the OpenVINO inference result using the segmentation type model into a human-readable format.

```
gst-launch-1.0 videotestsrc ! advino model=segment.xml device=GPU !
adtrans_segment blob-height=1024 blob-width=2048 only-max-prob=true ! ximagesink
```

The following pipeline translates the TensorRT inference result using the segmentation type model with *fcn* topology into a human-readable format.

```
gst-launch-1.0 videotestsrc ! adrt model=road.engine scale=1.0 mean="0 0 0"
device=0 batch=1 ! adtrans_segment class-num=4 blob-height=512 blob-width=896 !
ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

5.1.4.2 Hierarchy

```
GObject
 ╰── GInitiallyUnowned
       ╰── GstObject
             ╰── GstElement
                   ╰──AdtransSegment
```

5.1.4.3 Pad Templates

sink

```
ANY
```

Presence – *always*

Direction – *sink*

src

```
ANY
```

Presence – *always*

Direction – *src*

5.1.4.4 Properties

batch-num

```
"batch-num" gint
```

The batch number of the deep learning model. Range: 1 to 256

Flags: Read, Write

Default value: 1

class-num

```
"class-num" gint
```

The class number of the deep learning model. Range: 1 to 65535

Flags: Read, Write

Default value: 1

blob-width

```
"blob-width" gint
```

The blob width of the deep learning inference result. Range: 1 to 65535

Flags: Read, Write

Default value: 640

blob-height

```
"blob-height" gint
```

The blob height of the deep learning inference result. Range: 1 to 65535

Flags: Read, Write

Default value: 640

only-max-prob

```
"only-max-prob" gboolean
```

Keep the remaining maximum probability class of the Inference result. If this is true, the element will ignore the class-num property.

Flags: Read, Write

Default value: false

label

```
"label" gchararray
```

The deep learning model label.

Flags: Read, Write

Default value: NULL

5.1.5 adtrans_yolo

This element implements a buffer list chain function. Previous elements should push a buffer list into this element. The last buffer in the list will be seen as an inference result.

5.1.5.1 Examples Using gst-launch

The following pipeline translates the OpenVINO inference result using the yolov3 type model into a human-readable format.

```
gst-launch-1.0 videotestsrc ! advino model=yolov3.xml device=GPU ! adtran_yolo
label=yolo_VINO_labels.txt mask="(3,4,5),(0,1,2),(6,7,8)" blob-size=26,52,13
input-width=416 input-height=416 ! ximagesink
```

The following pipeline translates the TensorRT inference result using the detection type model with *yolov3* topology into a human-readable format.

```
gst-launch-1.0 videotestsrc ! adrt model=yolov3_608_tx2.engine scale=0.004 mean="0
0 0" device=0 batch=1 ! adtran_yolo label=yolo_RT_labels.txt blob-size="13,26,52"
mask="(6,7,8),(3,4,5),(0,1,2)" ! ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

5.1.5.2 Hierarchy

```
GObject
    ╰── GInitiallyUnowned
          ╰── GstObject
                ╰── GstElement
                     ╰──AdtransYolo
```

5.1.5.3 Pad Templates

sink

```
ANY
```

Presence – *always*

Direction – *sink*

src

```
ANY
```

Presence – *always*

Direction – *src*

5.1.5.4 Properties

batch-num

```
"batch-num" gint
```

The batch number of the deep learning model. Range: 1 to 256

Flags: Read, Write

Default value: 1

class-num

```
"class-num" gint
```

The class number of the deep learning model. Range: 1 to 65535

Flags: Read, Write

Default value: 80

blob-size

```
"blob-size" gchararray
```

Inference output blob's output width and height. You can use commas to define multiple output blob sizes. For example: '52,26,13' indicates three output blob sizes. You can also define blob sizes by WxH, for example: '26x42,52x68,13x19'

Flags: Read, Write

Default value: "52,26,13"

mask

`“mask” gchararray`

Yolo mask

Flags: Read, Write

Default value: "(0,1,2),(3,4,5),(6,7,8)"

anchor

`“anchor” gchararray`

Yolo anchor

Flags: Read, Write

Default value: "(10,13),(16,30),(33,23),(30,61),(62,45),(59,119),(116,90),(156,198),(373,326)"

input-width

`“input-width” gint`

Input width of image. Range: 1 to 65535

Flags: Read, Write

Default value: 416

input-height

`“input-height” gint`

Input height of image. Range: 1 to 65535

Flags: Read, Write

Default value: 416

threshold

`“threshold” gfloat`

The threshold of the inference result. Range: 0 to 1

Flags: Read, Write

Default value: 0.8

label

`“label” gchararray`

The deep learning model label.

