DepthAI SDK Docs

Release 1.13.1

Luxonis

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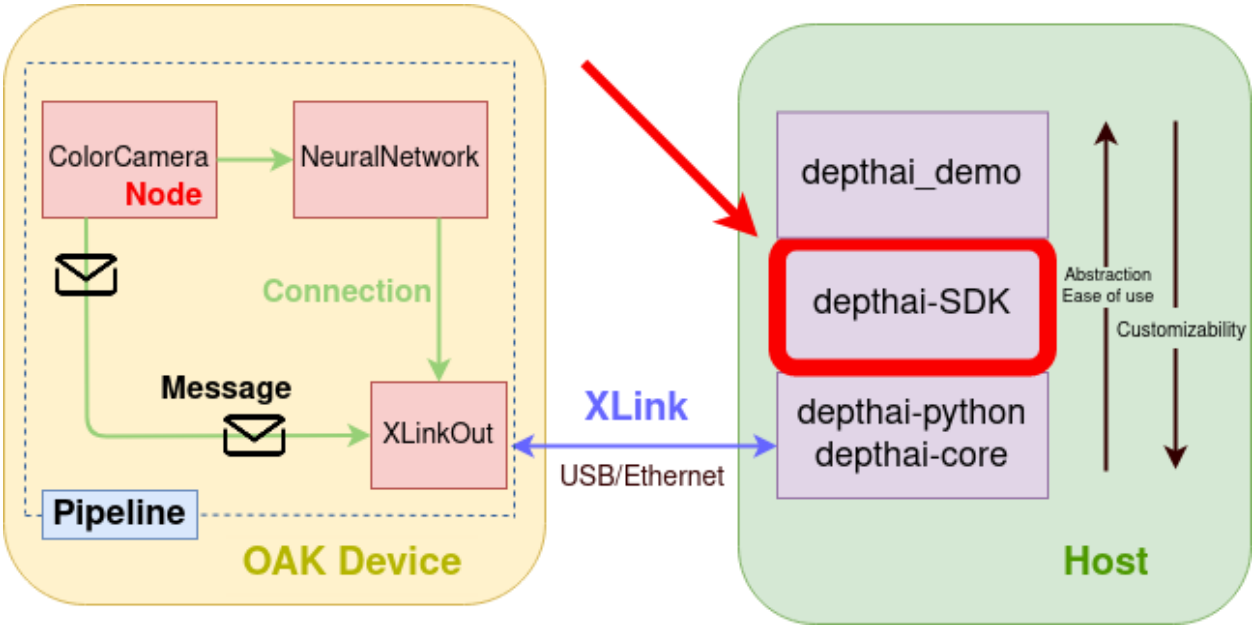
GETTING STARTED

DepthAI SDK is a Python package built on top of the depthai-python API library that **improves ease of use when developing apps for OAK devices**.



Note: DepthAI SDK is in **alpha stage** until **depthai-sdk 2.0**, so there will likely be API changes during the development.

CHAPTER

ONE

QUICKSTART

The DepthAI SDK is a powerful tool for building computer vision applications using Luxonis devices. This quickstart guide will help you get started with the SDK.

1.1 Installation

DepthAI SDK is available on PyPI. You can install it with the following command:

```
# Linux and macOS
python3 -m pip install depthai-sdk

# Windows
 py -m pip install depthai-sdk
```

1.2 Working with camera

The `OakCamera` class is a fundamental part of the DepthAI SDK, providing a high-level interface for accessing the features of the OAK device. This class simplifies the creation of pipelines that capture video from the OAK camera, run neural networks on the video stream, and visualize the results.

With `OakCamera`, you can easily create color and depth streams using the `create_camera()` and `create_stereo()` methods respectively, and add pre-trained neural networks using the `create_nn()` method. Additionally, you can add custom callbacks to the pipeline using the `callback()` method and record the outputs using the `record()` method.

1.2.1 Blocking behavior

When starting the `OakCamera` object, you can specify whether the `start()` method should block the main thread or not. By default, the `start()` method does not block the main thread, which means you will need to manually poll the camera using the `oak.poll()` method.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p')
    oak.visualize([color])
    oak.start(blocking=False)
```

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```
    while oak.running():
        oak.poll()
        # this code is executed while the pipeline is running
```

Alternatively, setting the `blocking` argument to `True` will loop and continuously poll the camera, blocking the rest of the code.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p')
    oak.visualize([color])
    oak.start(blocking=True)
    # this code doesn't execute until the pipeline is stopped
```

1.3 Creating color and depth streams

To create a color stream we can use the `OakCamera.create_camera()` method. This method takes the name of the sensor as an argument and returns a `CameraComponent` object.

The full list of supported sensors: `color`; `left`; `right`; `cam_{socket},color`, `cam_{socket},mono`, where `{socket}` is a letter from A to H representing the socket on the OAK device. Custom socket names are usually used for FFC devices.

To visualize the stream, we can use the `OakCamera.visualize()` method. This method takes a list of outputs and displays them. Each component has its own outputs, which can be found in the *Components* section.

Here is an example which creates color and depth streams and visualizes the stream:

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p')
    stereo = oak.create_stereo(resolution='800p')  # works with stereo devices only!
    oak.visualize([color, stereo])
    oak.start(blocking=True)
```

1.4 Creating YOLO neural network for object detection

DepthAI SDK provides a number of pre-trained neural networks that can be used for object detection, pose estimation, semantic segmentation, and other tasks. To create a neural network, we can use the `OakCamera.create_nn()` method and pass the name of the neural network as an argument.

Similarly to the `OakCamera.create_camera()` method, the `OakCamera.create_nn()` method returns a `NNComponent` object.

Here is an example which creates a YOLO neural network for object detection and visualizes the results:

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p')
```

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```
    # List of models that are supported out-of-the-box by the SDK:
    # https://docs.luxonis.com/projects/sdk/en/latest/features/ai_models/#sdk-
↪supported-models
    yolo = oak.create_nn('yolov6n_coco_640x640', input=color)

    oak.visualize([color, yolo])
    oak.start(blocking=True)
```

1.5 Adding custom callbacks

Callbacks are functions that are called when a new frame is available from the camera or neural network. `OakCamera` provides a mechanism for adding custom callbacks to the pipeline using the `OakCamera.callback()` method.

Here is an example which creates a YOLO neural network for object detection and prints the number of detected objects:

```
from depthai_sdk import OakCamera

def print_num_objects(packet):
    print(f'Number of objects detected: {len(packet.detections)}')

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p')
    yolo = oak.create_nn('yolov6n_coco_640x640', input=color)

    oak.callback(yolo, callback=print_num_objects)
    oak.start(blocking=True)
```

1.6 Recording

DepthAI SDK provides a simple API for recording the outputs. The `OakCamera.record()` method takes a list of outputs and a path to the output file. Here is an example which creates a YOLO neural network for object detection and records the results:

```
from depthai_sdk import OakCamera
from depthai_sdk.record import RecordType

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p')
    yolo = oak.create_nn('yolov6n_coco_640x640', input=color)

    oak.record([color, yolo], path='./records', record_type=RecordType.VIDEO)
    oak.start(blocking=True)
```

There are several formats supported by the SDK for recording the outputs:

1. `depthai_sdk.record.RecordType.VIDEO` - record video files.
2. `depthai_sdk.record.RecordType.MCAP` - record MCAP files.
3. `depthai_sdk.record.RecordType.BAG` - record ROS bag files.

You can find more information about recording in the *Recording* section.

1.7 Output syncing

There is a special case when one needs to synchronize multiple outputs. For example, recording color stream and neural network output at the same time. In this case, one can use the `OakCamera.sync()`. This method takes a list of outputs and returns a synchronized output to the specified callback function. Here is an example which synchronizes color stream and YOLO neural network output:

```
from depthai_sdk import OakCamera

def callback(synced_packets):
    print(synced_packets)

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p')
    yolo = oak.create_nn('yolov6n_coco_640x640', input=color)

    oak.sync([color.out.main, yolo.out.main], callback=callback)
    oak.start(blocking=True)
```

1.8 Encoded streams

Luxonis devices support on-device encoding of the outputs to `H.264`, `H.265` and `MJPEG` formats. To enable encoding, we should simply pass the `encode` argument to the `OakCamera.create_camera()` or `OakCamera.create_stereo()` methods. Possible values for the `encode` argument are `h264`, `h265` and `mjpeg`.

Each component has its own encoded output:

- `CameraComponent.Out.encoded`
- `StereoComponent.Out.encoded`
- `NNComponent.Out.encoded`

Here is an example which visualizes the encoded color, YOLO neural network and disparity streams:

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p', fps=20, encode='h264')
    stereo = oak.create_stereo('400p', encode='h264')
    yolo = oak.create_nn('yolov6nr3_coco_640x352', input=color)

    oak.visualize([color.out.encoded, stereo.out.encoded, yolo.out.encoded])
    oak.start(blocking=True)
```

CHAPTER

TWO

COMPONENTS

Components are part of the OakCamera class and abstract DepthAI API nodes; their initialization, configuration, and linking. This improves ease of use when developing OAK aplications.

2.1 Available components

- *CameraComponent*
- *NNComponent*
- *StereoComponent*
- *IMUComponent*

2.2 Reference

2.2.1 CameraComponent

CameraComponent abstracts ColorCamera and MonoCamera nodes and supports mocking the camera when recording is passed during OakCamera initialization. When using *Replaying* feature, this component will mock the camera by sending frames from the host to the OAK device (via XLinkIn node).

Usage

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    # Create color camera
    color = oak.create_camera('color')

    # Visualize color camera frame stream
    oak.visualize(color.out.main, fps=True)
    # Start the pipeline, continuously poll
    oak.start(blocking=True)
```

Component outputs

- `main` - Uses one of the outputs below.
- `camera` - Default output. Streams either ColorCamera's video (NV12) or MonoCamera's out (GRAY8) frames. Produces *FramePacket*.
- `replay` - If we are using *Replaying* feature. It doesn't actually stream these frames back to the host, but rather sends read frames to syncing mechanism directly (to reduce bandwidth by avoiding loopback). Produces *FramePacket*.
- `encoded` - If we are encoding frames, this will send encoded bitstream to the host. When visualized, it will decode frames (using cv2.imdecode for MJPEG, or pyav for H.26x). Produces *FramePacket*.

Reference

2.2.2 IMUComponent

IMUComponent abstracts IMU node and its configuration.

Usage

```
from depthai_sdk import OakCamera
from depthai_sdk.classes import IMUPacket

with OakCamera() as oak:
    imu = oak.create_imu()
    imu.config_imu(report_rate=400, batch_report_threshold=5)

    def callback(packet: IMUPacket):
        print(packet)

    oak.callback(imu.out.main, callback=callback)
    oak.start(blocking=True)
```

Component outputs

- `main` - Main output, produces *IMUPacket*.

Reference

2.2.3 NNComponent

NNComponent abstracts sourcing & decoding *AI models*, creating a DepthAI API node for neural inferencing, object tracking, and MultiStage pipelines setup. It also supports Roboflow integration.

DepthAI API nodes

For neural inference, NNComponent will use DepthAI API node:

- If we are using MobileNet-SSD based AI model, this component will create MobileNetDetectionNetwork (or MobileNetSpatialDetectionNetwork if `spatial` argument is set).
- If we are using YOLO based AI model, this component will create YoloDetectionNetwork (or YoloSpatialDetectionNetwork if `spatial` argument is set).
- If it's none of the above, component will create NeuralNetwork node.

If `tracker` argument is set and we have YOLO/MobileNet-SSD based model, this component will also create ObjectTracker node, and connect the two nodes togeter.

Usage

```
from depthai_sdk import OakCamera, ResizeMode

with OakCamera(recording='cars-tracking-above-01') as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('vehicle-detection-0202', color, tracker=True)
    nn.config_nn(resize_mode='stretch')

    oak.visualize([nn.out.tracker, nn.out.passthrough], fps=True)
    oak.start(blocking=True)
```

Component outputs

- `main` - Default output. Streams NN results and high-res frames that were downscaled and used for inferencing. Produces *DetectionPacket* or *TwoStagePacket* (if it's 2. stage NNComponent).
- `passthrough` - Default output. Streams NN results and passthrough frames (frames used for inferencing). Produces *DetectionPacket* or *TwoStagePacket* (if it's 2. stage NNComponent).
- `spatials` - Streams depth and bounding box mappings (`SpatialDetectionNework.boundingBoxMapping`). Produces *SpatialBbMappingPacket*.
- `twostage_crops` - Streams 2. stage cropped frames to the host. Produces *FramePacket*.
- `tracker` - Streams ObjectTracker's tracklets and high-res frames that were downscaled and used for inferencing. Produces *TrackerPacket*.
- `nn_data` - Streams NN raw output. Produces *NNDataPacket*.

Decoding outputs

NNComponent allows user to define their own decoding functions. There is a set of standardized outputs:

- *Detections*
- *SemanticSegmentation*
- *ImgLandmarks*
- *InstanceSegmentation*

Note: This feature is still in development and is not guaranteed to work correctly in all cases.

Example usage:

```
import numpy as np
from depthai import NNData

from depthai_sdk import OakCamera
from depthai_sdk.classes import Detections

def decode(nn_data: NNData):
    layer = nn_data.getFirstLayerFp16()
    results = np.array(layer).reshape((1, 1, -1, 7))
    dets = Detections(nn_data)

    for result in results[0][0]:
        if result[2] > 0.5:
            dets.add(result[1], result[2], result[3:])

    return dets


def callback(packet: DetectionPacket, visualizer: Visualizer):
    detections: Detections = packet.img_detections
    ...


with OakCamera() as oak:
    color = oak.create_camera('color')

    nn = oak.create_nn(..., color, decode_fn=decode)

    oak.visualize(nn, callback=callback)
    oak.start(blocking=True)
```

Reference

General (standarized) NN outputs, to be used for higher-level abstractions (eg. automatic visualization of results). "SDK supported NN models" will have to have standard NN output, so either dai.ImgDetections, or one of the outputs below. If the latter, model json config will incldue handler.py logic for decoding to the standard NN output. These will be integrated into depthai-core, bonus points for on-device decoding of some popular models.

class depthai_sdk.classes.nn_results.**Detection**(*img_detection: Union[NoneType, depthai.ImgDetection, depthai.SpatialImgDetection]*, *label_str: str*, *confidence: float*, *color: Tuple[int, int, int]*, *bbox: depthai_sdk.visualize.bbox.BoundingBox*, *angle: Union[int, NoneType]*, *ts: Union[datetime.timedelta, NoneType]*)

img_detection: **Union[None, depthai.ImgDetection, depthai.SpatialImgDetection]**

label_str: **str**

confidence: float

color: Tuple[int, int, int]

bbox: depthai_sdk.visualize.bbox.BoundingBox

angle: Optional[int]

ts: Optional[datetime.timedelta]

property top_left

property bottom_right

class depthai_sdk.classes.nn_results.**TrackingDetection**(*img_detection: Union[NoneType, depthai.ImgDetection, depthai.SpatialImgDetection], label_str: str, confidence: float, color: Tuple[int, int, int], bbox: depthai_sdk.visualize.bbox.BoundingBox, angle: Union[int, NoneType], ts: Union[datetime.timedelta, NoneType], tracklet: depthai.Tracklet, filtered_2d: depthai_sdk.visualize.bbox.BoundingBox, filtered_3d: depthai.Point3f, speed: Union[float, NoneType]*)

tracklet: depthai.Tracklet

filtered_2d: depthai_sdk.visualize.bbox.BoundingBox

filtered_3d: depthai.Point3f

speed: Optional[float]

property speed_kmph

property speed_mph

class depthai_sdk.classes.nn_results.**TwoStageDetection**(*img_detection: Union[NoneType, depthai.ImgDetection, depthai.SpatialImgDetection], label_str: str, confidence: float, color: Tuple[int, int, int], bbox: depthai_sdk.visualize.bbox.BoundingBox, angle: Union[int, NoneType], ts: Union[datetime.timedelta, NoneType], nn_data: depthai.NNData*)

nn_data: depthai.NNData

class depthai_sdk.classes.nn_results.**GenericNNOutput**(*nn_data*)
Generic NN output, to be used for higher-level abstractions (eg. automatic visualization of results).

getTimestamp()

Return type datetime.timedelta

getSequenceNum()

Return type int

class depthai_sdk.classes.nn_results.**ExtendedImgDetection**(*angle: int*)

class depthai_sdk.classes.nn_results.**Detections**(*nn_data*, *is_rotated=False*)
Detection results containing bounding boxes, labels and confidences. Optionally can contain rotation angles.

class depthai_sdk.classes.nn_results.**SemanticSegmentation**(*nn_data*, *mask*)
Semantic segmentation results, with a mask for each class.

Examples: *DeeplabV3*, *Lanenet*, *road-segmentation-adas-0001*.

mask: **List[numpy.ndarray]**

class depthai_sdk.classes.nn_results.**ImgLandmarks**(*nn_data*, *landmarks=None*, *landmarks_indices=None*, *pairs=None*, *colors=None*)
Landmarks results, with a list of landmarks and pairs of landmarks to draw lines between.

Examples: *human-pose-estimation-0001*, *openpose2*, *facial-landmarks-68*, *landmarks-regression-retail-0009*.

class depthai_sdk.classes.nn_results.**InstanceSegmentation**(*nn_data*, *masks*, *labels*)
Instance segmentation results, with a mask for each instance.

masks: **List[numpy.ndarray]**

labels: **List[int]**

2.2.4 StereoComponent

`StereoComponent` abstracts StereoDepth node, its configuration, filtering (eg. WLS filter), and disparity/depth viewing.

Usage

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    # Create stereo component, initialize left/right MonoCamera nodes for 800P and␣
↪60FPS
    stereo = oak.create_stereo('800p', fps=60)

    # Visualize normalized and colorized disparity stream
    oak.visualize(stereo.out.depth)
    # Start the pipeline, continuously poll
    oak.start(blocking=True)
```

Component outputs

- `main` - Default output. Uses `depth`.
- `disparity` - Streams StereoDepth's disparity frames to the host. When visualized, these get normalized and colorized. Produces *DepthPacket*.
- `depth` - Streams StereoDepth's depth frames to the host. When visualized, depth gets converted to disparity (for nicer visualization), normalized and colorized. Produces *DepthPacket*.
- `rectified_left` - Streams StereoDepth's rectified left frames to the host.
- `rectified_right` - Streams StereoDepth's rectified right frames to the host.
- `encoded` - Provides an encoded version of `disparity` stream.

Reference

CHAPTER

THREE

PACKETS

Packets are **synchronized collections** of one or more DepthAI messages. They are used **internally for visualization** and also forwarded to the callback function if the user:

1. Specified a callback for visualizing of an output via `OakCamera.visualize(..., callback=fn)`.
2. Used callback output via `OakCamera.callback(..., callback=fn, enable_visualizer=True)`.

3.1 API Usage

1. `OakCamera.visualize()`: In the example below SDK won't show the frame to the user, but instead it will send the packet to the callback function. SDK will draw detections (bounding boxes, labels) on the `packet.frame`.
2. `OakCamera.callback()`: This will also send *`DetectionPacket`* to the callback function, the only difference is that the SDK won't draw on the frame, so you can draw detections on the frame yourself.

Note: If you specify callback function in `OakCamera.visualize()`, you need to trigger drawing of detections yourself via `Visualizer.draw()` method.