Flags: Read, Write

Default value: NULL

5.1.6 adtrans_fcn

This element implements a buffer list chain function. Previous elements should push a buffer list into this element. The last buffer the list will be seen as an inference result.

5.1.6.1 Example Using gst-launch

The following pipeline translates the TensorRT inference result using the fcn type model into a human-readable format.

```
gst-launch-1.0 videotestsrc ! adrt model=FCN-Alexnet-Cityscapes-SD_tx2.engine
scale=1.0 mean="0 0 0" device=0 batch=1 ! adtrans_fcn class-num=21 blob-height=10
blob-width=26 input-width=1024 input-height=512! ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

5.1.6.2 Hierarchy

```
GObject
    ╰── GInitiallyUnowned
            ╰── GstObject
                    ╰── GstElement
                          ╰──AdtransFCN
```

5.1.6.3 Pad Templates

sink

```
ANY
```

Presence – *always*

Direction – *sink*

src

```
ANY
```

Presence – *always*

Direction – *src*

5.1.6.4 Properties

batch-num

```
"batch-num" gint
```

The batch number of the deep learning model. Range: 1 to 256

Flags: Read, Write

Default value: 1

class-num

`“class-num” gint`

The class number of the FCN deep learning model. Range: 1 to 65535

Flags: Read, Write

Default value: 21

input-width

`“input-width” gint`

The FCN deep learning model input width. Range: 1 to 65535

Flags: Read, Write

Default value: 1024

input-height

`“input-height” gint`

The FCN deep learning model input height. Range: 1 to 65535

Flags: Read, Write

Default value: 512

blob-width

`“blob-width” gint`

The FCN inference result blob width. Range: 1 to 65535

Flags: Read, Write

Default value: 26

blob-height

`“blob-height” gint`

The FCN inference result blob height. Range: 1 to 65535

Flags: Read, Write

Default value: 10

label

`“label” gchararray`

The deep learning model label.

Flags: Read, Write

Default value: NULL

5.1.7 adtrans_openpose_py

This element implements a buffer list chain function. Previous elements should push a buffer list into this element. The last buffer in the list will be seen as an inference result.

5.1.7.1 Example Using gst-launch

The following pipeline translates the TensorRT inference result using the pose estimation model into a human-readable format. Used mode reference at https://github.com/Daniil-Osokin/lightweight-human-pose-estimation.pytorch.

```
gst-launch-1.0 videotestsrc ! adrt model=pose-b1.engine scale=0.0039 mean="128 128
128" ! adtrans_openpose_py blob-size='(19,32,57),(38,32,57)' input-height=256
input-width=456 ! ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

5.1.7.2 Hierarchy

```
GObject
    ╰── GInitiallyUnowned
          ╰── GstObject
                ╰── GstElement
                      ╰──adtrans_openpose+adtrans_openposePy
```

5.1.7.3 Pad Templates

sink

`ANY`

Presence – *always*

Direction – *sink*

src

`ANY`

Presence – *always*

Direction – *src*

5.1.7.4 Properties

batch-num

`“batch-num” gint`

The number of the deep learning model batch. Range: 1 to 256

Flags: Read, Write

Default value: 1

blob-size

```
"blob-size" gchararry
```

The inference output blob's output width and height. You can use commas to define multiple output blob sizes. For example: '52,26,13' indicates three output blob size.s You can also define blob sizes by WxH, for example: '26x42,52x68,13x19'

Flags: Read, Write

Default value: NULL

input-width

```
"input-width" gint
```

Input width of the pose estimation deep learning model. Range: 1 to 65535

Flags: Read, Write

Default value: 416

input-height

```
"input-height" gint
```

Input hieght of the pose estimation deep learning model. Range: 1 to 65535

Flags: Read, Write

Default value: 416

label-file

```
"label-file" gchararray
```

The deep learning model label.