```
import cv2
from depthai_sdk import OakCamera
from depthai_sdk.classes import DetectionPacket

with OakCamera() as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('mobilenet-ssd', color)

    # Callback
    def cb(packet: DetectionPacket):
        print(packet.img_detections)
        cv2.imshow(packet.name, packet.frame)

    # 1. Callback after visualization:
    oak.visualize(nn.out.main, fps=True, callback=cb)

    # 2. Callback:
    oak.callback(nn.out.main, callback=cb, enable_visualizer=True)

    oak.start(blocking=True)
```

3.2 Reference

3.2.1 FramePacket

class depthai_sdk.classes.packets.**FramePacket**(*name*, *msg*)

Contains only dai.ImgFrame message and cv2 frame, which is used by visualization logic.

property frame

get_timestamp()

Return type datetime.timedelta

get_sequence_num()

Return type int

set_decode_codec(*get_codec*)

Parameters **get_codec** (*Callable*) –

decode()

Return type Optional[numpy.ndarray]

get_size()

Return type Tuple[int, int]

3.2.2 SpatialBbMappingPacket

class depthai_sdk.classes.packets.**SpatialBbMappingPacket**(*name*, *msg*, *spatials*, *disp_scale_factor*)

Output from Spatial Detection nodes - depth frame + bounding box mappings. Inherits FramePacket.

prepare_visualizer_objects(*vis*)

Prepare visualizer objects (boxes, lines, text, etc.), so visualizer can draw them on the frame.

Parameters

- **visualizer** – Visualizer object.
- **vis** (depthai_sdk.visualize.visualizer.Visualizer) –

Return type None

3.2.3 DetectionPacket

class depthai_sdk.classes.packets.**DetectionPacket**(*name*, *msg*, *dai_msg*, *bbox*)

Output from Detection Network nodes - image frame + image detections. Inherits FramePacket.

prepare_visualizer_objects(*vis*)

Prepare visualizer objects (boxes, lines, text, etc.), so visualizer can draw them on the frame.

Parameters

- **visualizer** – Visualizer object.
- **vis** (depthai_sdk.visualize.visualizer.Visualizer) –

Return type None

3.2.4 NNDataPacket

class depthai_sdk.classes.packets.**NNDataPacket**(*name*, *nn_data*)
Contains only dai.NNData message

get_timestamp()

Return type datetime.timedelta

get_sequence_num()

Return type int

3.2.5 DepthPacket

class depthai_sdk.classes.packets.**DepthPacket**(*name*, *msg*)

3.2.6 TrackerPacket

class depthai_sdk.classes.packets.**TrackerPacket**(*name*, *msg*, *tracklets*, *bbox*)
Output of Object Tracker node. Tracklets + Image frame. Inherits FramePacket.

prepare_visualizer_objects(*visualizer*)
Prepare visualizer objects (boxes, lines, text, etc.), so visualizer can draw them on the frame.

Parameters **visualizer** (depthai_sdk.visualize.visualizer.Visualizer) – Visualizer object.

Return type None

3.2.7 TwoStagePacket

class depthai_sdk.classes.packets.**TwoStagePacket**(*name*, *msg*, *img_detections*, *nn_data*, *labels*, *bbox*)
Output of 2-stage NN pipeline; Image frame, Image detections and multiple NNData results. Inherits DetectionPacket.

3.2.8 IMUPacket

class depthai_sdk.classes.packets.**IMUPacket**(*name*, *packet*, *rotation=None*)

get_imu_vals()
Returns imu values in a tuple. Returns in format (accelerometer_values, gyroscope_values, quaternion, magnetometer_values)

Return type Tuple[Sequence, Sequence, Sequence, Sequence]

get_timestamp()

Return type datetime.timedelta

get_sequence_num()

Return type int

CHAPTER

FOUR

VISUALIZER

DepthAI SDK visualizer serves as a tool to visualize the output of the DepthAI pipeline.

It can be used to visualize the output of the camera, neural network, depth and disparity map, the rectified streams, the spatial location of the detected objects, and more.

4.1 Getting Started

Visualizer is created upon calling `OakCamera.visualize()`, which returns *Visualizer* instance. Once it is created, the visualizer configs can be modified using *output()*, *stereo()*, *text()*, *detections()*, *tracking()* methods.

Example how *Visualizer* can be created:

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    cam = oak.create_camera('color')
    visualizer = oak.visualize(cam.out.main)
    oak.start(blocking=True)
```

Visualizer is primarily used alongside with *Packets* in `depthai_sdk.oak_outputs` module.

4.2 Configs

Visualizer is configurable via *VisConfig* that consists of five auxiliary configs: *OutputConfig*, *StereoConfig*, *TextConfig*, *DetectionConfig*, and *TrackingConfig*. Each config's type has its own set of parameters, which effects how the corresponding object will be visualized.

There are the following methods for modifying the default configuration: *output()*, *stereo()*, *text()*, *detections()*, *tracking()*. The arguments should be passed as key-value arguments with the same signature as the corresponding config, e.g., *Visualizer.text(font_size=2, font_color=(255,123,200))*.

The modified configuration will be applied to every created objects. The methods support fluent interface and can be chained, e.g., *Visualizer.text(font_size=2).detections(color=(255, 0, 0))*.

Example how to configure the visualizer:

```
visualizer = oak.visualize(camera.out.main)
visualizer.detections(
    bbox_style=BboxStyle.RECTANGLE,
    label_position=TextPosition.MID,
```

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```
).text(
    auto_scale=True
)
```

4.3 Objects

Visualizer operates with objects. Objects can be seen as a hierarchical structure. The root object is `self`, and the children are the list of the created objects. *add_child* should be used to add the object to the children list. The parent object shares the config and frame shape with all children.

All objects must be derived from *GenericObject*.

Implemented objects:

- *VisDetections*,
- *VisText*,
- *VisLine*,
- VisCircle,
- *VisTrail*.

Objects can be added to the visualizer using the following methods:

- *add_text()*,
- *add_detections()*,
- *add_trail()*,
- *add_circle()*,
- *add_line()*.

4.4 Create your own object

If the provided functionality is not enough, you can create your own object. To do so, you need to create a class derived from *GenericObject* and implement the *prepare*, *serialize*, and `draw` methods. The `draw` method should draw the object on the passed `frame` argument.

```
class YourOwnObject:
    def __init__(self, ...):
        ...

    def prepare(self) -> None:
        ...

    def serialize(self) -> str:
        ...

    def draw(self, frame) -> None:
        ...

with OakCamera() as oak:
```

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```
    cam = oak.create_camera(...)
    visualizer = cam.visualize(cam.out.main)
    visualizer.add_object(YourOwnObject(...))
```

4.5 Example usage

The following script will visualize the output of face detection model:

```
from depthai_sdk import OakCamera
from depthai_sdk.visualize.configs import BboxStyle, TextPosition

with OakCamera() as oak:
    camera = oak.create_camera('color')

    det = oak.create_nn('face-detection-retail-0004', camera)

    visualizer = oak.visualize(det.out.main, fps=True)
    visualizer.detections(
        color=(0, 255, 0),
        thickness=2,
        bbox_style=BboxStyle.RECTANGLE,
        label_position=TextPosition.MID,
    ).text(
        font_color=(255, 255, 0),
        auto_scale=True
    ).tracking(
        line_thickness=5
    )

    oak.start(blocking=True)
```

4.6 Serialization

The visualizer provides a way to serialize the output objects to JSON, which can be used for further processing.

4.6.1 JSON schemas

General config

```
{
  "frame_shape": {
    "type": "array",
    "items": {
      "type": "integer"
    },
    "description": "Frame shape in (height, width) format."
  },
  "config": {
    "type": "object",
```

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```
    "output": {
      "img_scale": {
        "type": "number",
        "minimum": 0.0,
        "maximum": 1.0,
        "default": 1.0,
        "description": "Scale of output image."
      },
      "show_fps": {
        "type": "boolean",
        "default": false,
        "description": "Show FPS on output image."
      },
      "clickable": {
        "type": "boolean",
        "default": false,
        "description": "Show disparity or depth value on mouse hover."
      }
    },
    "stereo": {
      "type": "object",
      "colorize": {
        "type": "integer",
        "default": 2,
        "description": "cv2 colormap."
      },
      "colormap": {
        "type": "integer",
        "default": 2,
        "description": "0 - gray, 1 - color, 2 - blended color and depth."
      },
      "wls_filter": {
        "type": "boolean",
        "default": false
      },
      "wls_lambda": {
        "type": "number",
        "default": 8000.0
      },
      "wls_sigma": {
        "type": "number",
        "default": 1.5
      }
    },
    "detection": {
      "type": "object",
      "thickness": {
        "type": "integer",
        "default": 1
      },
      "fill_transparency": {
        "type": "number",
        "default": 0.15,
        "minimum": 0.0,
        "maximum": 1.0,
        "description": "Transparency of bbox fill."
      },
```

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```
      "box_roundness": {
        "type": "integer",
        "default": 0,
        "description": "Roundness of bbox corners, used only when bbox_style is set␣
↪to BboxStyle.ROUNDED_*."
      },
      "color": {
        "type": "array",
        "items": {
          "type": "integer"
        },
        "default": [0, 255, 0],
        "description": "Default bbox color in RGB format."
      },
      "bbox_style": {
        "type": "integer",
        "default": 0,
        "description": "``depthai_sdk.visualize.configs.BBoxStyle`` enum value."
      },
      "line_width": {
        "type": "number",
        "default": 0.5,
        "minimum": 0.0,
        "maximum": 1.0,
        "description": "Horizontal line width of bbox."
      },
      "line_height": {
        "type": "number",
        "default": 0.5,
        "minimum": 0.0,
        "maximum": 1.0,
        "description": "Vertical line height of bbox."
      },
      "hide_label": {
        "type": "boolean",
        "default": false,
        "description": "Hide class label on output image."
      },
      "label_position": {
        "type": "integer",
        "default": 0,
        "description": "``depthai_sdk.visualize.configs.TextPosition`` enum value."
      },
      "label_padding": {
        "type": "integer",
        "default": 10,
        "description": "Padding between label and bbox."
      }
    },
    "text": {
      "font_face": {
        "type": "integer",
        "default": 0,
        "description": "cv2 font face."
      },
      "font_color": {
        "type": "array",
```

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```
        "items": {
          "type": "integer"
        },
        "default": [255, 255, 255],
        "description": "Font color in RGB format."
      },
      "font_transparency": {
        "type": "number",
        "default": 0.5,
        "minimum": 0.0,
        "maximum": 1.0
      },
      "font_scale": {
        "type": "number",
        "default": 1.0
      },
      "font_thickness": {
        "type": "integer",
        "default": 2
      },
      "font_position": {
        "type": "integer",
        "default": 0,
        "description": "``depthai_sdk.visualize.configs.TextPosition`` enum value."
      },
      "bg_transparency": {
        "type": "number",
        "default": 0.5,
        "minimum": 0.0,
        "maximum": 1.0,
        "description": "Text outline transparency."
      },
      "bg_color": {
        "type": "array",
        "items": {
          "type": "integer"
        },
        "default": [0, 0, 0],
        "description": "Text outline color in RGB format."
      },
      "line_type": {
        "type": "integer",
        "default": 16,
        "description": "cv2 line type."
      },
      "auto_scale": {
        "type": "boolean",
        "default": true,
        "description": "Automatically scale font size based on bbox size."
      }
    },
    "tracking": {
      "max_length": {
        "type": "integer",
        "default": -1,
        "description": "Maximum length of tracking line, -1 for infinite."
      },
```

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```
      "deletion_lost_threshold": {
        "type": "integer",
        "default": 5,
        "description": "Number of frames after which lost track is deleted."
      },
      "line_thickness": {
        "type": "integer",
        "default": 1
      },
      "fading_tails": {
        "type": "boolean",
        "default": false,
        "description": "Enable fading tails - reduces line thickness over time."
      },
      "line_color": {
        "type": "array",
        "items": {
          "type": "integer"
        },
        "default": [255, 255, 255],
        "description": "Tracking line color in RGB format."
      },
      "line_type": {
        "type": "integer",
        "default": 16,
        "description": "cv2 line type."
      }
    },
    "circle": {
      "thickness": {
        "type": "integer",
        "default": 1
      },
      "color": {
        "type": "array",
        "items": {
          "type": "integer"
        },
        "default": [0, 255, 0],
        "description": "Circle color in RGB format."
      },
      "line_type": {
        "type": "integer",
        "default": 16,
        "description": "cv2 line type."
      }
    }
  },
  "objects": {
    "type": "array",
    "items": {
      "type": "object"
    },
    "description": "Array of objects (e.g. detection, text, line).",
    "default": []
  }
}
```

Objects

- Detection:

```
{
  "type": "detections",
  "detections": {
    "type": "array",
    "items": {
      "type": "object",
      "bbox": {
        "type": "array",
        "items": {
          "type": "number"
        },
        "description": "bbox absolute coordinates in format [x1, y1, x2, y2]"
      },
      "label": {
        "type": "string",
        "description": "class label"
      },
      "color": {
        "type": "array",
        "items": {
          "type": "integer"
        },
        "description": "bbox color in RGB format"
      }
    }
  },
  "children": {
    "type": "array",
    "items": {
      "type": "object"
    },
    "description": "array of child objects (e.g. detection, text, line)",
    "default": []
  }
}
```

- Text:

```
{
  "type": "text",
  "text": {
    "type": "plain_text"
  },
  "coords": {
    "type": "array",
    "items": {
      "type": "number"
    },
    "description": "The absolute coordinates of the text in the format (x1, y1)."
  }
}
```

- Line:

```
{
  "type": "line",
  "pt1": {
    "type": "array",
    "items": {
      "type": "number"
    },
    "description": "Absolute (x, y) coordinates of the first point."
  },
  "pt2": {
    "type": "array",
    "items": {
      "type": "number"
    },
    "description": "Absolute (x, y) coordinates of the second point."
  },
  "children": {
    "type": "array",
    "items": {
      "type": "object"
    },
    "description": "array of child objects (e.g. detection, text, line).",
    "default": []
  }
}
```

Example JSON output

```
{
  "frame_shape": [720, 1280],
  "config": {
    "output": {
      "img_scale": 1.0,
      "show_fps": false,
      "clickable": true
    },
    "stereo": {
      "colorize": 2,
      "colormap": 2,
      "wls_filter": false,
      "wls_lambda": 8000,
      "wls_sigma": 1.5
    },
    "detection": {
      "thickness": 1,
      "fill_transparency": 0.15,
      "box_roundness": 0,
      "color": [0, 255, 0],
      "bbox_style": 0,
      "line_width": 0.5,
      "line_height": 0.5,
      "hide_label": false,
      "label_position": 0,
      "label_padding": 10
    },
    "text": {
```