Flags: Read, Write

Default value: NULL

threshold

```
"threshold" gfloat
```

The inference result threshold. Range: 0 to 1

Flags: Read, Write

Default value: 0.8

5.1.8 adrt

Initializes the TensorRT inference engine plugins to infer a data stream with the following parameters.

1. TensorRT optimized engine model path
2. Scale (must be a float number)
3. Mean (must be a string of 3 numbers representing a vector of mean values used in training)

For more details about converting a model for TensorRT, refer to the chapter Convert for TensorRT Model.

Note: Only supported on NVIDIA platforms.

5.1.8.1 Example Using gst-launch

```
gst-launch-1.0 videotestsrc pattern=snow ! adrt model=classification.engine
scale=0.017 mean="103.94 116.78 123.68" batch=1 device=0 ! fakesink
```

5.1.8.2 Hierarchy

```
GObject
 ╰── GInitiallyUnowned
      ╰── GstObject
           ╰── GstElement
                ╰──AdTSRT
```

5.1.8.3 Pad Templates

sink

```
video/x-raw:
          format: {BGR}
           width: [ 0, 2147483647 ]
          height: [ 0, 2147483647 ]
       framerate: [ 0/1, 2147483647/1 ]
video/x-raw(ANY):
          format: {BGR}
           width: [ 0, 2147483647 ]
          height: [ 0, 2147483647 ]
       framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw:
         format: {BGR}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
video/x-raw(ANY):
         format: {BGR}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

5.1.8.4 Properties

model

`"model" gchararray`

The path where the TensorRT optimized engine is located.

Flags: Read / Write

Default value: NULL

scale

`"scale" gfloat`

Sets the scale needed to apply to input data. Scale is to normalize the input to corresponding range. Please refer to https://en.wikipedia.org/wiki/Feature_scaling

Flags: Read / Write

Default value: 1.0

mean

`"mean" gchararray`

Sets the mean vector value needed to apply to input data. The mean value of the dataset is the mean value of the pixels of all the images across all the color channels (e.g. RBG). Grey scale images will have just one mean value and color images like ImageNet will have 3 mean values.

Flags: Read / Write

Default value: "103.94 116.78 123.68"

device

`"device" gchararray`

Selects which GPU will be used to inference, use GPU index start from 0.

Flags: Read / Write

Default value: "0"

batch

```
"batch" guit
```

Batch size of input to inference (number of image to inference at same time) need at least 1.

Flags: Read / Write

Default value: 1

rgbconv

```
"rebconv" gboolean
```

Sets whether to convert the color format of an input image to RGB.

Flags: Read / Write

Default value: false

5.1.9 advino

Initializes the OpenVINO inference engine plugins to infer a data stream with the following parameters.

1. OpenVINO optimized engine Model path
2. Inference device type: (1) CPU<default>; (2) GPU; (3) VPU; (4) FPGA; (5) MYRIAD (Reference: OpenVINO support devices link)

Some MYRIAD boards contain multiple MYRIAD cores, so users can inference a specific core or select one via the OpenVINO inference scheduler.

The following command can query the available devices.

```
$ python3 -c "from openvino.inference_engine import IECore;
print(IECore().available_devices)"

['CPU', 'GPU', 'HDDL', 'MYRIAD.7.1-ma2480', 'MYRIAD.7.2-ma2480']
```

This element pushes a buffer list where the last buffer is the inference result raw data needed to be analyzed by the next element, and the other result is the original incoming frame buffer.

Unexpected results can occur if you pipe an element that does not implement a buffer list chain function.

For more details, refer to Convert for OpenVINO Model.

Note: Only supported on Intel platforms.

5.1.9.1 Example Using gst-launch

```
gst-launch-1.0 videotestsrc pattern=snow ! advino model=yolov3.xml ! fakesink
```

5.1.9.2 Hierarchy

```
GObject
 ╰── GInitiallyUnowned
      ╰── GstObject
           ╰── GstElement
                ╰──AdVINO
```

5.1.9.3 Pad Templates

sink

```
video/x-raw:
         format: {BGR}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
video/x-raw(ANY):
         format: {BGR}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw:
         format: {BGR}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
video/x-raw(ANY):
         format: {BGR}
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

5.1.9.4 Properties

model

`“model” gchararray`

The path where the OpenVINO optimized engine is located.

Flags: Read / Write

Default value: NULL

scale

`“scale” gfloat`

Sets the scale needed to apply to input data.

Flags: Read / Write

Default value: 1.0

mean

`“mean” gchararray`

Sets the mean vector value needed to apply to input data.

Flags: Read / Write

Default value: NULL

device

`“device” gchararray`

Deep learning device, ex: CPU, GPU or MYRIAD. User may also using following command to list available devices. "python3 -c 'from openvino.inference_engine import IECore; print(IECore().available_devices)'"

Flags: Read / Write

Default value: "CPU"

batch

`“batch” guit`

Batch size of input to inference (number of image to inference at same time). Must be at least 1.

Flags: Read / Write

Default value: 1

rgbconv

`“rebconv” gboolean`

Sets whether to convert the color format of an input image to RGB.

Flags: Read / Write

Default value: false

5.1.10 advideobatch

This element batches multiple streams to a single vertical stream fitting the data format of the inference engine and collects all admeta data of the individual streams into batch meta data.

5.1.10.1 Example Using gst-launch

```
gst-launch-1.0 advideobatch name=mix ! videoconvert ! ximagesink \
 videotestsrc pattern="red" ! admetawriter devinfo=dev1.txt count-frame=TRUE !
mix.sink_0 \
 videotestsrc pattern="blue" ! admetawriter devinfo=dev1.txt count-frame=TRUE !
mix.sink_1
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

5.1.10.2 Hierarchy

```
GObject
     ╰──GInitiallyUnowned
         ╰──GstObject
             ╰──GstElement
                 ╰──AdVideoBatch
```

5.1.10.3 Pad Templates

sink_%u

```
video/x-raw:
         format: { BGR }
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw:
         format: { BGR }
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *src*

5.1.11 adsplitbatch

A batched stream is a stream in which each of its frames is the combination of several smaller frames from several sources. This element will split a batched stream frame back to its original component frames and display it sequentially as a single stream.

This element must run after an advideobatch element with admeta data in its stream.

Note: The fps of the stream at sink pad will be equal to the number of batched streams multiplied with the fps of the src stream. For example, a stream of 30fps with a batch of 4 will generate a stream of 120fps.

5.1.11.1 Example Using gst-launch

```
gst-launch-1.0 advideobatch name=mix ! videoconvert ! adsplitbatch !
videoconvert ! ximagesink \
 videotestsrc pattern="red" ! admetawriter devinfo=dev1.txt count-frame=TRUE !
mix.sink_0 \
 videotestsrc pattern="blue" ! admetawriter devinfo=dev1.txt count-frame=TRUE !
mix.sink_1 \
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

5.1.11.2 Hierarchy

```
GObject
    ╰── GInitiallyUnowned
            ╰── GstObject
                    ╰── GstElement
                          ╰──AdSplitBatch
```

5.1.11.3 Pad Templates

sink_%u

```
video/x-raw:
         format: { BGR }
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *sink*

src

```
video/x-raw:
         format: { BGR }
          width: [ 0, 2147483647 ]
         height: [ 0, 2147483647 ]
      framerate: [ 0/1, 2147483647/1 ]
```

Presence – *always*

Direction – *src*

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6 Connector Plugins

The following table lists the element of the supported connector plugins.

Element Name	Plugin Name	Vendor	Version	Description
rtspclientsink	rtspclientsink	GStreamer	1.16.2	Send data over the network via RTSP RECORD(RFC 2326)

6.1 Element Descriptions

This section describes each element of the connector plugins in greater detail.

6.1.1 rtspclientsink

This element can send data over the network via RTSP RECORD(RFC 2326). For more details, refer to the official documentation at: https://gstreamer.freedesktop.org/documentation/rtspclientsink/plugin-index.html?gi-language=c#rtspclientsink-page

6.1.1.1 Examples Using gst-launch

Open a test source and send the raw RTP packets to a connected RTSP server.

```
gst-launch-1.0 videotestsrc ! x264enc ! rtspclientsink
location=rtsp://some.server/url
```

An open source tool, rtsp-simple-server, is located in EVA_INSTALLED_PATH\bin\third-party for testing. For more details, refer to the official documentation at: https://github.com/aler9/rtsp-simple-server.