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```
      "font_face": 0,
      "font_color": [255, 255, 255],
      "font_transparency": 0.5,
      "font_scale": 1.0,
      "font_thickness": 2,
      "font_position": 0,
      "bg_transparency": 0.5,
      "bg_color": [0, 0, 0],
      "line_type": 16,
      "auto_scale": true
    },
    "tracking": {
      "max_length": -1,
      "deletion_lost_threshold": 5,
      "line_thickness": 1,
      "fading_tails": false,
      "line_color": [255, 255, 255],
      "line_type": 16
    },
    "circle": {
      "thickness": 1,
      "color": [255, 255, 255],
      "line_type": 16
    }
  },
  "objects": [
    {
      "type": "detections",
      "detections": [
        {
          "bbox": [101, 437, 661, 712],
          "label": "laptop",
          "color": [210, 167, 218]
        }
      ],
      "children": [
        {
          "type": "text",
          "text": "Laptop",
          "coords": [111, 469]
        }
      ]
    }
  ]
}
```

4.7 References

class depthai_sdk.visualize.visualizer.**Visualizer**(*scale=None*, *fps=False*)

add_object(*obj*)
Call *set_config*, *set_frame_shape* and *prepare* for the object and add it to the list of objects. :param obj: The object to add.

Returns self

Parameters **obj** (depthai_sdk.visualize.objects.GenericObject) –

Return type *depthai_sdk.visualize.visualizer.Visualizer*

add_bbox(*bbox*, *color=None*, *thickness=None*, *bbox_style=None*, *label=None*)
Add a bounding box to the visualizer.

Parameters

- **bbox** (*depthai_sdk.visualize.bbox.BoundingBox*) – Bounding box.
- **label** (*Optional[str]*) – Label for the detection.
- **thickness** (*Optional[int]*) – Bounding box thickness.
- **color** (*Optional[Tuple[int, int, int]]*) – Bounding box color (RGB).
- **bbox_style** (*Optional[depthai_sdk.visualize.configs.BboxStyle]*) – Bounding box style (one of depthai_sdk.visualize.configs.BboxStyle).

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

add_detections(*detections*, *normalizer=None*, *label_map=None*, *spatial_points=None*, *label_color=None*, *label_background_color=None*, *label_background_transparency=None*, *is_spatial=False*, *bbox=None*)
Add detections to the visualizer.

Parameters

- **detections** (*List[Union[depthai.ImgDetection, depthai.Tracklet]]*) – List of detections.
- **normalizer** (*Optional[depthai_sdk.visualize.bbox.BoundingBox]*) – Normalizer object.
- **label_map** (*Optional[List[Tuple[str, Tuple]]]*) – List of tuples (label, color).
- **spatial_points** (*Optional[List[depthai.Point3f]]*) – List of spatial points. None if not spatial.
- **label_color** (*Optional[Tuple[int, int, int]]*) – Color for the label.
- **label_background_color** (*Optional[Tuple[int, int, int]]*) – Color for the label background.
- **label_background_transparency** (*Optional[float]*) – Transparency for the label background.
- **is_spatial** – Flag that indicates if the detections are spatial.

- **bbox** (*Optional[Union[numpy.ndarray, Tuple[int, int, int, int]]]*) – Bounding box, if there's a detection inside a bounding box.

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

add_text(*text*, *coords=None*, *size=None*, *color=None*, *thickness=None*, *outline=True*, *background_color=None*, *background_transparency=0.5*, *bbox=None*, *position=<TextPosition.TOP_LEFT: 0>*, *padding=10*)

Add text to the visualizer.

Parameters

- **text** (*str*) – Text.
- **coords** (*Optional[Tuple[int, int]]*) – Coordinates.
- **size** (*Optional[int]*) – Size of the text.
- **color** (*Optional[Tuple[int, int, int]]*) – Color of the text.
- **thickness** (*Optional[int]*) – Thickness of the text.
- **outline** (*bool*) – Flag that indicates if the text should be outlined.
- **background_color** (*Optional[Tuple[int, int, int]]*) – Background color.
- **background_transparency** (*float*) – Background transparency.
- **bbox** (*Optional[Union[numpy.ndarray, Tuple, depthai_sdk.visualize.bbox.BoundingBox]]*) – Bounding box.
- **position** (depthai_sdk.visualize.configs.TextPosition) – Position.
- **padding** (*int*) – Padding.

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

add_trail(*tracklets*, *label_map*, *bbox=None*)

Add a trail to the visualizer.

Parameters

- **tracklets** (*List[depthai.Tracklet]*) – List of tracklets.
- **label_map** (*List[Tuple[str, Tuple]]*) – List of tuples (label, color).
- **bbox** (*Optional[depthai_sdk.visualize.bbox.BoundingBox]*) – Bounding box.

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

add_circle(*coords*, *radius*, *color=None*, *thickness=None*)

Add a circle to the visualizer.

Parameters

- **coords** (*Tuple[int, int]*) – Center of the circle.
- **radius** (*int*) – Radius of the circle.
- **color** (*Optional[Tuple[int, int, int]]*) – Color of the circle.

- **thickness** (*Optional[int]*) – Thickness of the circle.

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

add_line(*pt1*, *pt2*, *color=None*, *thickness=None*)
Add a line to the visualizer.

Parameters

- **pt1** (*Tuple[int, int]*) – Start coordinates.
- **pt2** (*Tuple[int, int]*) – End coordinates.
- **color** (*Optional[Tuple[int, int, int]]*) – Color of the line.
- **thickness** (*Optional[int]*) – Thickness of the line.

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

add_mask(*mask*, *alpha*)
Add a mask to the visualizer.

Parameters

- **mask** (*numpy.ndarray*) – Mask represented as uint8 numpy array.
- **alpha** (*float*) – Transparency of the mask.

Returns self

drawn(*frame*)
Draw all objects on the frame if the platform is PC. Otherwise, serialize the objects and communicate with the RobotHub application.

Parameters **frame** (*numpy.ndarray*) – The frame to draw on.

Returns np.ndarray if the platform is PC, None otherwise.

Return type Optional[numpy.ndarray]

show(*packet*)
Show the packet on the screen.

serialize(*force_reset=True*)
Serialize all contained objects to JSON.

Parameters **force_reset** (*bool*) – Flag that indicates if the objects should be cleared after serialization.

Returns Stringified JSON.

Return type str

reset()
Clear all objects.

output(*img_scale=None*, *show_fps=None*)
Configure the output of the visualizer.

Parameters

- **img_scale** (*Optional[float]*) – Scale of the output image.
- **show_fps** (*Optional[bool]*) – Flag that indicates if the FPS should be shown.

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

stereo(*colorize=None*, *colormap=None*, *wls_filter=None*, *wls_lambda=None*, *wls_sigma=None*, *depth_score=None*)

Parameters

- **colorize** (*Optional[depthai_sdk.visualize.configs.StereoColor]*) –
- **colormap** (*Optional[int]*) –
- **wls_filter** (*Optional[bool]*) –
- **wls_lambda** (*Optional[float]*) –
- **wls_sigma** (*Optional[float]*) –
- **depth_score** (*Optional[bool]*) –

detections(*thickness=None*, *fill_transparency=None*, *bbox_roundness=None*, *color=None*, *bbox_style=None*, *line_width=None*, *line_height=None*, *hide_label=None*, *label_position=None*, *label_padding=None*)

Configure how bounding boxes will look like. :param thickness: Thickness of the bounding box. :param fill_transparency: Transparency of the bounding box. :param bbox_roundness: Roundness of the bounding box. :param color: Color of the bounding box. :param bbox_style: Style of the bounding box. :param line_width: Width of the bbox horizontal lines CORNERS or ROUNDED_CORNERS style is used. :param line_height: Height of the bbox vertical lines when CORNERS or ROUNDED_CORNERS style is used. :param hide_label: Flag that indicates if the label should be hidden. :param label_position: Position of the label. :param label_padding: Padding of the label.

Returns self

Parameters

- **thickness** (*Optional[int]*) –
- **fill_transparency** (*Optional[float]*) –
- **bbox_roundness** (*Optional[float]*) –
- **color** (*Optional[Tuple[int, int, int]]*) –
- **bbox_style** (*Optional[depthai_sdk.visualize.configs.BboxStyle]*) –
- **line_width** (*Optional[float]*) –
- **line_height** (*Optional[float]*) –
- **hide_label** (*Optional[bool]*) –
- **label_position** (*Optional[depthai_sdk.visualize.configs.TextPosition]*) –
- **label_padding** (*Optional[int]*) –

Return type *depthai_sdk.visualize.visualizer.Visualizer*

text(*font_face=None*, *font_color=None*, *font_transparency=None*, *font_scale=None*, *font_thickness=None*, *font_position=None*, *background_transparency=None*, *background_color=None*, *outline_color=None*, *line_type=None*, *auto_scale=None*)

Configure how text will look like.

Parameters

- **font_face** (*Optional[int]*) – Font face (from cv2).
- **font_color** (*Optional[Tuple[int, int, int]]*) – Font color.
- **font_transparency** (*Optional[float]*) – Font transparency.
- **font_scale** (*Optional[float]*) – Font scale.
- **font_thickness** (*Optional[int]*) – Font thickness.
- **font_position** (*Optional[depthai_sdk.visualize.configs.TextPosition]*) – Font position.
- **background_transparency** (*Optional[float]*) – Text background transparency.
- **background_color** (*Optional[Tuple[int, int, int]]*) – Text background color.
- **outline_color** (*Optional[Tuple[int, int, int]]*) – Outline color.
- **line_type** (*Optional[int]*) – Line type (from cv2).
- **auto_scale** (*Optional[bool]*) – Flag that indicates if the font scale should be automatically adjusted.

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

tracking(*max_length=None*, *deletion_lost_threshold=None*, *line_thickness=None*, *fading_tails=None*, *show_speed=None*, *line_color=None*, *line_type=None*, *bg_color=None*)

Configure how tracking trails will look like.

Parameters

- **max_length** (*Optional[int]*) – Maximum length of the trail (in pixels).
- **deletion_lost_threshold** (*Optional[int]*) – Number of consequent LOST statuses after which the trail is deleted.
- **line_thickness** (*Optional[int]*) – Thickness of the line.
- **fading_tails** (*Optional[bool]*) – Flag that indicates if the tails should fade.
- **show_speed** (*Optional[bool]*) – Flag that indicates if the speed should be shown.
- **line_color** (*Optional[Tuple[int, int, int]]*) – Color of the line.
- **line_type** (*Optional[int]*) – Type of the line (from cv2).
- **bg_color** (*Optional[Tuple[int, int, int]]*) – Text background color.

Returns self

Return type *depthai_sdk.visualize.visualizer.Visualizer*

segmentation(*mask_alpha=None*)

Parameters **mask_alpha** (*Optional[float]*) –

Return type *depthai_sdk.visualize.visualizer.Visualizer*

property frame_shape

close()

class depthai_sdk.visualize.objects.**GenericObject**(*config=VisConfig(output=OutputConfig(img_scale=1.0, show_fps=False, clickable=True), stereo=StereoConfig(colorize=<StereoColor.RGB: 2>, colormap=array([[[128, 0, 0]], [[132, 0, 0]], [[136, 0, 0]], [[140, 0, 0]], [[144, 0, 0]], [[148, 0, 0]], [[152, 0, 0]], [[156, 0, 0]], [[160, 0, 0]], [[164, 0, 0]], [[168, 0, 0]], [[172, 0, 0]], [[176, 0, 0]], [[180, 0, 0]], [[184, 0, 0]], [[188, 0, 0]], [[192, 0, 0]], [[196, 0, 0]], [[200, 0, 0]], [[204, 0, 0]], [[208, 0, 0]], [[212, 0, 0]], [[216, 0, 0]], [[220, 0, 0]], [[224, 0, 0]], [[228, 0, 0]], [[232, 0, 0]], [[236, 0, 0]], [[240, 0, 0]], [[244, 0, 0]], [[248, 0, 0]], [[252, 0, 0]], [[255, 0, 0]], [[255, 4, 0]], [[255, 8, 0]], [[255, 12, 0]], [[255, 16, 0]], [[255, 20, 0]], [[255, 24, 0]], [[255, 28, 0]], [[255, 32, 0]], [[255, 36, 0]], [[255, 40, 0]], [[255, 44, 0]], [[255, 48, 0]], [[255, 52, 0]], [[255, 56, 0]], [[255, 60, 0]], [[255, 64, 0]], [[255, 68, 0]], [[255, 72, 0]], [[255, 76, 0]], [[255, 80, 0]], [[255, 84, 0]], [[255, 88, 0]], [[255, 92, 0]], [[255, 96, 0]], [[255, 100, 0]], [[255, 104, 0]], [[255, 108, 0]], [[255, 112, 0]], [[255, 116, 0]], [[255, 120, 0]], [[255, 124, 0]], [[255, 128, 0]], [[255, 132, 0]], [[255, 136, 0]], [[255, 140, 0]], [[255, 144, 0]], [[255, 148, 0]], [[255, 152, 0]], [[255, 156, 0]], [[255, 160, 0]], [[255, 164, 0]], [[255, 168, 0]], [[255, 172, 0]], [[255, 176, 0]], [[255, 180, 0]], [[255, 184, 0]], [[255, 188, 0]], [[255, 192, 0]], [[255, 196, 0]], [[255, 200, 0]], [[255, 204, 0]], [[255, 208, 0]], [[255, 212, 0]], [[255, 216, 0]], [[255, 220, 0]], [[255, 224, 0]], [[255, 228, 0]], [[255, 232, 0]], [[255, 236, 0]], [[255, 240, 0]], [[255, 244, 0]], [[255, 248, 0]], [[255, 252, 0]], [[254, 255, 2]], [[250, 255, 6]], [[246, 255, 10]], [[242, 255, 14]], [[238, 255, 18]], [[234, 255, 22]], [[230, 255, 26]], [[226, 255, 30]], [[222, 255, 34]], [[218, 255, 38]], [[214, 255, 42]], [[210, 255, 46]], [[206, 255, 50]], [[202, 255, 54]], [[198, 255, 58]], [[194, 255, 62]], [[190, 255, 66]], [[186, 255, 70]], [[182, 255, 74]], [[178, 255, 78]], [[174, 255, 82]], [[170, 255, 86]], [[166, 255, 90]], [[162, 255, 94]], [[158, 255, 98]], [[154, 255, 102]], [[150, 255,*

Generic object used by visualizer.

set_config(*config*)
Set the configuration for the current object.

Parameters **config** (depthai_sdk.visualize.configs.VisConfig) – instance of VisConfig.

Returns self

Return type *depthai_sdk.visualize.objects.GenericObject*

set_frame_shape(*frame_shape*)
Set the incoming frame shape for the current object.

Parameters **frame_shape** (*Tuple[int, ..]*) – frame shape as a tuple of (height, width, channels).

Returns self

Return type *depthai_sdk.visualize.objects.GenericObject*

prepare()
Prepare necessary data for drawing.

Returns self

Return type *depthai_sdk.visualize.objects.GenericObject*

abstract serialize()
Serialize the object to dict.

Return type dict

add_child(*child*)
Add a child object to the current object.

Parameters **child** (depthai_sdk.visualize.objects.GenericObject) – instance derived from GenericObject.

Returns self

Return type *depthai_sdk.visualize.objects.GenericObject*

property children
Get the children of the current object.

Returns List of children.

class depthai_sdk.visualize.objects.**VisDetections**(*detections*, *normalizer*, *label_map=None*, *label_color=None*, *label_background_color=None*, *label_background_transparency=None*, *spatial_points=None*, *is_spatial=False*, *parent_bbox=None*)
Object that represents detections.

serialize()
Serialize the object to dict.

Return type dict

register_detection(*bbox*, *label*, *color*)
Register a detection.

Parameters

- **bbox** (*Union[Tuple[int, ..], depthai_sdk.visualize.bbox.BoundingBox]*) – Bounding box.
- **label** (*str*) – Label.
- **color** (*Tuple[int, int, int]*) – Color.

Return type None

prepare()
Prepare necessary data for drawing.

Returns self

Return type *depthai_sdk.visualize.objects.VisDetections*

get_detections()
Get detections.

Returns List of tuples (bbox, label, color).

Return type List[Tuple[numpy.ndarray, str, Tuple[int, int, int]]]

class depthai_sdk.visualize.objects.**VisText**(*text*, *coords=None*, *size=None*, *color=None*, *thickness=None*, *outline=True*, *background_color=None*, *background_transparency=0.5*, *bbox=None*, *position=<TextPosition.TOP_LEFT: 0>*, *padding=10*)
Object that represents a text.

serialize()
Serialize the object to dict.

class depthai_sdk.visualize.objects.**VisLine**(*pt1*, *pt2*, *color=None*, *thickness=None*)
Object that represents a line.

serialize()
Serialize the object to dict.

prepare()
Prepare necessary data for drawing.

Returns self

Return type *depthai_sdk.visualize.objects.VisLine*

class depthai_sdk.visualize.objects.**VisTrail**(*tracklets*, *label_map*, *bbox*)
Object that represents a trail.

serialize()
Serialize the object to dict.

prepare()
Prepare necessary data for drawing.

Returns self

Return type *depthai_sdk.visualize.objects.VisTrail*

groupby_tracklet()
Group tracklets by tracklet id.

Returns Dictionary of tracklets grouped by tracklet id.

static get_rect_centroid(*rect*, *w*, *h*)
Get centroid of a rectangle.

Parameters **rect** (*depthai.Rect*) –

Return type Tuple[int, int]

class depthai_sdk.visualize.configs.**TextPosition**(*value*)
Where on frame do we want to print text.

TOP_LEFT = 0

MID_LEFT = 1

BOTTOM_LEFT = 2

TOP_MID = 10

MID = 11

BOTTOM_MID = 12

TOP_RIGHT = 20

MID_RIGHT = 21

BOTTOM_RIGHT = 22

class depthai_sdk.visualize.configs.**BboxStyle**(*value*)
How do we want to draw bounding box.

RECTANGLE = 0

CORNERS = 1

ROUNDED_RECTANGLE = 10

ROUNDED_CORNERS = 11

class depthai_sdk.visualize.configs.**StereoColor**(*value*)
An enumeration.

GRAY = 1

RGB = 2

RGBD = 3

class depthai_sdk.visualize.configs.**OutputConfig**(*img_scale=1.0*, *show_fps=False*, *clickable=True*)
Configuration for output of the visualizer.

img_scale: float = 1.0

show_fps: bool = False

clickable: bool = True

class depthai_sdk.visualize.configs.**StereoConfig**(*colorize: depthai_sdk.visualize.configs.StereoColor = <StereoColor.RGB: 2>*, *colormap: numpy.ndarray = <factory>*, *wls_filter: bool = False*, *wls_lambda: float = 8000*, *wls_sigma: float = 1.5*, *depth_score: bool = False*)

colorize: *depthai_sdk.visualize.configs.StereoColor* = 2

colormap: numpy.ndarray

wls_filter: bool = False

wls_lambda: float = 8000

wls_sigma: float = 1.5

depth_score: bool = False

class depthai_sdk.visualize.configs.**DetectionConfig**(*thickness=1, fill_transparency=0.15, box_roundness=0, color=(0, 255, 0), bbox_style=<BboxStyle.RECTANGLE: 0>, line_width=0.5, line_height=0.5, hide_label=False, label_position=<TextPosition.TOP_LEFT: 0>, label_padding=10*)

Configuration for drawing bounding boxes.

thickness: int = 1

fill_transparency: float = 0.15

box_roundness: int = 0

color: Tuple[int, int, int] = (0, 255, 0)

bbox_style: *depthai_sdk.visualize.configs.BboxStyle* = 0

line_width: float = 0.5

line_height: float = 0.5

hide_label: bool = False

label_position: *depthai_sdk.visualize.configs.TextPosition* = 0

label_padding: int = 10

class depthai_sdk.visualize.configs.**TextConfig**(*font_face=0, font_color=(255, 255, 255), font_transparency=0.5, font_scale=1.0, font_thickness=2, font_position=<TextPosition.TOP_LEFT: 0>, background_color=None, background_transparency=0.5, outline_color=(0, 0, 0), line_type=16, auto_scale=True*)

Configuration for drawing labels.

font_face: int = 0

font_color: Tuple[int, int, int] = (255, 255, 255)

font_transparency: float = 0.5

font_scale: float = 1.0

font_thickness: int = 2

font_position: *depthai_sdk.visualize.configs.TextPosition* = 0

background_color: Optional[Tuple[int, int, int]] = None

background_transparency: *float* = 0.5

outline_color: *Tuple[int, int, int]* = (0, 0, 0)

line_type: *int* = 16

auto_scale: *bool* = True

class depthai_sdk.visualize.configs.**TrackingConfig**(*max_length=500*, *deletion_lost_threshold=5*, *line_thickness=1*, *fading_tails=False*, *line_color=(255, 255, 255)*, *line_type=16*, *show_speed=False*)

Configuration for drawing tracking bounding boxes.

max_length: *int* = 500

deletion_lost_threshold: *int* = 5

line_thickness: *int* = 1

fading_tails: *bool* = False

line_color: *Tuple[int, int, int]* = (255, 255, 255)

line_type: *int* = 16

show_speed: *bool* = False

class depthai_sdk.visualize.configs.**SegmentationConfig**(*mask_alpha=0.5*)

Configuration for drawing segmentation masks.

mask_alpha: *float* = 0.5

class depthai_sdk.visualize.configs.**CircleConfig**(*thickness=1*, *color=(255, 255, 255)*, *line_type=16*)

Configuration for drawing circles.

thickness: *int* = 1

color: *Tuple[int, int, int]* = (255, 255, 255)

line_type: *int* = 16

class depthai_sdk.visualize.configs.**VisConfig**(*output=<factory>*, *stereo=<factory>*, *detection=<factory>*, *text=<factory>*, *tracking=<factory>*, *circle=<factory>*)

Configuration for visualizer.

output: *depthai_sdk.visualize.configs.OutputConfig*

stereo: *depthai_sdk.visualize.configs.StereoConfig*

detection: *depthai_sdk.visualize.configs.DetectionConfig*

text: *depthai_sdk.visualize.configs.TextConfig*

tracking: *depthai_sdk.visualize.configs.TrackingConfig*

circle: *depthai_sdk.visualize.configs.CircleConfig*

CHAPTER

FIVE

AI MODELS

Through the *NNComponent*, DepthAI SDK abstracts:

1. **AI model sourcing** using blobconverter from Open Model Zoo (OMZ) and DepthAI Model Zoo (DMZ).
2. **AI result decoding** - currently SDK supports on-device decoding for YOLO and MobileNet based results using YoloDetectionNetwork and MobileNetDetectionNetwork nodes.
3. **Decoding** of the `config.json` which **allows an easy deployment of custom AI models** trained using our notebooks and converted using https://tools.luxonis.com.
4. Formatting of the AI model input frame - SDK uses **BGR** color order and **Planar / CHW** (Channel, Height, Width) layout conventions. If model accepts color images, it should accept 3 channels (B,G,R), and if it accepts grayscale images, it should accept 1 channel.

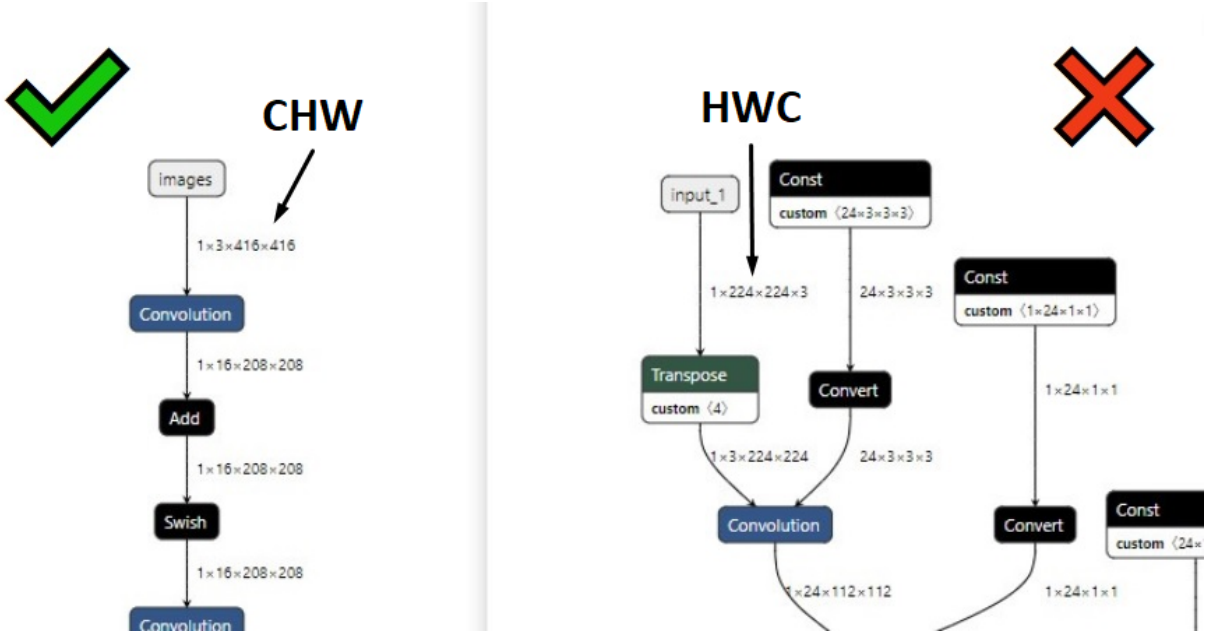


Fig. 1: Netron app allows you to check model's input layout

5. Integration with 3rd party tools/services (Roboflow).

5.1 SDK supported models

With *NNComponent* you can **easily try out a variety of different pre-trained models** by simply changing the model name:

```
  from depthai_sdk import OakCamera

  with OakCamera() as oak:
      color = oak.create_camera('color')
-     nn = oak.create_nn('mobilenet-ssd', color)
+     nn = oak.create_nn('vehicle-detection-0202', color)
      oak.visualize([nn], fps=True)
      oak.start(blocking=True)
```

Both of the models above are supported by this SDK, so they will be downloaded and deployed to the OAK device along with the pipeline.

The following table lists all the models supported by the SDK. The model name is the same as the name used in the *NNComponent* constructor.

Name	Model Source	FPS*
age-gender-recognition-retail-0013	OMZ	33
emotions-recognition-retail-0003	OMZ	33
face-detection-adas-0001	OMZ	18
face-detection-retail-0004	OMZ	33
facemesh_192x192	DMZ	32
facial_landmarks_68_160x160	32	DMZ
human-pose-estimation-0001	OMZ	8
mobilenet-ssd	OMZ	31
mobilenetv2_imagenet_embedder_224x224	DMZ	/
pedestrian-detection-adas-0002	OMZ	19
person-detection-0200	OMZ	14
person-detection-retail-0013	OMZ	15
person-reidentification-retail-0288	OMZ	33
person-vehicle-bike-detection-crossroad-1016	OMZ	12
sbd_mask_classification_224x224	DMZ	64+
vehicle-detection-0202	OMZ	14
vehicle-detection-adas-0002	OMZ	14
vehicle-license-plate-detection-barrier-0106	OMZ	29
yolo-v3-tf	OMZ	3.5
yolo-v3-tiny-tf	OMZ	33
yolov4_coco_608x608	DMZ	1.1
yolov4_tiny_coco_416x416	DMZ	32
yolov5n_coco_416x416	DMZ	32
yolov6n_coco_640x640	DMZ	26
yolov6nr3_coco_640x352	DMZ	32
yolov7tiny_coco_640x352	DMZ	23
yolov7tiny_coco_416x416	DMZ	29
yolov8n_coco_640x352	DMZ	22

⋆ - FPS was measured using only color camera (1080P) and 1 NN using callbacks (without visualization)

CHAPTER

SIX

AUTOMATIC IR POWER CONTROL

Note: This feature is only available on OAK devices with IR lights.

Note: This feature is experimental, please report any issues you encounter to the Luxonis team.

Automatic IR power control is a feature that allows the device to automatically adjust the IR power based on the scene. This is useful for applications where the scene is not always the same, for example when the camera is used in an outdoor environment.

To enable automatic IR power control, you need to use `auto_ir` method that accepts two parameters:

- `auto_mode` - `True` to enable automatic IR power control, `False` to disable it.
- `continuous_mode` - `True` to enable continuous mode, `False` otherwise. Requires `auto_mode` to be enabled.

When **automatic mode** is enabled, the device will automatically adjust the IR power after the startup. The disparity map will be analyzed with different dot projector and illumination settings, and once the best settings are found, the device will use them for the rest of the session. The whole process takes around **25 seconds**.

If **continuous mode** is enabled, the device will continue to search for better settings. In case the scene changes and disparity map quality drops below a certain threshold, the device will automatically adjust the IR power again.

6.1 Usage

The following example shows how to enable automatic IR power control in continuous mode:

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    left = oak.create_camera('left')
    right = oak.create_camera('right')
    stereo = oak.create_stereo(left=left, right=right)

    # Automatically estimate IR brightness and adjust it continuously
    stereo.set_auto_ir(auto_mode=True, continuous_mode=True)

    oak.visualize([stereo.out.disparity, left])
    oak.start(blocking=True)
```

CHAPTER

SEVEN

CONDITIONAL ACTIONS

DepthAI SDK provides a way to perform actions based on some conditions. For example, you can perform an action when a certain number of objects is detected in the frame. This functionality can be achieved by using Trigger-Action API.