In Linux, set publishUser and publishPass as adlinkpublisher, and set readerUser and readerPass as adlinkreader in the yml configuration file. For all other settings, use the defaults. Execute the binary file to run the server first. Then, use rtspclientsink from the sender site, as shown below, to send image data to an rtsp server channel (e.g. streamName) where SERVERIP is the RTSP server's IP address.

```
gst-launch-1.0 videotestsrc ! x264enc option-
string="bitrate=800:ratetol=1.06:deblock:partitions=i8x8i4x4p8x8b8x8:me=hex:subme=6
:merange=16:keyint=250:min-
keyint=25:scenecut=40:ipratio=0.71:qcomp=0.6:qpmin=10:qpmax=51:qpstep=4:ref=2:trell
is=1:no-cabac:bframes=0:level=30" ! rtspclientsink
location=rtsp://adlinkpublisher:adlinkpublisher@SERVERIP:8554/streamName
```

The relevant rtspsrc to receive the data:

```
gst-launch-1.0 rtspsrc
location=rtsp://adlinkreader:adlinkreader@SERVERIP:8554/streamName ! rtph264depay !
h264parse ! avdec_h264 ! videoconvert ! ximagesink
```

If using MSDK for transcoding, see the following similar example.

```
gst-launch-1.0 videotestsrc ! video/x-raw,format=NV12 ! msdkh264enc rate-
control=cqp qpi=28 qpp=28 qpb=28 gop-size=30 num-slices=1 ref-frames=1 b-frames=2
target-usage=4 hardware=true ! rtspclientsink
location=rtsp://adlinkpublisher:adlinkpublisher@SERVERIP:8554/streamName
```

The relevant rtspsrc to receive the data:

```
gst-launch-1.0 rtspsrc
location=rtsp://adlinkreader:adlinkreader@SERVERIP:8554/streamName ! rtph264depay !
h264parse ! msdkh264dec hardware=true ! videoconvert ! video/x-raw, format=I420 !
ximagesink
```

Note: The element ‘xvimagesink’ is only support on Linux. It is recommended to use the ‘glimagesink’ or ‘d3dvideosink’ elements to display the window on Windows.

7 Convert for OpenVINO Model

7.1 Model Optimizer Developer Guide

Model Optimizer is a cross-platform command-line tool that facilitates the transition between the training and deployment environment, performs static model analysis, and adjusts deep learning models for optimal execution on end-point target devices. Refer to the official documentation at:
https://docs.openvinotoolkit.org/latest/_docs_MO_DG_Deep_Learning_Model_Optimizer_DevGuide.html

7.2 Converting a Caffe* Model

For more details on converting a Caffe* Model, refer to the official documentation at:
https://docs.openvinotoolkit.org/latest/_docs_MO_DG_prepare_model_convert_model_Convert_Model_From_Caffe.html

7.3 Converting a TensorFlow* Model

For more details on converting a TensorFlow* Model, refer to the official documentation at:
https://docs.openvinotoolkit.org/latest/_docs_MO_DG_prepare_model_convert_model_Convert_Model_From_TensorFlow.html

7.4 Converting an ONNX* Model

For more details on converting an ONNX* Model, refer to the official documentation at:
https://docs.openvinotoolkit.org/latest/_docs_MO_DG_prepare_model_convert_model_Convert_Model_From_ONNX.html

7.5 Converting a Tensorflow YoloV3 Model

For more details on converting a Tensorflow YoloV3 Model, refer to the official documentation at:
https://docs.openvinotoolkit.org/latest/openvino_docs_MO_DG_prepare_model_convert_model_tf_specific_Convert_YOLO_From_Tensorflow.html

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8 Convert for TensorRT Model

Basic understanding of Deep Learning Neural networks is required.

It is very important that each GPU architecture can only use the converted engine of the corresponding Compute Capability (CC) (https://en.wikipedia.org/wiki/CUDA). For example, the TX2 CC is 6.2, so an engine converted on TX2 can only run on other devices with CC 6.2, they cannot run on another PASCAL GPU like the P1000 (CC 6.1), or Tesla P100 (CC 6.0).