7.1 Overview

Trigger-Action API is a way to define a set of conditions and actions that should be performed when these conditions are met. DepthAI SDK provides a set of predefined conditions and actions, but you can also define your own.

Basic concepts:

- **Trigger** - a condition that should be met to perform an action.
- **Action** - an action that should be performed when a trigger is met.

Note: Trigger-Action API is implemented in the `depthai.trigger_action` module.

7.2 Triggers

The base class for all triggers is `Trigger`. In order to create a trigger, you need to use the `Trigger` class and pass the following parameters:

- `input` - a component that should be used as a trigger source.
- `condition` - a function that should return `True` or `False` based on the trigger source.
- `cooldown` - defines how often a trigger can be activated (in seconds).

The set of predefined triggers:

- `DetectionTrigger` - a trigger that is activated when a certain number of objects is detected in the frame.

7.3 Actions

An action can be represented by either a function or a class derived from `Action` class. The custom action should implement `activate()` and optionally `on_new_packets()` methods.

The set of predefined actions:

- `RecordAction` - records a video of a given duration when a trigger is activated.

7.4 Usage

The following example shows how to create a trigger that is activated when at least 1 person is detected in the frame. When the trigger is activated, it records a 15 seconds video (5 seconds before the trigger is activated and 10 seconds after).

```
from depthai_sdk import OakCamera
from depthai_sdk.trigger_action.actions.record_action import RecordAction
from depthai_sdk.trigger_action.triggers.detection_trigger import DetectionTrigger

with OakCamera() as oak:
    color = oak.create_camera('color', encode='jpeg')
    stereo = oak.create_stereo('400p')

    nn = oak.create_nn('mobilenet-ssd', color)

    trigger = DetectionTrigger(input=nn, min_detections={'person': 1}, cooldown=30)
    action = RecordAction(inputs=[color, stereo.out.disparity], dir_path='./
↪recordings/',
                          duration_before_trigger=5, duration_after_trigger=10)
    oak.trigger_action(trigger=trigger, action=action)

    oak.visualize(nn)
    oak.start(blocking=True)
```

7.5 Reference

CHAPTER

EIGHT

RECORDING

OakCamera allows users to easily **record** video streams so the scene can later be fully replayed (see *Replaying* documentation), including **reconstructing the stereo depth perception**.

The script below will save color, left, and right H265 encoded streams into video files. Frames are synchronized (via timestamps) before being saved.

```
from depthai_sdk import OakCamera, RecordType

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080P', fps=20, encode='H265')
    left = oak.create_camera('left', resolution='800p', fps=20, encode='H265')
    right = oak.create_camera('right', resolution='800p', fps=20, encode='H265')

    # Synchronize & save all (encoded) streams
    oak.record([color.out.encoded, left.out.encoded, right.out.encoded], './',␣
↪RecordType.VIDEO)
    # Show color stream
    oak.visualize([color.out.camera], scale=2/3, fps=True)

    oak.start(blocking=True)
```

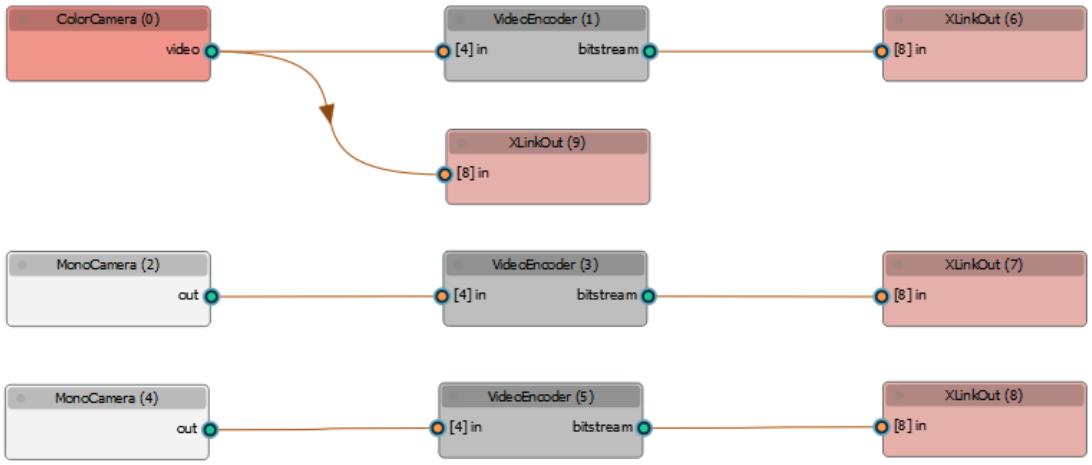


Fig. 1: Recording pipeline of the script above

After 20 seconds we stopped the recording and SDK printed the location of saved files (`./1-18443010D116631200` in our case):

```
Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----          10/3/2022  12:50 PM           9281 calib.json
-a----          10/3/2022  12:51 PM       19172908 color.mp4
-a----          10/3/2022  12:51 PM       15137490 left.mp4
-a----          10/3/2022  12:51 PM       15030761 right.mp4
```

This depthai-recording can then be used next time to reconstruct the whole scene using the *Replaying* feature.

8.1 Supported recording types

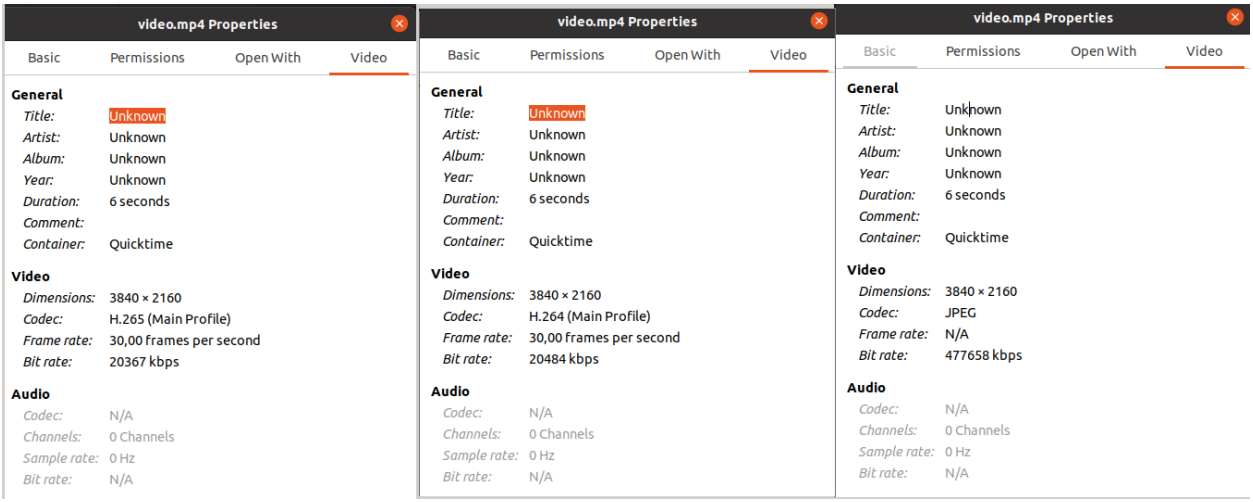
1. *RecordType.VIDEO*
2. *RecordType.BAG*
3. *RecordType.MCAP*

8.1.1 1. Video

This option will write each stream separately to a video file. There are three options for saving these files:

1. If we are saving unencoded frames SDK will use `cv2.VideoWriter` class to save these streams into `.avi` file.
2. If we are saving encoded streams and we have `av` installed (PyAv library) SDK will save encoded streams directly to `.mp4` container. This will allow you to watch videos with a standard video player. There's **no decoding/encoding** (or converting) happening on the host computer and host **CPU/GPU/RAM usage is minimal**. More information here.
3. Otherwise SDK will save encoded streams to files (eg. `color.mjpeg`) and you can use ffmpeg or mkvmerge to containerize the stream so it's viewable by most video players. More information here.

200 frames from 4K color camera using different encoding options (MJPEG, H.264, H.265) using `av`:



8.1.2 2. Rosbag

Currently, we only support recording `depth` to the rosbag (`recording.bag`). In the future we will also support color (which is depth aligned) stream and mono streams. You can open the rosbag with the RealSense Viewer to view the depth:

8.1.3 3. MCAP recording

An alternative to Rosbags are mcap files which can be viewed with Foxglove studio. You can find MCAP recording example here. Currently supported streams:

- MJPEG encoded color/left/right/disparity. Lossless MJPEG/H264/H265 aren't supported by Foxglove Studio.
- Non-encoded color/left/right/disparity/depth frames.
- Pointcloud, enable with `recorder.config_mcap(pointcloud=True)`. It converts depth frame to pointcloud on the host.

Standalone Foxglove studio streaming demo can be found here.

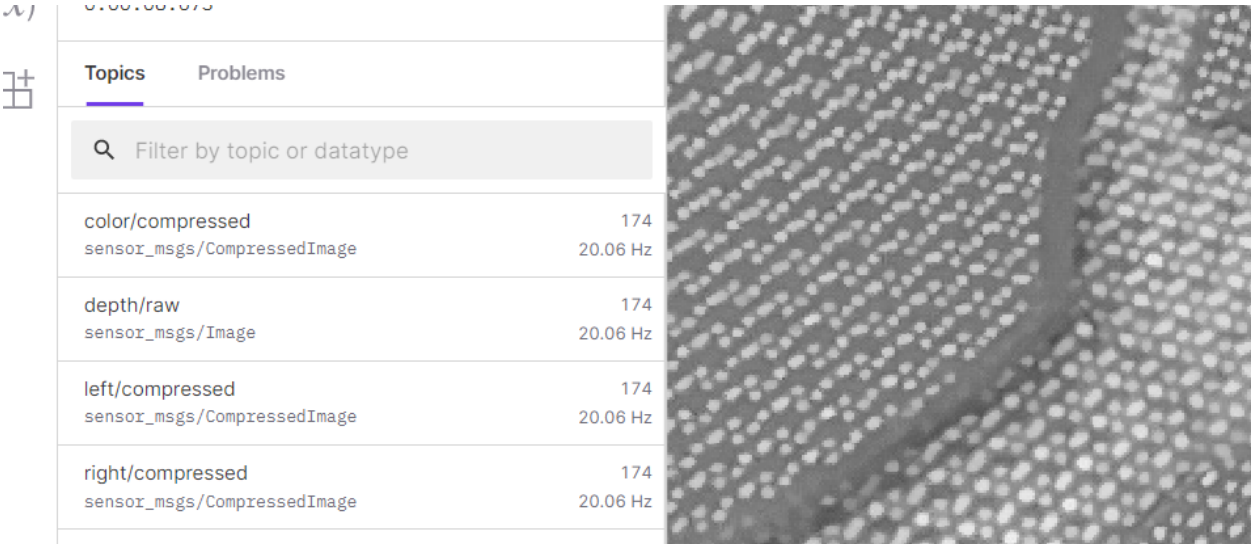


Fig. 2: Available topics in Foxglove Studio from MCAP recorded by mcap-recording.py example

CHAPTER

NINE

REPLAYING

OakCamera allows users to easily use **depthai-recording** instead of the live camera feed to run their pipelines. This feature will send recorded frames to the OAK device. This is useful especially during development, so we can **record a complex scene** only once and replay it many times to fine-tune the pipeline or AI models.

Because *Recording* saves calibration data and can save synchronized left+right mono streams so we can achieve full depth reconstruction.

```
from depthai_sdk import OakCamera

with OakCamera(recording='[PATH/URL/NAME]') as oak:
    # Created CameraComponent/StereoComponent will use streams from the recording
    camera = oak.create_camera('color')
```

9.1 Replaying support

Replaying feature is quite extensible, and supports a variety of different inputs:

1. Single image.
2. Folder with images. Images are getting rotated every 3 seconds. Example here.
3. URL to a video/image.
4. URL to a YouTube video.
5. Path to *depthai-recording*.
6. A name of a *public depthai-recording*.

9.2 Replaying a depthai-recording

When constructing the OakCamera object we can easily replay an existing *depthai-recording*, which results in using XLinkIn nodes instead of ColorCamera / MonoCamera nodes.

Script below will also do depth reconstruction and will display 3D detections coordinates (XYZ) to the frame.

```
  from depthai_sdk import OakCamera

- with OakCamera() as oak:
+ with OakCamera(replay='path/to/folders') as oak:
      color = oak.create_camera('color')
      nn = oak.create_nn('mobilenet-ssd', color, spatial=True)
```

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```
    oak.visualize(nn.out.main, fps=True)
    oak.start(blocking=True)
```

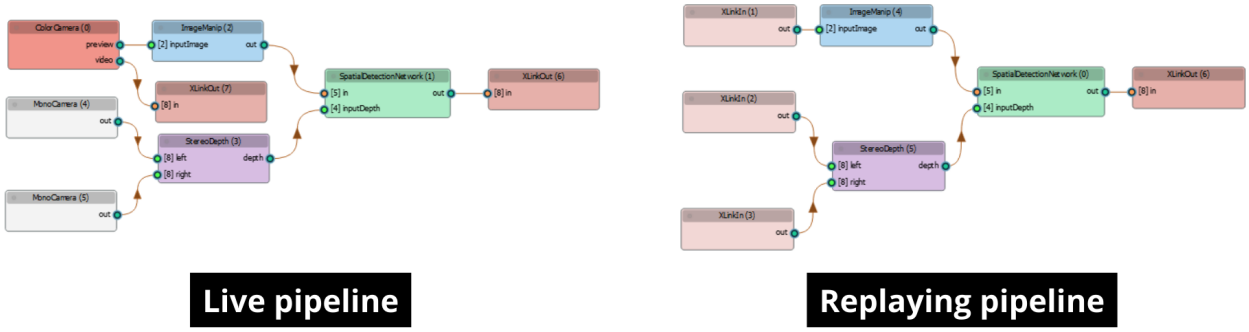


Fig. 1: Live view pipeline uses live camera feeds (MonoCamera, ColorCamera) whereas Replaying pipeline uses XLinkIn nodes to which we send recorded frames.

9.3 Public depthai-recordings

We host several depthai-recordings on our servers that you can easily use in your application, e.g., `OakCamera(recording='cars-california-01')`. Recording will get downloaded & cached on the computer for future use.

The following table lists all available recordings:

Name	Files	Size	Notice
`cars-california-01`	`color.mp4`	21.1 MB	Source video, useful for car detection / license plate recognition
`cars-california-02`	`color.mp4`	27.5 MB	Source video, useful for car detection / license plate recognition
`cars-california-03`	`color.mp4`	19 MB	Source video, useful for license plate recognition and bicylist detection
`cars-tracking-above-01`	`color.mp4`	30.8 MB	Source video, useful for car tracking/counting
`depth-people-counting-01`	`left.mp4`, `right.mp4`, `calib.json`	5.8 MB	Used by depth-people-counting demo
`people-construction-vest-01`	`color.mp4`	5.2 MB	Used by ObjectTracker example and pedestrian reidentification demo
`people-images-01`	5x jpg images	2 MB	Used by people-counting demo
`people-tracking-above-01`	`color.mp4`	3.2 MB	Fisheye top-down view, useful for people tracking/counting. Fast forward/downscaled
`people-tracking-above-02`	`color.mp4`	86.4 MB	Fisheye top-down view, useful for people tracking/counting
`people-tracking-above-03`	`color.mp4`	16.7 MB	Top-down view, used by people-tracker demo
`people-tracking-above-04`	`color.mp4`	5.3 MB	Top-down view at an angle, source video here
`people-tracking-above-05`	`CAM_A.mp4`, `CAM_A.mp4`, `calib.json`	12 MB (35sec)	Top-down view, left+right stereo cameras, demo usage at replay.py

CHAPTER

TEN

CODE SAMPLES

10.1 FFC Camera Visualization

This example shows how to use the *Camera* component to display the camera feed from the FFC camera.

For FFC, the camera board socket must be specified. In our case the cameras are connected to socket A, B and C. After setting the resolution to 1200p and downscaling using ISP to 800p, the camera feed is displayed in a window.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

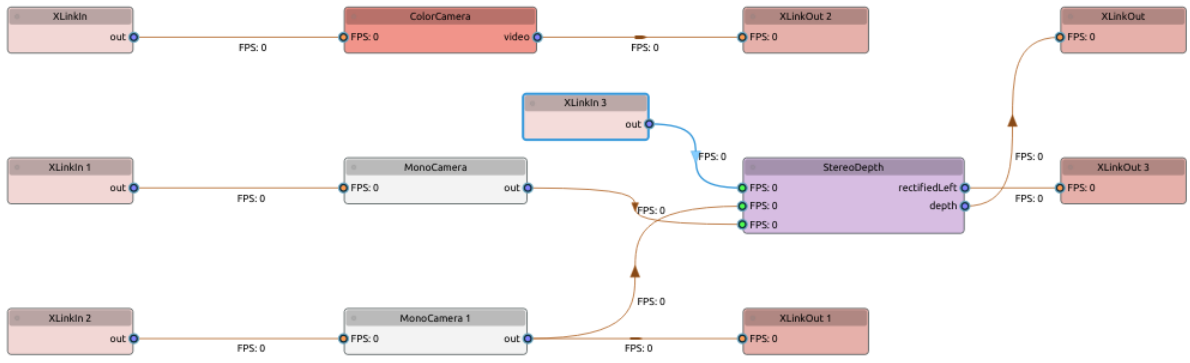
10.1.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.1.2 Pipeline



10.1.3 Source Code

Python

Also available on GitHub

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    cama = oak.create_camera('cama,c', resolution='1200p')
    cama.config_color_camera(isp_scale=(2,3))
    camb = oak.create_camera('camb,c', resolution='1200p')
    camb.config_color_camera(isp_scale=(2,3))
    camc = oak.create_camera('camc,c', resolution='1200p')
    camc.config_color_camera(isp_scale=(2,3))

    stereo = oak.create_stereo(left=camb, right=camc)
    stereo.config_undistortion(M2_offset=0)

    oak.visualize([stereo, camc, cama, stereo.out.rectified_left], fps=True)

    oak.start(blocking=True)
```

10.2 Camera Control

This example shows how to use DepthAI SDK to control the color camera parameters.

```
Control:      key[dec/inc]  min..max
exposure time:     I   O      1..33000 [us]
sensitivity iso:   K   L    100..1600

To go back to auto controls:
'E' - autoexposure
```

10.2.1 Demo

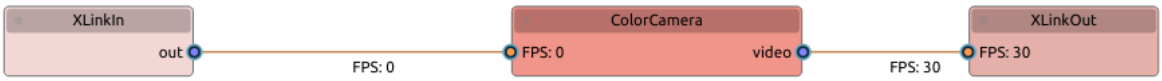
10.2.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.2.3 Pipeline



10.2.4 Source Code

Python

Also available on GitHub

```python
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color')
    oak.visualize(color, fps=True, scale=2/3)
    oak.start()

    while oak.running():
        key = oak.poll()
        if key == ord('i'):
            color.control.exposure_time_down()
        elif key == ord('o'):
            color.control.exposure_time_up()
        elif key == ord('k'):
            color.control.sensitivity_down()
        elif key == ord('l'):
            color.control.sensitivity_up()

        elif key == ord('e'): # Switch to auto exposure
            color.control.send_controls({'exposure': {'auto': True}})

```

10.3 Camera Control with NN

This example shows how to set up control of color camera (focus and exposure) to be controlled by NN. The NN is a face detection model which passes detected face bounding box to camera component run auto focus and auto exposure algorithms on.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.3.1 Demo

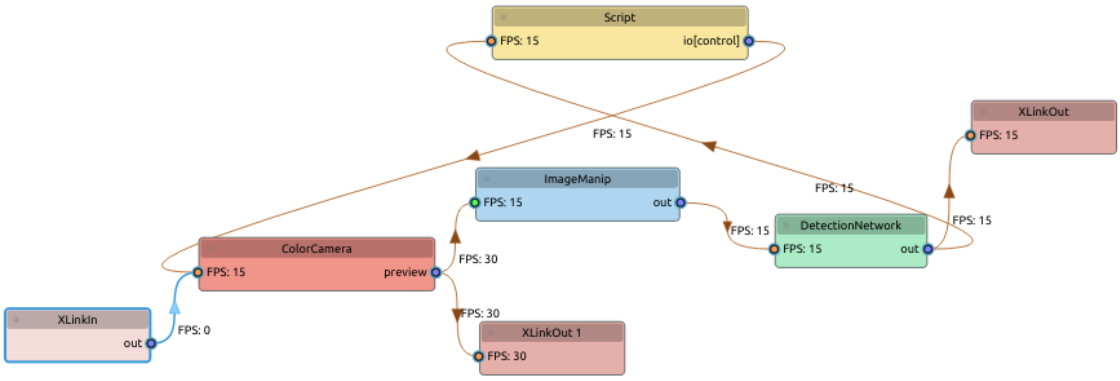
10.3.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.3.3 Pipeline



10.3.4 Source Code

Python

Also available on GitHub

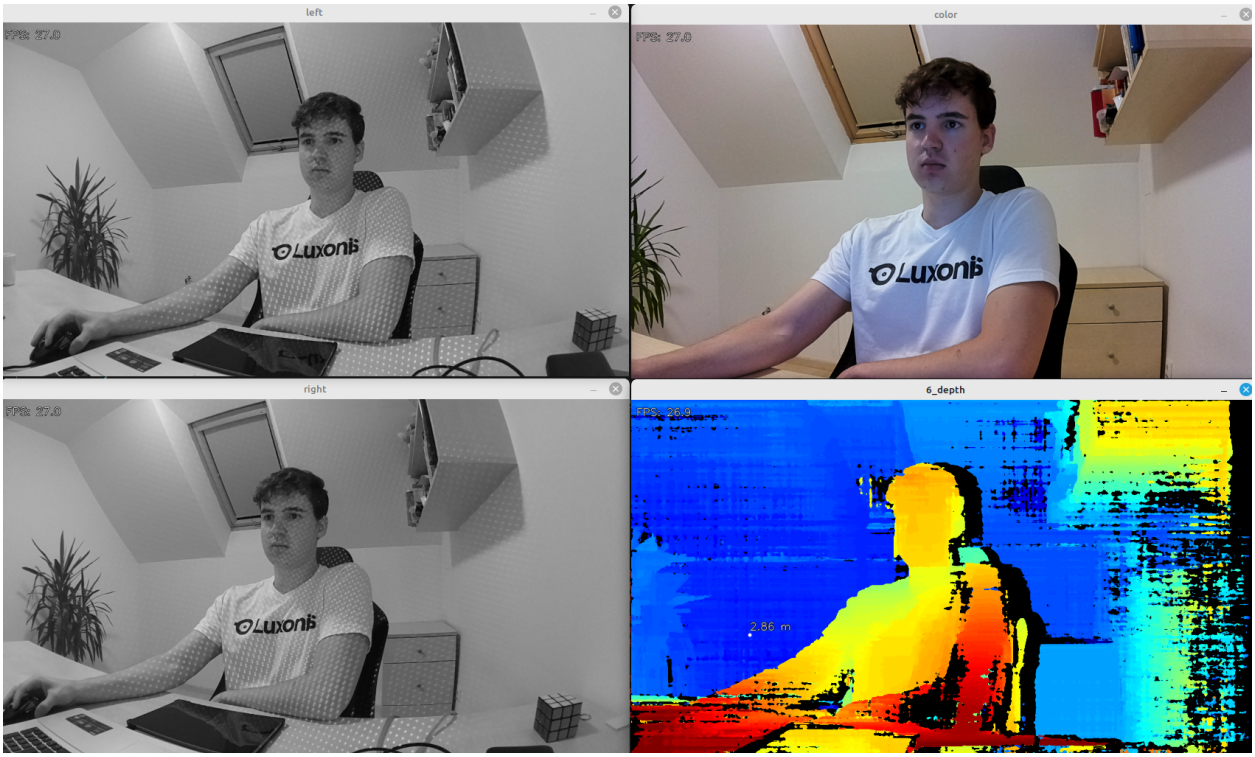
```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color')
    face_det = oak.create_nn('face-detection-retail-0004', color)
    # Control the camera's exposure/focus based on the (largest) detected face
    color.control_with_nn(face_det, auto_focus=True, auto_exposure=True, debug=False)

    oak.visualize(face_det, fps=True)
    oak.start(blocking=True)
```

10.4 Camera Preview

This example shows how to set up a pipeline that outputs a a preview for color camera, both mono cameras and their stereo depth. Each frame is displayed using OpenCV in blocking behavour.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.4.1 Demo



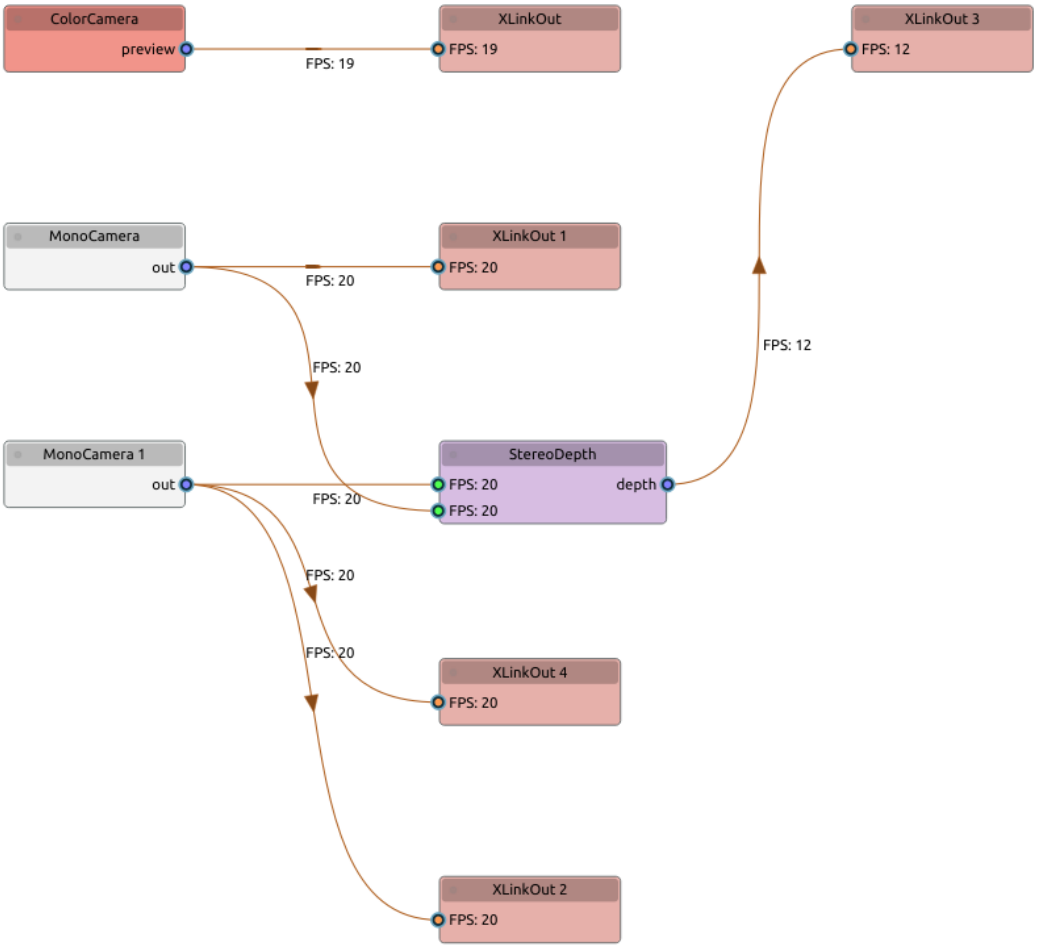
10.4.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.4.3 Pipeline



10.4.4 Source Code

Python

Also available on GitHub

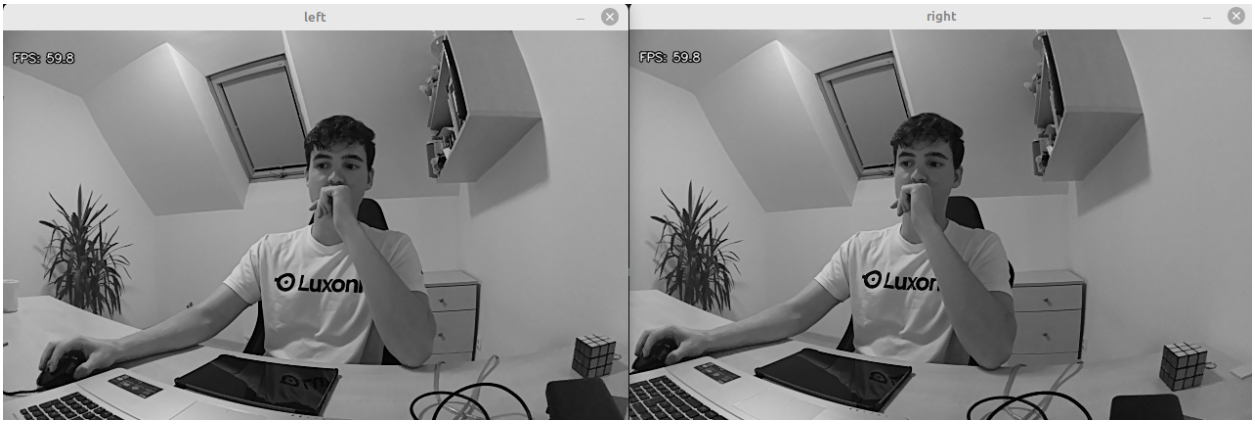
```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color')
    left = oak.create_camera('left')
    right = oak.create_camera('right')
    stereo = oak.create_stereo(left=left, right=right)

    oak.visualize([color, left, right, stereo.out.depth], fps=True, scale=2/3)
    oak.start(blocking=True)
```

10.5 Mono Camera Preview

This example shows how to set up a pipeline that outputs a video feed for both mono cameras and sets the resolution to 400p (640x400) and the frame rate to 60 fps.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.5.1 Demo



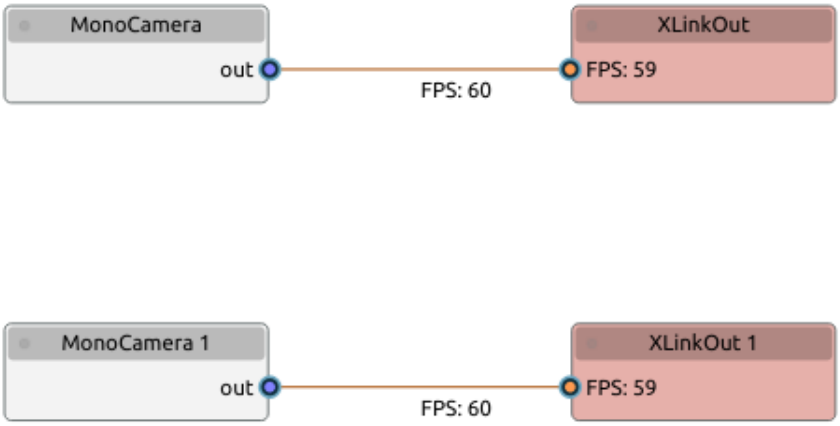
10.5.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.5.3 Pipeline



10.5.4 Source Code

Python

Also available on GitHub

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    left = oak.create_camera('left', resolution='400p', fps=60)
    right = oak.create_camera('right', resolution='400p', fps=60)
    oak.visualize([left, right], fps=True)
    oak.start(blocking=True)
```

10.6 Preview All Cameras

This example shows how to set up a pipeline that outputs a a preview for each camera currently connected (and available) to the device. The preview is displayed in a window on the host machine. If run on OAK-D devices, this example does the same thing as the `sdk_camera_preview` example.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.6.1 Demo

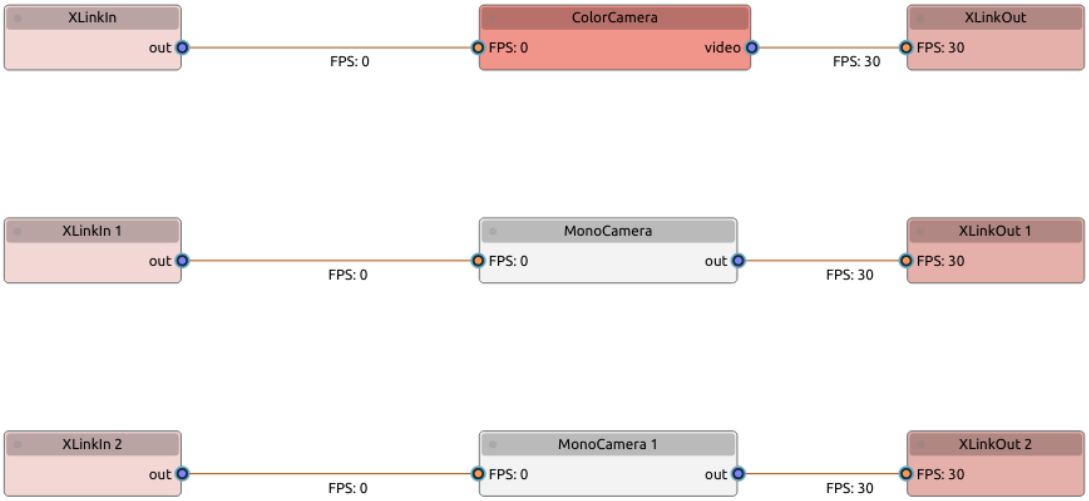
10.6.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.6.3 Pipeline



10.6.4 Source Code

Python

Also available on GitHub

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    cams = oak.create_all_cameras(resolution='max')
    oak.visualize(cams, fps=True)
    oak.start(blocking=True)
```

10.7 RGB and Mono Preview

This example shows how to use the *Camera* component to get RGB and Mono previews. It is similar to the ref:*sdk_camera_preview* example, but lacks the stereo depth visualization.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.7.1 Demo

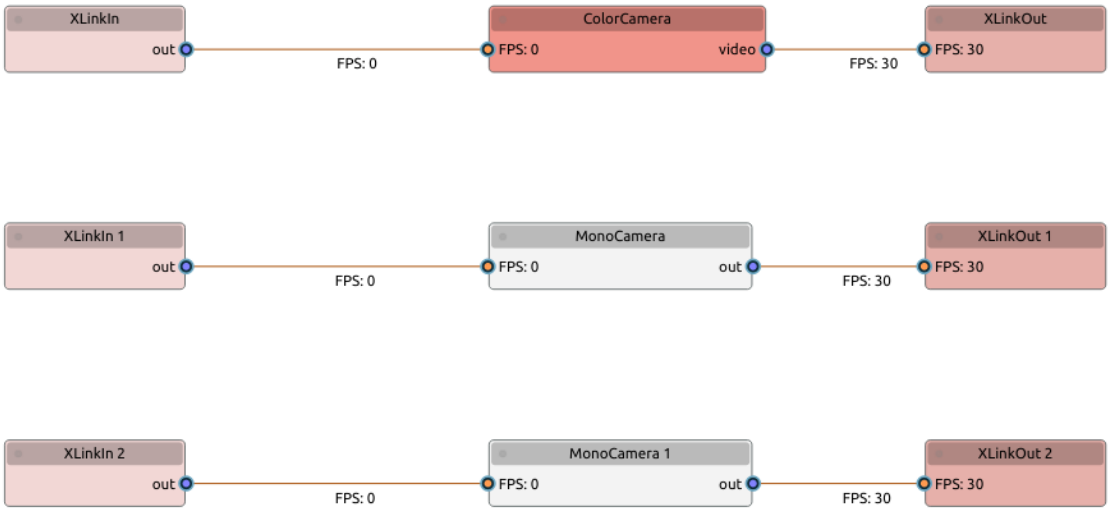
10.7.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.7.3 Pipeline



10.7.4 Source Code

Python

Also available on GitHub

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color')
    left = oak.create_camera('left')
    right = oak.create_camera('right')
    oak.visualize([color, left, right], fps=True)
    oak.start(blocking=True)
```

10.8 Camera Rotated Preview

This example showcases how to rotate the preview frames by a desired angle (currently only 90, 180 and 270 degrees are supported).

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.8.1 Demo

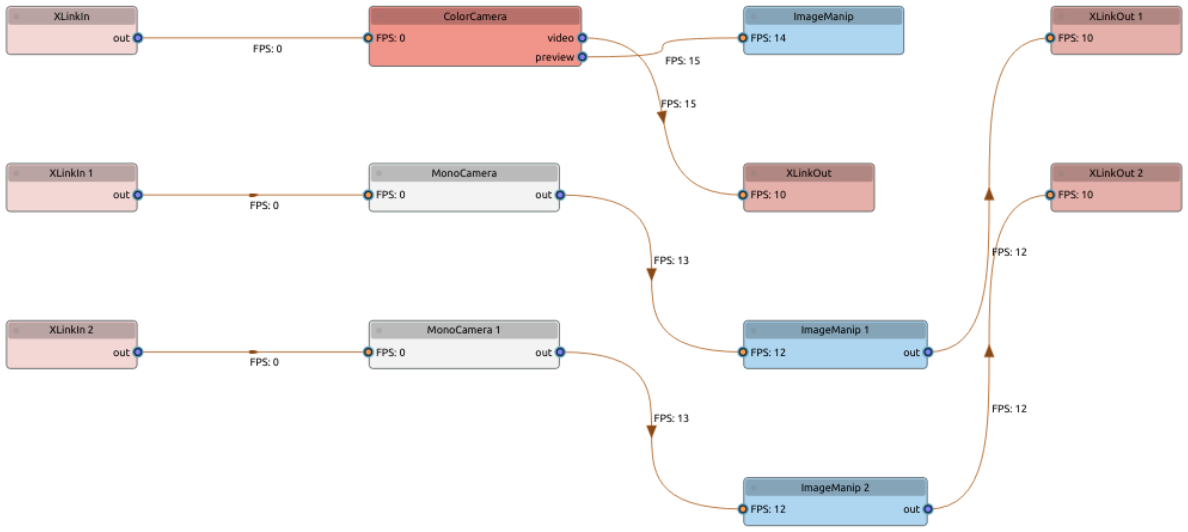
10.8.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.8.3 Pipeline



10.8.4 Source Code

Python

Also available on GitHub

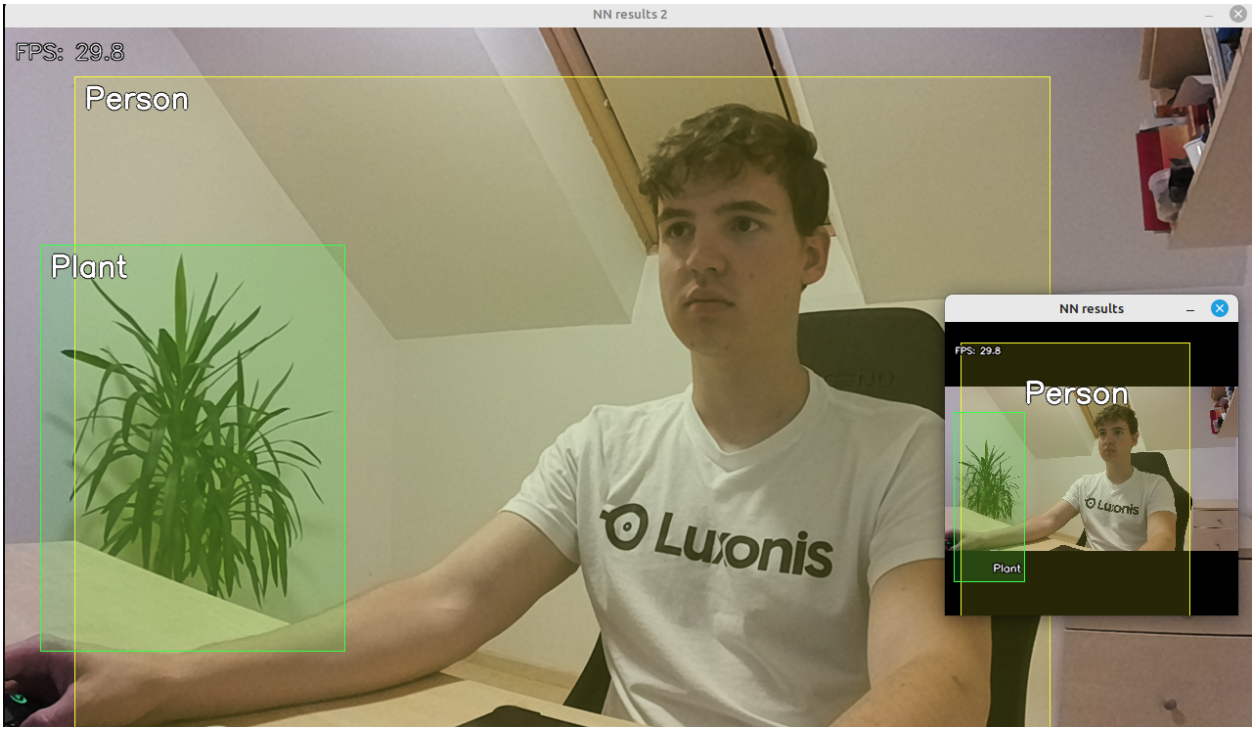
```
from depthai_sdk import OakCamera

with OakCamera(rotation=90) as oak:
    all_cams = oak.create_all_cameras()
    oak.visualize(all_cams, fps=True)
    oak.start(blocking=True)
```

10.9 API Interoperability Example

This example shows how to bridge the DepthAI API with the SDK. It first creates the color camera and mobilenet neural network and displays the results. With *oak.build()* we build the pipeline which is part of the API. We can then manipulate the pipeline just like we would in the API (e.g. add Xlink connections, scripts, ...). In this example we manually add a feature tracker since the SDK currently does not support it. We then start the pipeline and display the results.

Note that in this case, the visualizer behavior is non-blocking. This means we need to poll the visualizer in order to get the results.

10.9.1 Demo



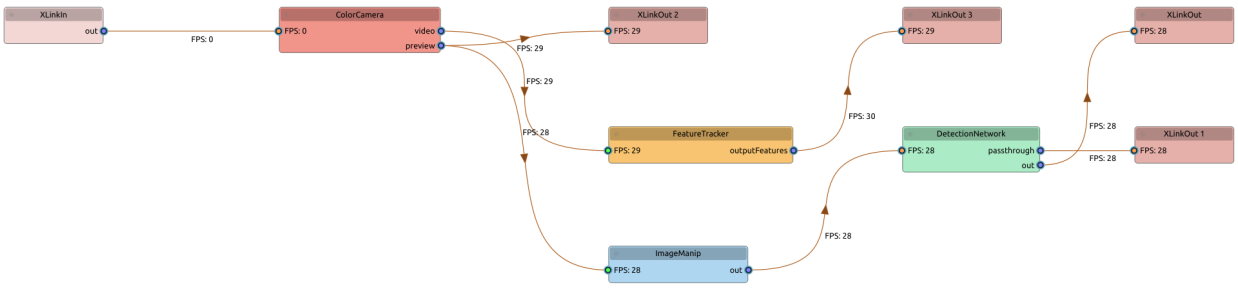
10.9.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.9.3 Pipeline



10.9.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera
import depthai as dai

with OakCamera() as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('mobilenet-ssd', color)
    oak.visualize([nn.out.passthrough, nn], fps=True)

    nn.node.setNumInferenceThreads(2) # Configure components' nodes

    features = oak.pipeline.create(dai.node.FeatureTracker) # Create new pipeline␣
↪nodes
    color.node.video.link(features.inputImage)

    out = oak.pipeline.create(dai.node.XLinkOut)
    out.setStreamName('features')
    features.outputFeatures.link(out.input)

    oak.start() # Start the pipeline (upload it to the OAK)

    q = oak.device.getOutputQueue('features') # Create output queue after calling␣
↪start()
    while oak.running():
        if q.has():
            result = q.get()
            print(result)
        # Since we are not in blocking mode, we have to poll oak camera to
        # visualize frames, call callbacks, process keyboard keys, etc.
        oak.poll()
```