Download and install the TensorRT command-line wrapper tool “trtexec” from:
https://github.com/NVIDIA/TensorRT/tree/master/samples/opensource/trtexec

If TensorRT is installed, trtexec is prebuilt and installed in the following path.

```
On Linux: /usr/src/tensorrt/bin/trtexec

On Windows: [TensorRT install Path]/bin/trtexec.exe
```

8.1 Build TensorRT Engine Parameters

TensorRT supports the ONNX, Caffe, and UFF models.

8.1.1 ONNX Model

Parameter	Description
--onnx=<file>	Path to ONNX model
--output=<name>[,<name>]*	Output layer name, ONNX not required

8.1.2 Caffe Model

Parameter	Description
--model=<file>	Path to Caffe weight
--deploy=<file>	Path to Caffe prototxt
--output=<name>[,<name>]*	Output layer name (required)

8.1.3 UFF Model

Parameter	Description
--uff=<file>	Path to UFF model file
--uffInput=<name>,X,Y,Z	Input layer and dimension (required)
--output=<name>[,<name>]*	Output layer name (required)
--uffNHWC	If specified, the input X,Y,Z will be used as H,W,C. Default is C,H,W

8.1.4 Build Options

Parameter	Description
--calib=<file>	Read INT8 calibration cache file, required if --int8
--explicitBatch	Use explicit batch sizes when building the engine (default = implicit)
--fp16	Enable fp16 mode (default = disabled)
--int8	Run in int8 mode. (default = disabled)
--maxBatch=<int>	Set max batch size and build an implicit batch engine. (default = 1)
--plugins=<file>	Plugin library (.so) to load (can be specified multiple times). This is a customized plugin which contains unsupported layers. Needs to be in CUDA code.
--saveEngine=<file>	Save the TensorRT engine as <file>
--workspace=N	Set workspace size to N megabytes. (default = 16) Set as big as possible for maximum converting speed.

8.2 Convert Tensorflow models

TensorRT does not support the Tensorflow model. The Tensorflow models must be converted to a UFF model or an ONNX model.

8.2.1 Convert Tensorflow to UFF

For more details on converting a TensorFlow model stream to a UFF mode, refer to the official documentation at: https://docs.nvidia.com/deeplearning/tensorrt/api/python_api/uff/uff.html

8.2.2 Convert Tensorflow to ONNX

For more details on converting a TensorFlow model stream to an ONNX mode, refer to the official documentation at: https://github.com/onnx/tensorflow-onnx

8.3 Samples

8.3.1 Convert Yolov3.onnx to FP32 or FP16 engine file

Follow this link to convert yolo to onnx: https://github.com/jkjung-avt/tensorrt_demos/blob/master/yolo/yolo_to_onnx.py

More information can be found at: https://github.com/jkjung-avt/tensorrt_demos/tree/master/yolo

8.3.1.1 FP32

```
Linux:

/usr/src/tensorrt/bin/trtexec --onnx=yolov3.onnx --workspace=3000
--maxBatch=4 --verbose --saveEngine=yolov3.engine

Windows:

trtexec.exe --onnx=yolov3.onnx --workspace=3000 --maxBatch=4 --
verbose --saveEngine=yolov3.engine
```

8.3.1.1 FP16

```
Linux:

/usr/src/tensorrt/bin/trtexec --onnx=yolov3.onnx --workspace=3000
--maxBatch=4 --fp16 --verbose --saveEngine=yolov3_fp16.engine

Windows:

trtexec.exe --onnx=yolov3.onnx --workspace=3000 --maxBatch=4 --
fp16 --verbose --saveEngine=yolov3_fp16.engine
```

8.3.1.2 Parameters

Parameter	Description
--onnx=yolov3.onnx	Load onnx file path
--workspace=3000	Set GPU memory in MB to allow TensorRT to use to build engine. Optimal setting is around 80% of all memory.
--maxBatch=4	Build engine will allow maximum input batch size = 4
--saveEngine=yolov3.engine	Save the final engine to yolov3.engine file
--verbose	Display more information
--fp16	Set model to fp16 precision
--buildOnly	Reduce 10s for testing model, and only build and save engine. (Optional)

8.3.2 Convert googlenet caffe model to FP32 or FP16 engine file

Download model from https://github.com/BVLC/caffe/tree/master/models/bvlc_googlenet.

Caffemodel contains two files: prototxt and caffemodel. To inference, deploy.prototxt is normally required.