10.10 Car Tracking Example

This example shows how to use SDK to run inference on a pre-saved video file and display the results.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.10.1 Demo

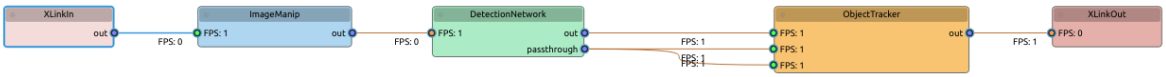
10.10.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.10.3 Pipeline



10.10.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera, ResizeMode

# Download public depthai-recording
with OakCamera(replay='cars-tracking-above-01') as oak:
    # Create color camera, add video encoder
    color = oak.create_camera('color')

    # Download & run pretrained vehicle detection model and track detections
    nn = oak.create_nn('vehicle-detection-0202', color, tracker=True)

    # Visualize tracklets, show FPS
    visualizer = oak.visualize(nn.out.tracker, fps=True, record_path='./car_tracking.
↪avi')
    visualizer.tracking(line_thickness=5).text(auto_scale=True)
    # Start the app in blocking mode
    # oak.show_graph()
    oak.start(blocking=True)
```

10.11 Collision Avoidance

This example shows how to set up a depth based collision avoidance system for proximity. This can be used with supervised robotic operation where the goal is to limit the robot's speed when a person is detected in front of it.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.11.1 Demo

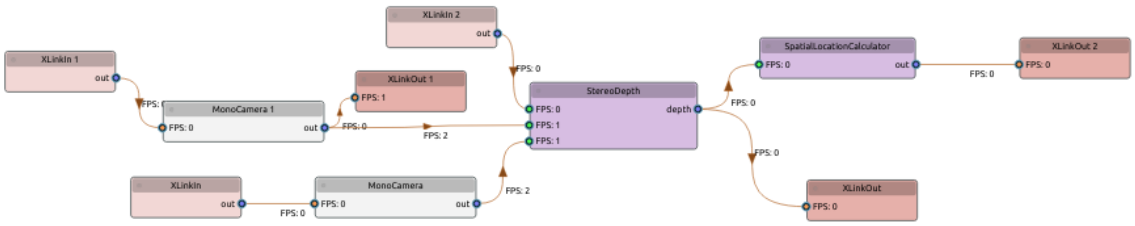
10.11.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.11.3 Pipeline



10.11.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera
from depthai_sdk.visualize.configs import StereoColor
from depthai_sdk.classes.packets import DisparityDepthPacket
from depthai_sdk.visualize.visualizers.opencv_visualizer import OpenCvVisualizer
import math
```

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```
import depthai as dai
import cv2

# User-defined constants
WARNING = 1000 # 1m, orange
CRITICAL = 500 # 50cm, red

slc_data = []
fontType = cv2.FONT_HERSHEY_TRIPLEX



with OakCamera() as oak:
    stereo = oak.create_stereo('720p')
    # We don't need high fill rate, just very accurate depth, that's why we enable some filters, and
    # set the confidence threshold to 50
    config = stereo.node.initialConfig.get()
    config.postProcessing.brightnessFilter.minBrightness = 0
    config.postProcessing.brightnessFilter.maxBrightness = 255
    stereo.node.initialConfig.set(config)
    stereo.config_postprocessing(colorize=StereoColor.RGBD, colormap=cv2.COLORMAP_BONE)
    stereo.config_stereo(confidence=50, lr_check=True, extended=True)


    slc = oak.pipeline.create(dai.node.SpatialLocationCalculator)
    for x in range(15):
        for y in range(9):
            config = dai.SpatialLocationCalculatorConfigData()
            config.depthThresholds.lowerThreshold = 200
            config.depthThresholds.upperThreshold = 10000
            config.roi = dai.Rect(dai.Point2f((x+0.5)*0.0625, (y+0.5)*0.1), dai.Point2f((x+1.5)*0.0625, (y+1.5)*0.1))
            # TODO: change from median to 10th percentile once supported
            config.calculationAlgorithm = dai.SpatialLocationCalculatorAlgorithm.MEDIAN
            slc.initialConfig.addROI(config)

    stereo.depth.link(slc.inputDepth)

    slc_out = oak.pipeline.create(dai.node.XLinkOut)
    slc_out.setStreamName('slc')
    slc.out.link(slc_out.input)

    stereoQ = oak.queue(stereo.out.depth).get_queue()

    oak.start() # Start the pipeline (upload it to the OAK)

    slcQ = oak.device.getOutputQueue('slc') # Create output queue after calling start()
    vis = OpenCvVisualizer()
    while oak.running():
        oak.poll()
        packet: DisparityDepthPacket = stereoQ.get()
        slc_data = slcQ.get().getSpatialLocations()

```

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```
        depthFrameColor = packet.get_colorized_frame(vis)

        for depthData in slc_data:
            roi = depthData.config.roi
            roi = roi.denormalize(width=depthFrameColor.shape[1], height=depthFrameColor.shape[0])

            xmin = int(roi.topLeft().x)
            ymin = int(roi.topLeft().y)
            xmax = int(roi.bottomRight().x)
            ymax = int(roi.bottomRight().y)

            coords = depthData.spatialCoordinates
            distance = math.sqrt(coords.x ** 2 + coords.y ** 2 + coords.z ** 2)

            if distance == 0: # Invalid
                continue

            if distance < CRITICAL:
                color = (0, 0, 255)
                cv2.rectangle(depthFrameColor, (xmin, ymin), (xmax, ymax), color, thickness=4)
                cv2.putText(depthFrameColor, "{:.1f}m".format(distance/1000), (xmin + 10, ymin + 20), fontType, 0.5, color)
            elif distance < WARNING:
                color = (0, 140, 255)
                cv2.rectangle(depthFrameColor, (xmin, ymin), (xmax, ymax), color, thickness=2)
                cv2.putText(depthFrameColor, "{:.1f}m".format(distance/1000), (xmin + 10, ymin + 20), fontType, 0.5, color)

        cv2.imshow('Frame', depthFrameColor)
```

10.12 Speed Calculation Preview

This example showcases the use of callback function inside the visualizer to log speed and draw tracking information.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.12.1 Demo

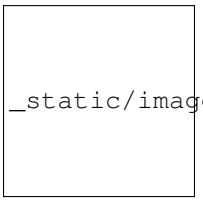
10.12.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.12.3 Pipeline



10.12.4 Source Code

Python

Also available on GitHub.

```
import cv2

from depthai_sdk import OakCamera
from depthai_sdk.classes.packets import TrackerPacket


def callback(packet: TrackerPacket):
    for obj_id, tracklets in packet.tracklets.items():
        if len(tracklets) != 0:
            tracklet = tracklets[-1]
        if tracklet.speed is not None:
            print(f'Speed for object {obj_id}: {tracklet.speed:.02f} m/s, {tracklet.
↪speed_kmph:.02f} km/h, {tracklet.speed_mph:.02f} mph')

    frame = packet.visualizer.draw(packet.decode())
    cv2.imshow('Speed estimation', frame)


with OakCamera() as oak:
    color = oak.create_camera('color')
    stereo = oak.create_stereo('800p')
    stereo.config_stereo(subpixel=False, lr_check=True)

    nn = oak.create_nn('face-detection-retail-0004', color, spatial=stereo,␣
↪tracker=True)
    nn.config_tracker(calculate_speed=True)

    visualizer = oak.visualize(nn.out.tracker, callback=callback, fps=True)
```

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```
    visualizer.tracking(show_speed=True).text(auto_scale=True)

    oak.start(blocking=True)
```

10.13 Switch Between Models

This example shows how to switch between models on the fly. It uses script node to alter pipeline flow (either to use the yolo model or the mobilenet model).

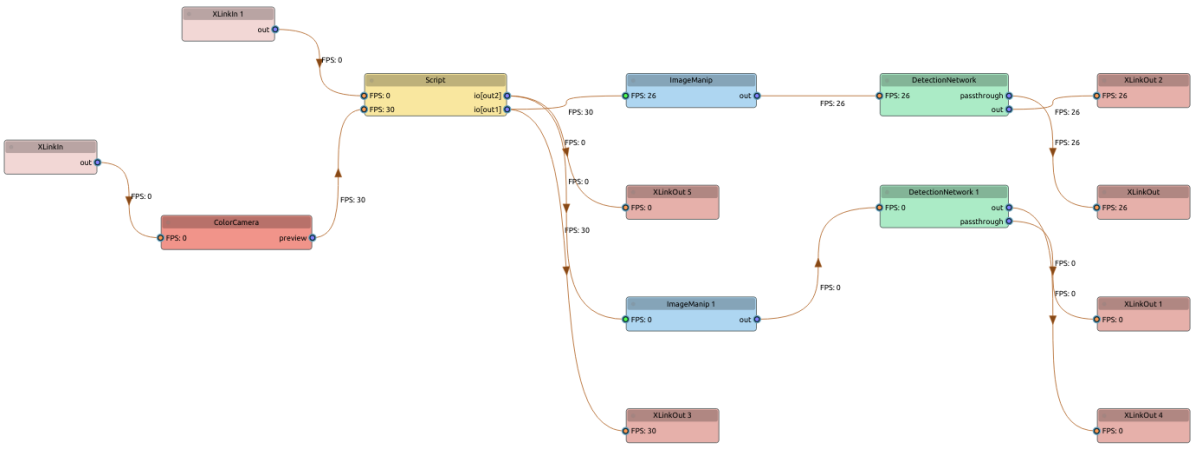
10.13.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.13.2 Pipeline



10.13.3 Source Code

Python

Also available on GitHub.

```python
from depthai_sdk import OakCamera
from depthai_sdk.classes.packets import DetectionPacket
import depthai as dai
import cv2

# We use callback, so we only have cv2 window for both models
def cb(packet: DetectionPacket):
    frame = packet.visualizer.draw(packet.frame)
    cv2.imshow('Frame', frame)

with OakCamera() as oak:
    color = oak.create_camera('color')

    script = oak.pipeline.create(dai.node.Script)
    # When Script node receives a message from the host it will switch streaming␣
↪frames to another NN model
    script.setScript("""
    i = 0
    outputs = ['out1', 'out2']

    while True:
        frame = node.io['frames'].get()

        switch = node.io['switch'].tryGet()
        if switch is not None:
            i += 1
            if len(outputs) <= i:
                i = 0

        node.io[outputs[i]].send(frame)
    """)
    color.stream.link(script.inputs['frames'])

    # We can have multiple models here, not just 2 object detection models
    nn1 = oak.create_nn('yolov6nr3_coco_640x352', input=script.outputs['out1'])
    nn1.config_nn(resize_mode='stretch') # otherwise, BB mappings will be incorrect
    nn2 = oak.create_nn('mobilenet-ssd', input=script.outputs['out2'])
    nn2.config_nn(resize_mode='stretch') # otherwise, BB mappings will be incorrect

    # We will send "switch" message via XLinkIn
    xin = oak.pipeline.create(dai.node.XLinkIn)
    xin.setStreamName('switch')
    xin.out.link(script.inputs['switch'])

    # We don't want syncing, we just want either of the model packets in the callback
    oak.visualize([nn1, nn2], fps=True, callback=cb)

    oak.visualize([nn1.out.passthrough, nn2.out.passthrough], fps=True)

    # oak.show_graph()

    oak.start()
```

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```
    qin = oak.device.getInputQueue('switch')

    while True:
        key = oak.poll()
        if key == ord('s'):
            print('Switching NN model')
            qin.send(dai.Buffer())
        elif key == ord('q'):
            break
```

10.14 Sync Multiple Outputs

This example shows how to apply software syncing to different outputs of the OAK device. In this example, the color stream is synced with two NeuralNetworks and passthrough.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.14.1 Demo

```
jaka@X750LN:~/Desktop/depthai/depthai_sdk/examples$ python3 mixed/sync_multiple_outputs.py
synced! {'color': <depthai_sdk.classes.packets.FramePacket object at 0x7f5d3d6e4790>, 'face-detection_out;face-detection_preview': <depthai
_sdk.classes.packets.DetectionPacket object at 0x7f5d3d6e4490>, 'mobilenet_out;mobilenet_passthrough': <depthai_sdk.classes.packets.Detecti
onPacket object at 0x7f5d3d6e40a0>, 'mobilenet_out;mobilenet_preview': <depthai_sdk.classes.packets.DetectionPacket object at 0x7f5d3d6e407
0>}
synced! {'color': <depthai_sdk.classes.packets.FramePacket object at 0x7f5d3d6e47f0>, 'face-detection_out;face-detection_preview': <depthai
_sdk.classes.packets.DetectionPacket object at 0x7f5d3d6e44c0>, 'mobilenet_out;mobilenet_passthrough': <depthai_sdk.classes.packets.Detecti
onPacket object at 0x7f5d3d6e4160>, 'mobilenet_out;mobilenet_preview': <depthai_sdk.classes.packets.DetectionPacket object at 0x7f5d3d6e446
0>}
synced! {'color': <depthai_sdk.classes.packets.FramePacket object at 0x7f5d3d6e4700>, 'face-detection_out;face-detection_preview': <depthai
_sdk.classes.packets.DetectionPacket object at 0x7f5d3d6e4430>, 'mobilenet_out;mobilenet_passthrough': <depthai_sdk.classes.packets.Detecti
onPacket object at 0x7f5d3d6e45e0>, 'mobilenet_out;mobilenet_preview': <depthai_sdk.classes.packets.DetectionPacket object at 0x7f5d3d6e434
0>}
synced! {'color': <depthai_sdk.classes.packets.FramePacket object at 0x7f5d3d6e4610>, 'face-detection_out;face-detection_preview': <depthai
_sdk.classes.packets.DetectionPacket object at 0x7f5d3d6e4280>, 'mobilenet_out;mobilenet_passthrough': <depthai_sdk.classes.packets.Detecti
onPacket object at 0x7f5d3d6e45e0>, 'mobilenet_out;mobilenet_preview': <depthai_sdk.classes.packets.DetectionPacket object at 0x7f5d3d6e416
0>}
```

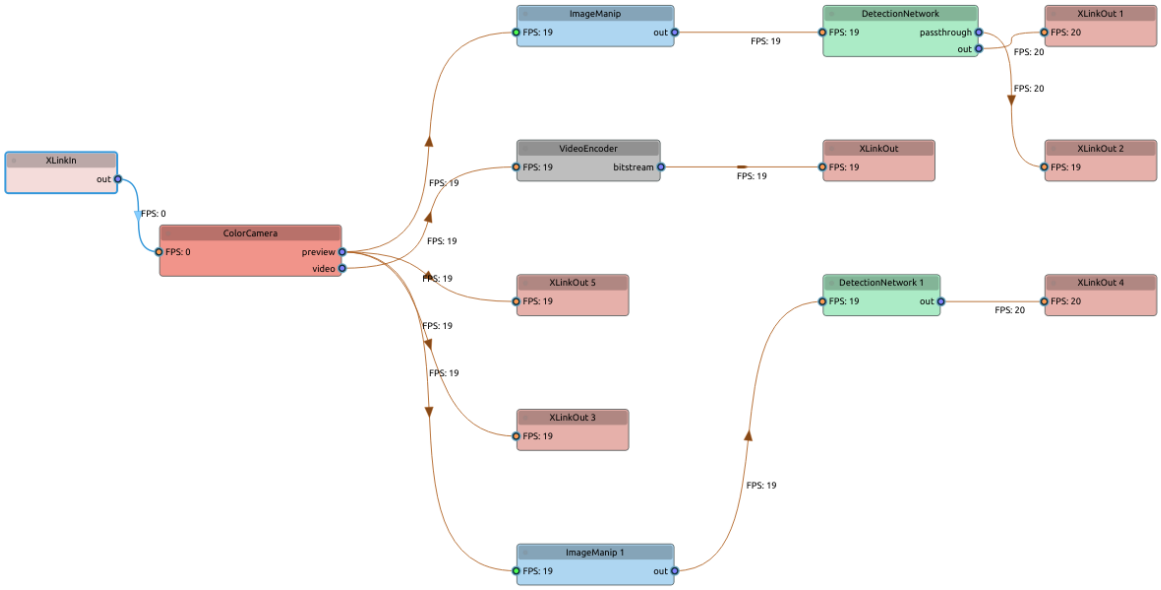
10.14.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.14.3 Pipeline



10.14.4 Source Code

Python

Also available on GitHub

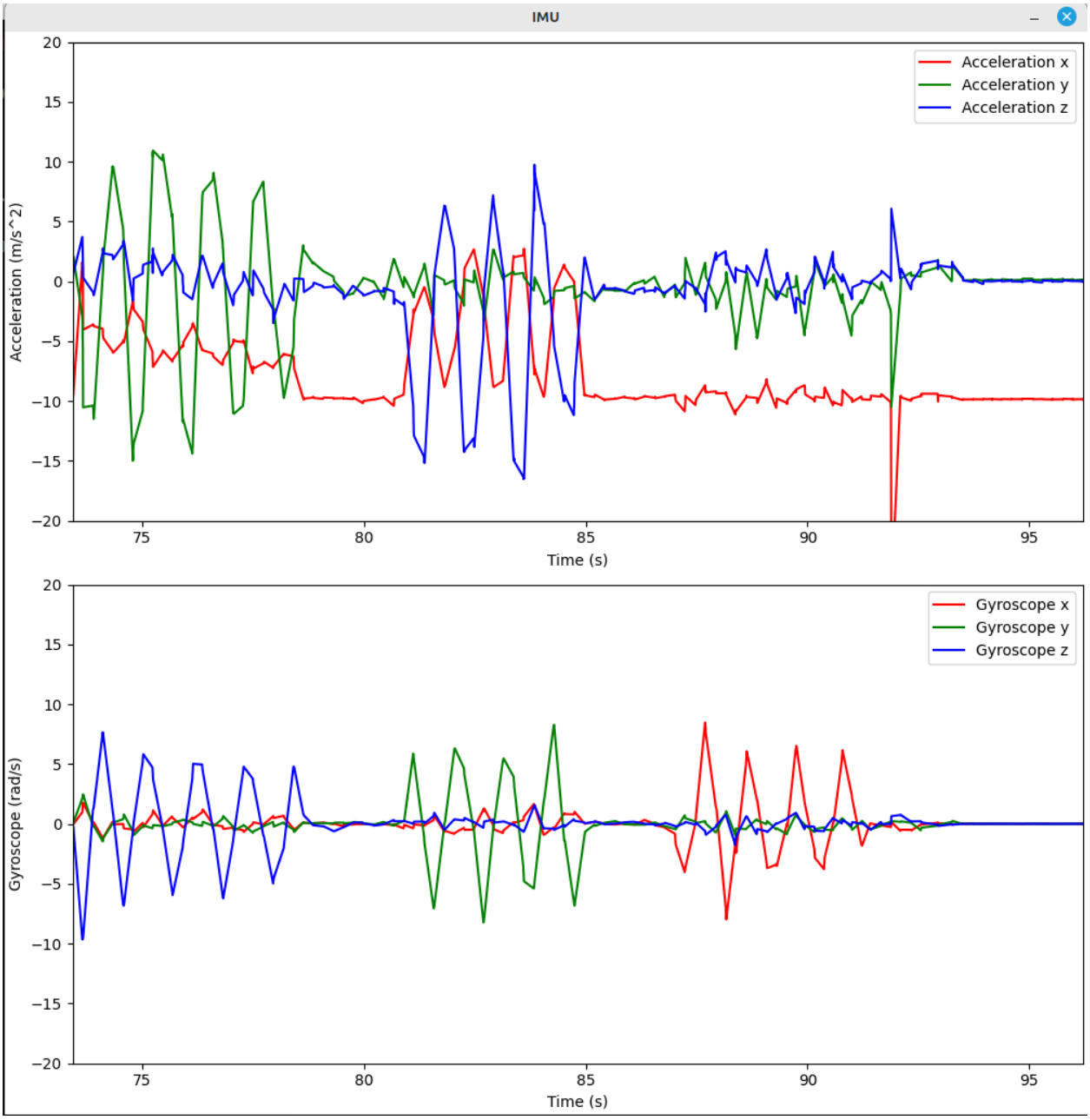
```
from typing import Dict

from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color', encode='h264')
    nn = oak.create_nn('mobilenet-ssd', color)
    nn2 = oak.create_nn('face-detection-retail-0004', color)

    def cb(msgs: Dict):
        print('====== New synced packets! ======')
        for name, packet in msgs.items():
            print(f"Packet '{name}' with timestamp:", packet.get_timestamp(), 'Seq number:', packet.get_sequence_num(), 'Object', packet)

    oak.callback([nn.out.passthrough, nn.out.encoded, nn2.out.encoded], cb) \
        .configure_syncing(enable_sync=True, threshold_ms=30)
    # oak.show_graph()

    oak.start(blocking=True)
```

10.15 IMU Demonstration

This example showcases how to use the integrated IMU sensor on the OAK-D board with the Depthai sdk. In our example we set the IMU to output data at 400Hz, and batch size to 5. This means we get 5 IMU readings every 12.5ms (2.5ms per reading * 5). We then print out the IMU data to the console.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.15.1 Demo


IMU
Acceleration x
Acceleration y
Acceleration z
Acceleration (m/s^2)
Time (s)
Gyroscope x
Gyroscope y
Gyroscope z
Gyroscope (rad/s)
Time (s)

10.15.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.15.3 Pipeline

10.15.4 Source Code

Python

Also available on GitHub.

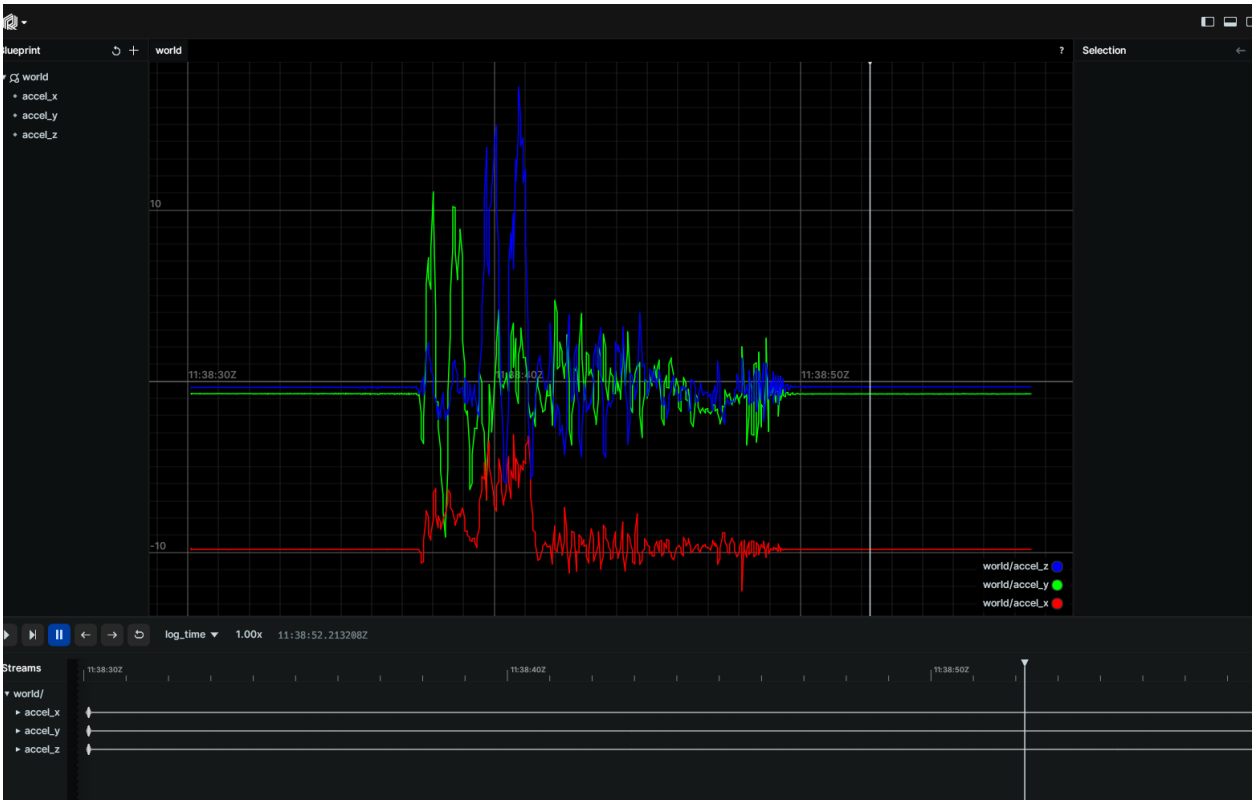
```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    imu = oak.create_imu()
    imu.config_imu(report_rate=400, batch_report_threshold=5)
    # DepthAI viewer should open, and IMU data can be viewed on the right-side panel,
    # under "Stats" tab (right of the "Device Settings" tab).
    oak.visualize(imu.out.main)
    oak.start(blocking=True)
```

10.16 IMU Rerun Demonstration

This example showcases how to use the integrated IMU sensor on the OAK-D board. In this example, the displaying is done with Rerun (the same core as our DepthAI Viewer).

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.16.1 Demo



10.16.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.16.3 Pipeline

10.16.4 Source Code

Python

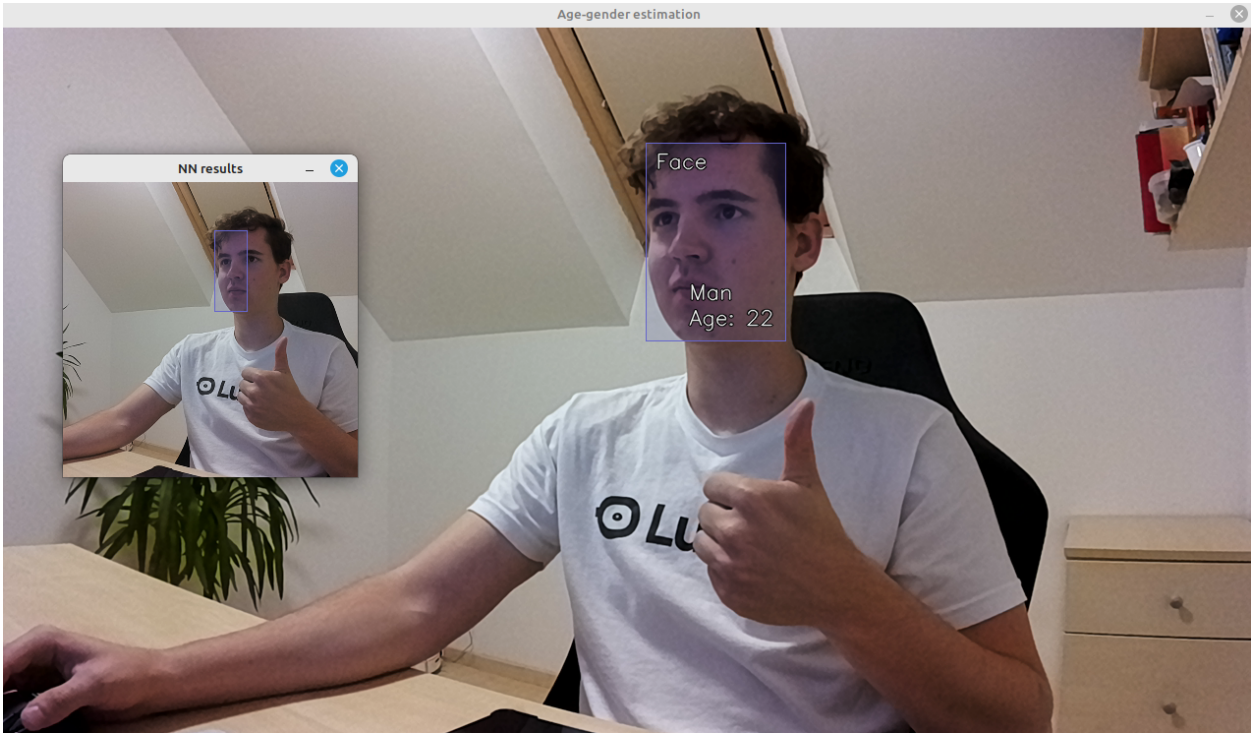
Also available on GitHub.

10.17 Age-Gender Inference

This example showcases the usage of multi-stage neural network pipeline to make age and gender inference on a video frame.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.17.1 Demo



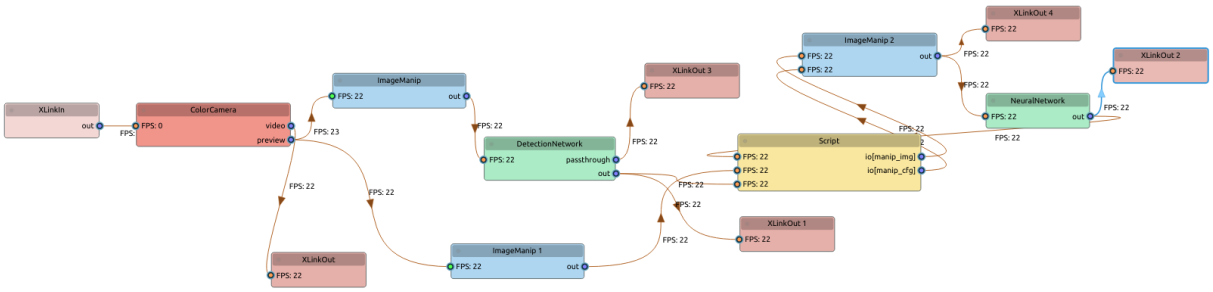
10.17.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.17.3 Pipeline



10.17.4 Source Code

Python

Also available on GitHub.

```
import cv2
import numpy as np

from depthai_sdk import OakCamera
from depthai_sdk.classes import TwoStagePacket
from depthai_sdk.visualize.configs import TextPosition


def callback(packet: TwoStagePacket):
    visualizer = packet.visualizer
    for det, rec in zip(packet.detections, packet.nnData):
        age = int(float(np.squeeze(np.array(rec.getLayerFp16('age_conv3')))) * 100)
        gender = np.squeeze(np.array(rec.getLayerFp16('prob')))
        gender_str = "Woman" if gender[0] > gender[1] else "Man"

        visualizer.add_text(f'{gender_str}\nAge: {age}',
                            bbox=packet.bbox.get_relative_bbox(det.bbox),
                            position=TextPosition.BOTTOM_RIGHT)

    frame = visualizer.draw(packet.frame)
    cv2.imshow('Age-gender estimation', frame)


with OakCamera() as oak:
```

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```
    color = oak.create_camera('color')
    det = oak.create_nn('face-detection-retail-0004', color)
    det.config_nn(resize_mode='crop')

    age_gender = oak.create_nn('age-gender-recognition-retail-0013', input=det)
    # age_gender.config_multistage_nn(show_cropped_frames=True) # For debugging

    # Visualize detections on the frame. Don't show the frame but send the packet
    # to the callback function (where it will be displayed)
    oak.visualize(age_gender, callback=callback)
    oak.visualize(det.out.passthrough)
    oak.visualize(age_gender.out.twostage_crops)

    # oak.show_graph() # Show pipeline graph, no need for now
    oak.start(blocking=True)  # This call will block until the app is stopped (by
↪pressing 'Q' button)
```

10.18 Custom Decode Function

This example showcases the usage of custom decoding functions for the neural network component. More info is available inside the function itself.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

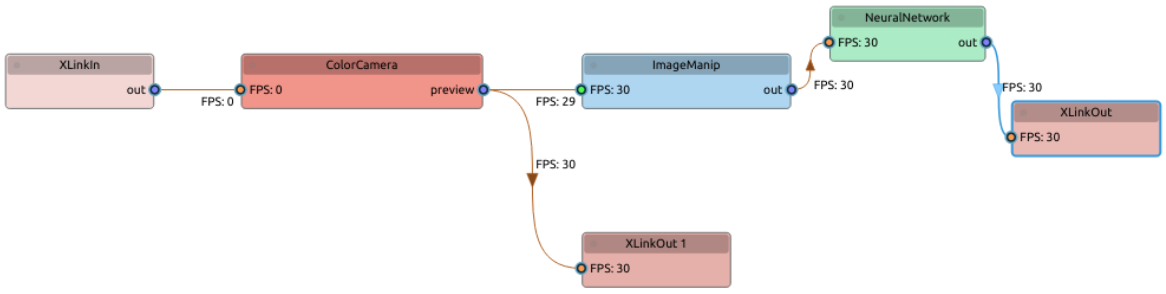
10.18.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.18.2 Pipeline



10.18.3 Source Code

Python

Also available on GitHub.

```python
import blobconverter
import numpy as np
import depthai as dai
from depthai_sdk import OakCamera
from depthai_sdk.classes import Detections


def decode(nn_data: dai.NNData) -> Detections:
    """
    Custom decode function for the NN component. Decode function has to accept NNData argument.
    The return type should preferably be a class that inherits from depthai_sdk.classes.GenericNNOutput,
    which support visualization. But this is not required, i.e. the function can return arbitrary type.

    The decoded output can be accessed from the packet object in the callback function via packet.img_detections.
    """
    layer = nn_data.getFirstLayerFp16()
    results = np.array(layer).reshape((1, 1, -1, 7))
    dets = Detections(nn_data)
    for result in results[0][0]:
        if result[2] > 0.3:
            label = int(result[1])
            conf = result[2]
            bbox = result[3:]
            det = dai.ImgDetection()
            det.confidence = conf
            det.label = label
            det.xmin = bbox[0]
            det.ymin = bbox[1]
            det.xmax = bbox[2]
            det.ymax = bbox[3]
```

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```
            dets.detections.append(det)

    return dets

with OakCamera() as oak:
    color = oak.create_camera('color')

    nn_path = blobconverter.from_zoo(name='person-detection-0200', version='2021.4',
↪shaves=6)
    nn = oak.create_nn(nn_path, color, decode_fn=decode)

    oak.visualize(nn)
    oak.start(blocking=True)
```

10.19 Deeplabv3 Person Segmentation

This example showcases the implementation of deepLabv3 person segmentation model with DepthAI SDK.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

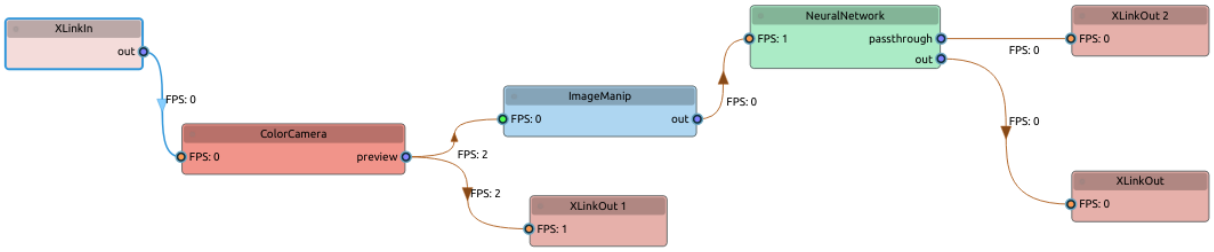
10.19.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.19.2 Pipeline



10.19.3 Source Code

One thing worth noting is the resize mode option. Because inference is done on a color camera which has a 16:9 aspect ratio, and the model expects a 1:1 aspect ratio, we need to resize the input frame to fit the model. This is done in three ways:

- letterbox - resize the frame to fit the model, and pad the rest with black pixels
- crop - crop the frame to fit the model
- stretch - stretch the frame to fit the model

More information at Maximizing FOV.

Python

Also available on GitHub

10.20 Emotion Recognition

This example showcases the implementation of two stage neural network pipeline, where the first stage is a face detection network, and the second stage is an emotion recognition model.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.20.1 Demo

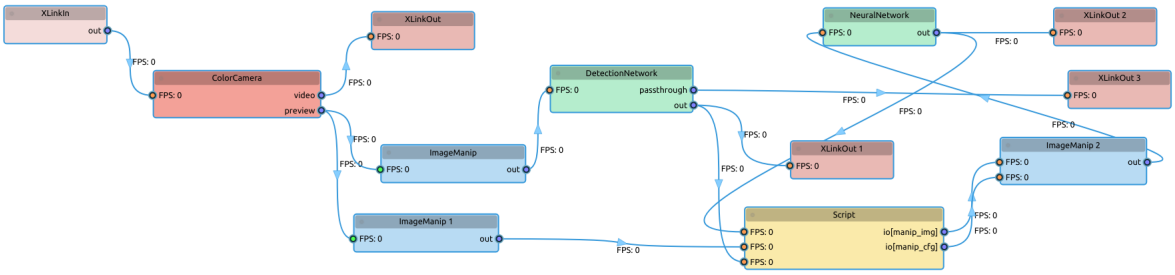
10.20.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.20.3 Pipeline



10.20.4 Source Code

Python

Also available on GitHub.

```
import cv2
import numpy as np

from depthai_sdk import OakCamera
from depthai_sdk.classes import TwoStagePacket
from depthai_sdk.visualize.configs import TextPosition

emotions = ['neutral', 'happy', 'sad', 'surprise', 'anger']


def callback(packet: TwoStagePacket):
    visualizer = packet.visualizer

    for det, rec in zip(packet.detections, packet.nnData):
        emotion_results = np.array(rec.getFirstLayerFp16())
        emotion_name = emotions[np.argmax(emotion_results)]

        visualizer.add_text(emotion_name,
                            bbox=packet.bbox.get_relative_bbox(det.bbox),
                            position=TextPosition.BOTTOM_RIGHT)

    visualizer.draw(packet.frame)
    cv2.imshow(packet.name, packet.frame)


with OakCamera() as oak:
    color = oak.create_camera('color')
    det = oak.create_nn('face-detection-retail-0004', color)
    # Passthrough is enabled for debugging purposes
    det.config_nn(resize_mode='crop')

    emotion_nn = oak.create_nn('emotions-recognition-retail-0003', input=det)
    # emotion_nn.config_multistage_nn(show_cropped_frames=True) # For debugging

    # Visualize detections on the frame. Also display FPS on the frame. Don't show␣
↪the frame but send the packet
```

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```
    # to the callback function (where it will be displayed)
    oak.visualize(emotion_nn, callback=callback, fps=True)
    oak.visualize(det.out.passthrough)
    # oak.show_graph() # Show pipeline graph, no need for now
    oak.start(blocking=True)  # This call will block until the app is stopped (by
↪pressing 'Q' button)
```

10.21 Face Detection RGB

This example shows how to run face detection on RGB camera input using SDK.

For running the same face detection on mono camera, see *Face Detection Mono*.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.21.1 Demo

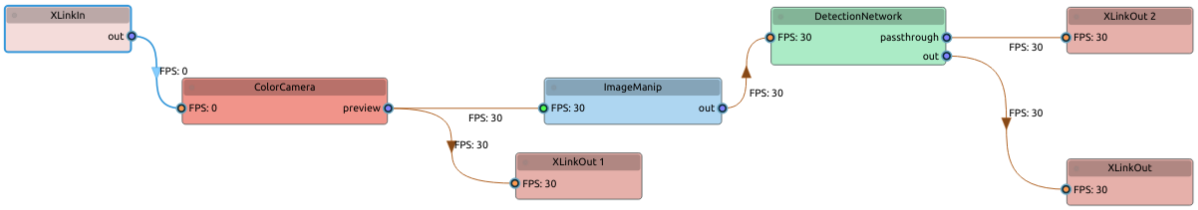
10.21.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.21.3 Pipeline



10.21.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('face-detection-retail-0004', color)
    oak.visualize([nn.out.main, nn.out.passthrough], scale=2/3, fps=True)
    oak.start(blocking=True)
```