When converting the Caffe model, input the output layer name. In the above link, the input layer is "Input" and the output layer is "prob".

8.3.2.1 FP32

```
Linux:

/usr/src/tensorrt/bin/trtexec --model=bvlc_googlenet.caffemodel -
-deploy=deploy.prototxt --output=prob --workspace=3000 --
maxBatch=4 --verbose --saveEngine=googlenet.engine

Windows:

trtexec.exe --model=bvlc_googlenet.caffemodel --
deploy=deploy.prototxt --output=prob --workspace=3000 --
maxBatch=4 --verbose --saveEngine=googlenet.engine
```

8.3.2.2 FP16

```
Linux:

/usr/src/tensorrt/bin/trtexec --model=bvlc_googlenet.caffemodel -
-deploy=deploy.prototxt --output=prob --workspace=3000 --fp16 --
maxBatch=4 --verbose --saveEngine=googlenet_fp16.engine

Windows:

trtexec.exe --model=bvlc_googlenet.caffemodel --
deploy=deploy.prototxt --output=prob --workspace=3000 --fp16 --
maxBatch=4 --verbose --saveEngine=googlenet_fp16.engine
```

8.3.2.3 Parameters

Parameter	Description
--deploy=deploy.prototxt	Load prototxt file path
--model=bvlc_googlenet.caffemodel	Load model file path
--output=prob	Set output layer name
--workspace=3000	Set GPU memory in MB to allow TensorRT to use to build engine. Optimal setting is around 80% of all memory.
--maxBatch=4	Build engine will allow maximum input batch size = 4
--saveEngine=googlenet.engine	Save the final engine to googlenet.engine file
--fp16	Set model to fp16 precision
--verbose	Display more information
--buildOnly	Reduce 10s for testing model, and only build and save engine. (Optional)

8.3.3 Convert ssd_inception_v2 uff model to FP32 or FP16 engine file

The models are generated from:
https://github.com/NVIDIA/TensorRT/tree/master/samples/opensource/sampleUffSSD

When converting the UFF model, input the output layer and input layer names. In the above link, the input layer is "Input" with dimensions of 3x300x300, and the output layer is "NMS".

8.3.3.1 FP32

```
Linux:

/usr/src/tensorrt/bin/trtexec --uff=sample_ssd_relu6.uff --output=NMS --
uffInput=Input,3,300,300 --workspace=3000 --saveEngine=ssdv2.engine --verbose --
maxBatch=4

Windows:

trtexec.exe --uff=sample_ssd_relu6.uff --output=NMS --uffInput=Input,3,300,300 -
-workspace=3000 --saveEngine=ssdv2.engine --verbose --maxBatch=4
```

8.3.3.2 FP16

```
Linux:

/usr/src/tensorrt/bin/trtexec --uff=sample_ssd_relu6.uff --output=NMS --
uffInput=Input,3,300,300 --workspace=3000 --saveEngine=ssdv2_fp16.engine --
verbose --maxBatch=4 --fp16

Windows:

Trtexec.exe --uff=sample_ssd_relu6.uff --output=NMS --uffInput=Input,3,300,300 -
-workspace=3000 --saveEngine=ssdv2_fp16.engine --verbose --maxBatch=4 --fp16
```

8.3.3.3 Parameters

Parameter	Description
--uff	Load uff file path
--uffInput=Input,3,300,300	Set input layer name and input layer dimension
--output=NMS	Set output layer name
--workspace=3000	Set GPU memory in MB to allow TensorRT to use to build engine. Optimal setting is around 80% of all memory.
--maxBatch=4	Build engine will allow maximum input batch size = 4
--saveEngine=mobilenet_ssdv2.engine	Save the final engine to ssdv2.engine file
--fp16	Set model to fp16 precision
--verbose	Display more information
--buildOnly	Reduce 10s for testing model, and only build and save engine. (Optional)

Safety Instructions

Read and follow all instructions marked on the product and in the documentation before you operate your system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User's Manual for later reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment, turn off the power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources.
  - Keep equipment away from high heat or high humidity.
  - Keep equipment properly ventilated (do not block or cover ventilation openings).
  - Make sure to use recommended voltage and power source settings.
  - Always install and operate equipment near an easily accessible electrical socket-outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings.
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

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