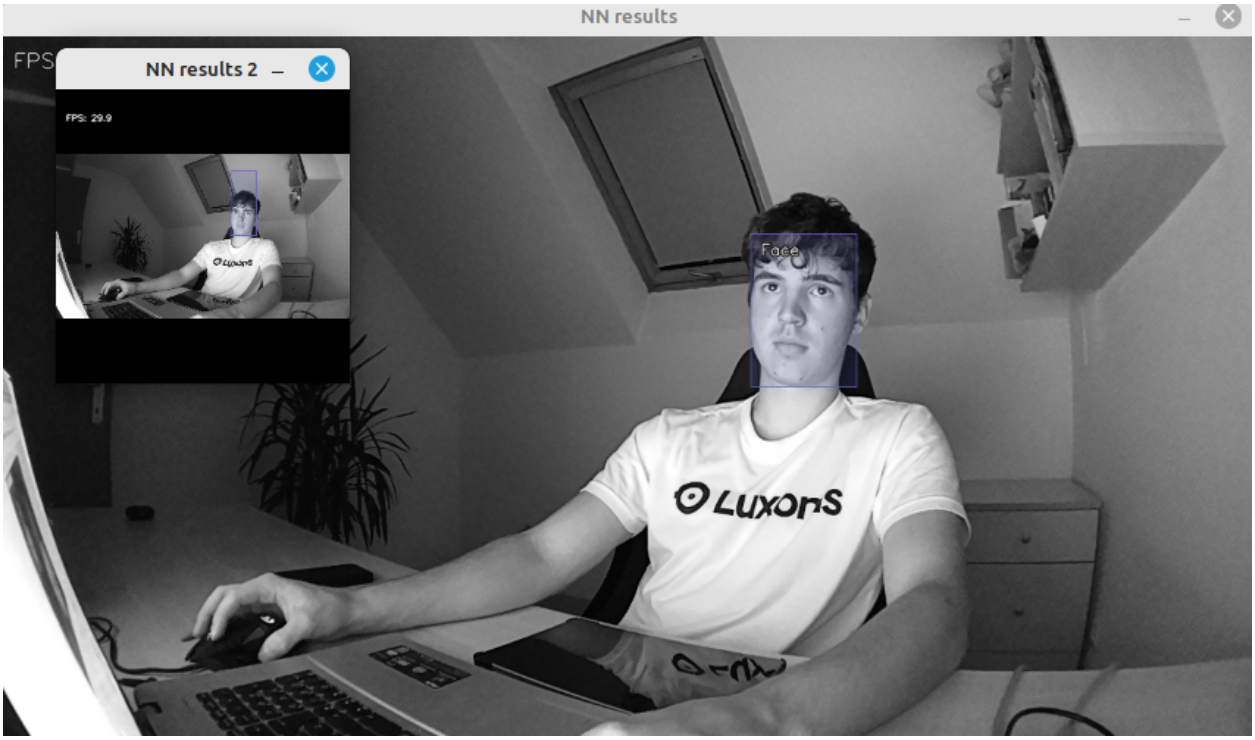
10.22 Face Detection Mono

This example shows how to run face detection on Mono camera input using SDK.

For running the same face detection on RGB camera, see *Face Detection RGB*.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.22.1 Demo



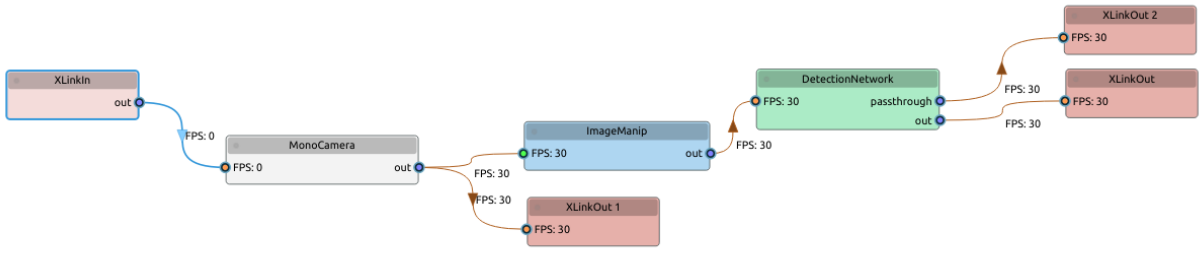
10.22.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.22.3 Pipeline



10.22.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    left = oak.create_camera('left')
    nn = oak.create_nn('face-detection-retail-0004', left)
    oak.visualize([nn.out.main, nn.out.passthrough], scale=2/3, fps=True)
    oak.start(blocking=True)
```

10.23 Human Pose Estimation

This example showcases the implementation of a human pose estimation network using the DepthAI SDK.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.23.1 Demo

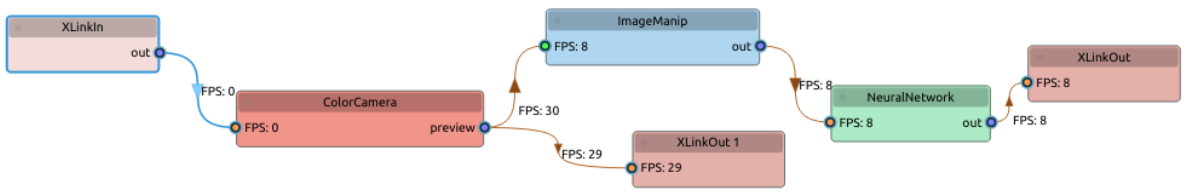
10.23.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.23.3 Pipeline



10.23.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color')
    # List of models that are supported out-of-the-box by the SDK:
    # https://docs.luxonis.com/projects/sdk/en/latest/features/ai_models/#sdk-supported-models
    human_pose_nn = oak.create_nn('human-pose-estimation-0001', color)

    oak.visualize(human_pose_nn)
    oak.start(blocking=True)
```

10.24 MobileNet Encoded

This example shows how to run an encoded RGB stream through a neural network and display the encoded results.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

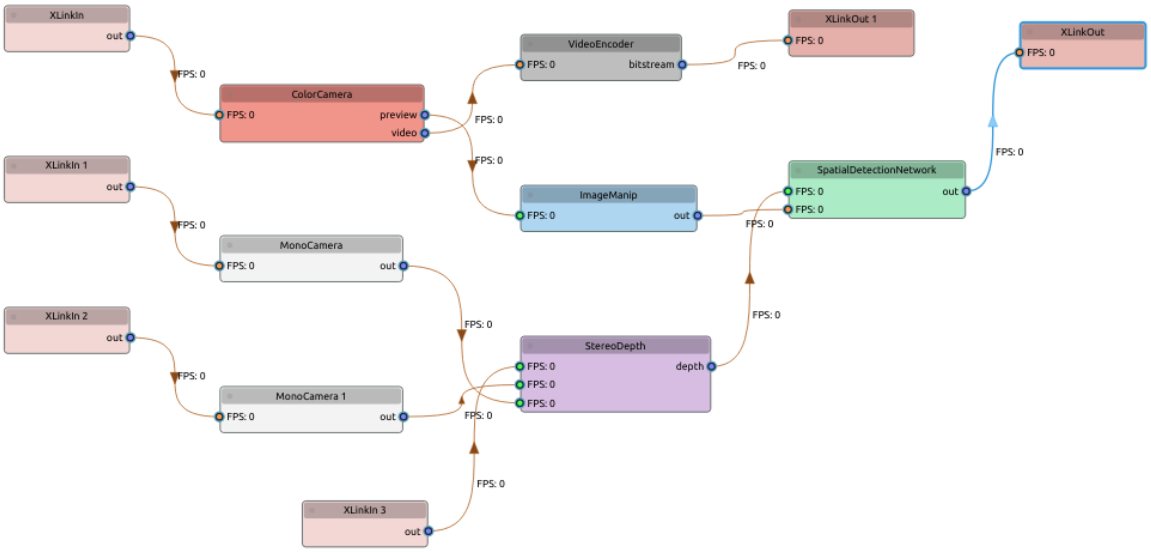
10.24.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.24.2 Pipeline



10.24.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color', encode='mjpeg', fps=10)

    nn = oak.create_nn('mobilenet-ssd', color, spatial=True)  # spatial flag␣
↪indicates that we want to get spatial data

    oak.visualize([nn.out.encoded])  # Display encoded output
    oak.start(blocking=True)
```

10.25 Neural Network Component

This example shows how to run run a color camera stream through a YoloV7 model and display the results on the host.

For additional models, check: models supported by SDK

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

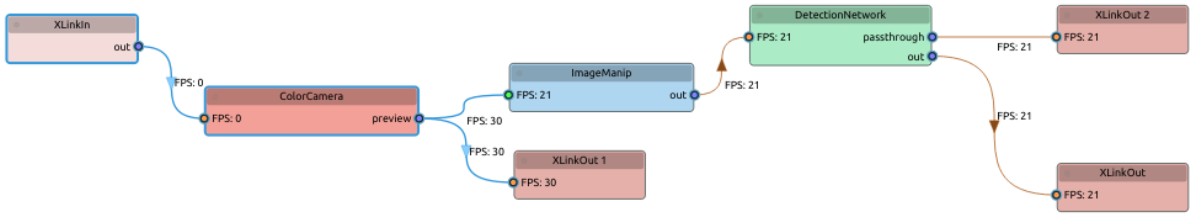
10.25.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.25.2 Pipeline



10.25.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color')
    # List of models that are supported out-of-the-box by the SDK:
    # https://docs.luxonis.com/projects/sdk/en/latest/features/ai_models/#sdk-supported-models
    nn = oak.create_nn('yolov5n_coco_416x416', color)
    nn.config_nn(resize_mode='stretch')
    oak.visualize([nn.out.main], fps=True)
    oak.visualize(nn.out.passthrough)
    oak.start(blocking=True)
```

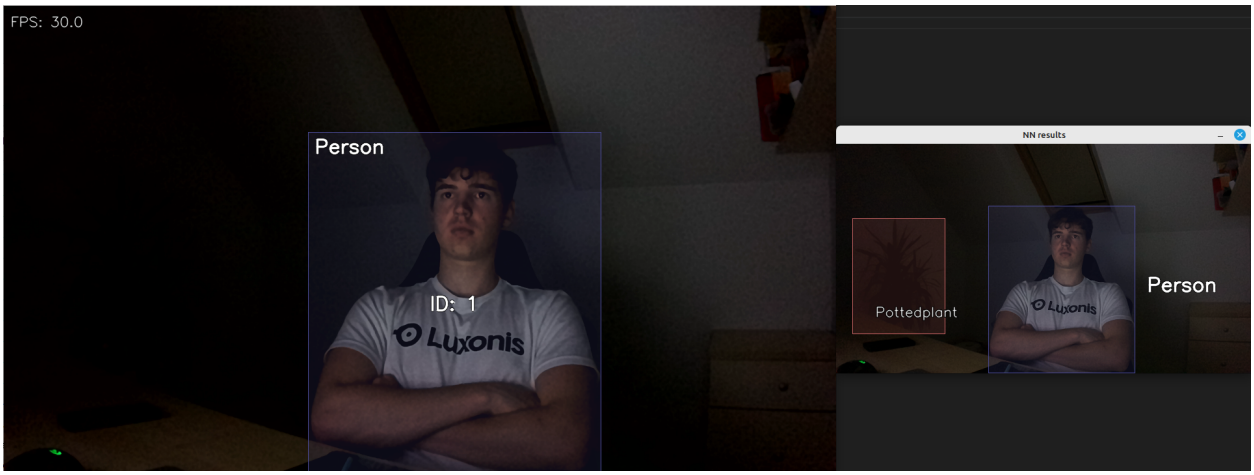
10.26 Object Tracking

This example showcases the usage of object tracking in Depthai SDK.

For more information about tracker configuration, please refer to config tracker reference.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.26.1 Demo



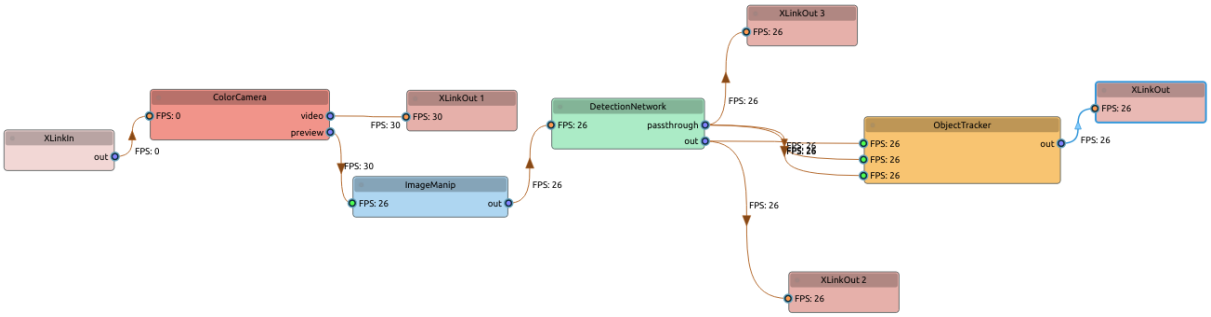
10.26.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.26.3 Pipeline



10.26.4 Source Code

Python

Also available on GitHub.

```python
from depthai_sdk import OakCamera
import depthai as dai

with OakCamera() as oak:
    color = oak.create_camera('color')
    # List of models that are supported out-of-the-box by the SDK:
    # https://docs.luxonis.com/projects/sdk/en/latest/features/ai_models/#sdk-supported-models
    nn = oak.create_nn('yolov6nr3_coco_640x352', color, tracker=True)

    nn.config_nn(resize_mode='stretch')
    nn.config_tracker(
        tracker_type=dai.TrackerType.ZERO_TERM_COLOR_HISTOGRAM,
        track_labels=[0], # Track only 1st object from the object map. If unspecified, track all object types
        # track_labels=['person'] # Track only people (for coco datasets, person is 1st object in the map)
        assignment_policy=dai.TrackerIdAssignmentPolicy.SMALLEST_ID,
        max_obj=10, # Max objects to track, which can improve performance
        threshold=0.1 # Tracker threshold
    )

    oak.visualize([nn.out.tracker], fps=True)
    oak.visualize(nn.out.passthrough)
    oak.start(blocking=True)
```

10.27 Roboflow Integration

This example showcases the usage of the ROBOFLOW platform to train a custom object detection model and use it with DepthAI SDK.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

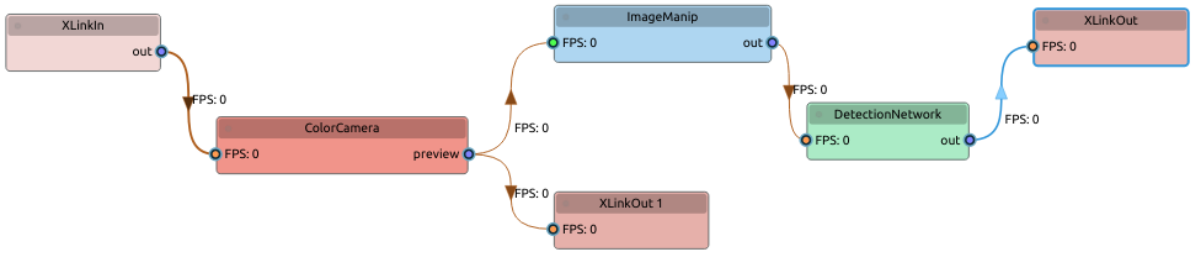
10.27.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.27.2 Pipeline



10.27.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

# Download & deploy a model from Roboflow universe:
# # https://universe.roboflow.com/david-lee-d0rhs/american-sign-language-letters/
↪dataset/6

with OakCamera() as oak:
    color = oak.create_camera('color')
    model_config = {
        'source': 'roboflow', # Specify that we are downloading the model from␣
↪Roboflow
```

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```
        'model':'american-sign-language-letters/6',
        'key':'181b0f6e43d59ee5ea421cd77f6d9ea2a4b059f8' # Fake API key, replace with your own!
    }
    nn = oak.create_nn(model_config, color)
    oak.visualize(nn, fps=True)
    oak.start(blocking=True)
```

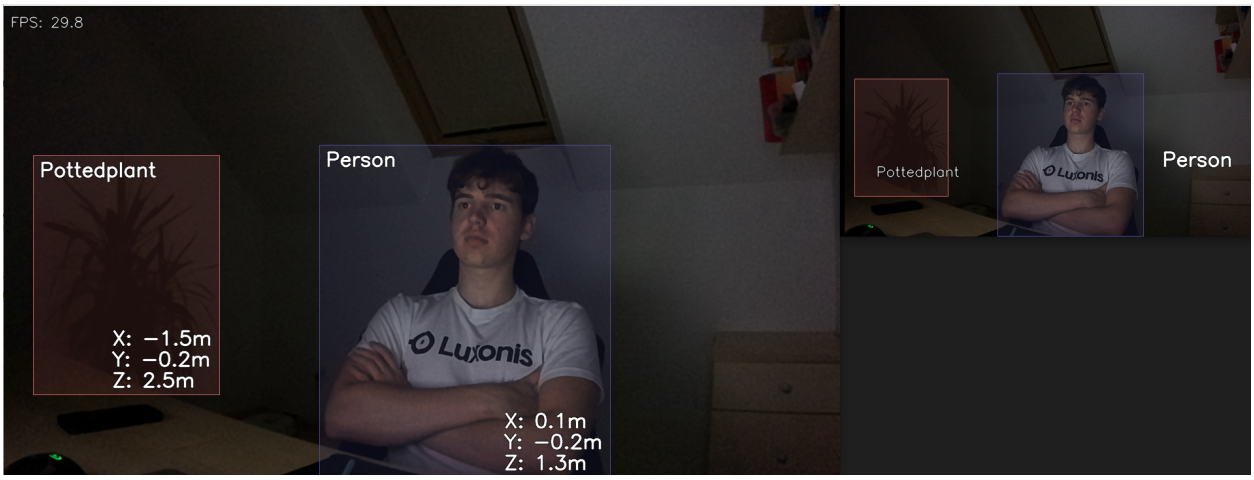
10.28 Spatial Detection

This example showcases the usage of spatial detection using MobileNet-SSD neural network.

For more information about spatial configuration (thresholds, averaging), please refer to config spatial reference.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.28.1 Demo



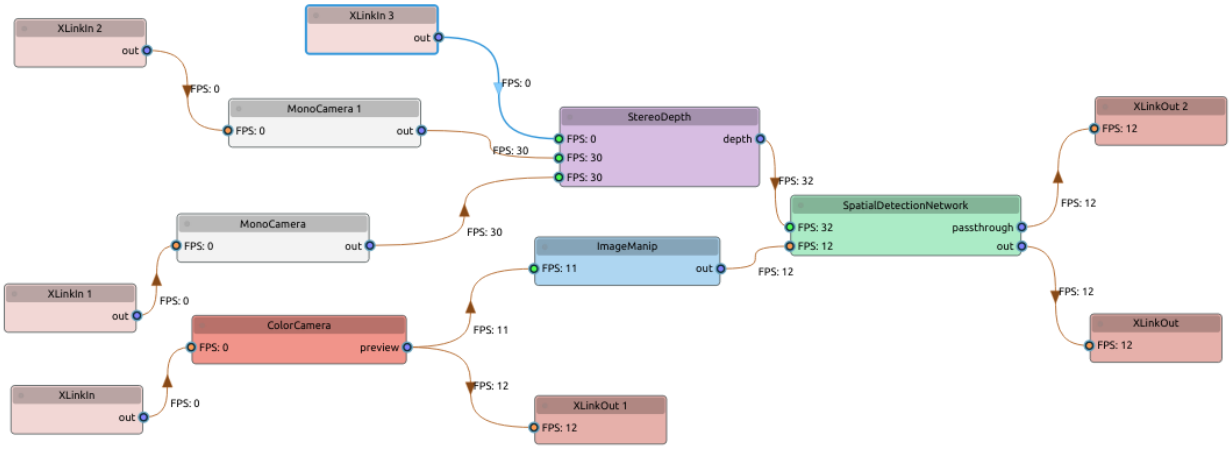
10.28.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.28.3 Pipeline



10.28.4 Source Code

Python

Also available on GitHub

```
from depthai_sdk import OakCamera
import depthai as dai

with OakCamera() as oak:
    color = oak.create_camera('color')
    # List of models that are supported out-of-the-box by the SDK:
    # https://docs.luxonis.com/projects/sdk/en/latest/features/ai_models/#sdk-supported-models
    nn = oak.create_nn('yolov6nr3_coco_640x352', color, spatial=True)

    nn.config_spatial(
        bb_scale_factor=0.5, # Scaling bounding box before averaging the depth in that ROI
        lower_threshold=300, # Discard depth points below 30cm
        upper_threshold=10000, # Discard depth pints above 10m
        # Average depth points before calculating X and Y spatial coordinates:
        calc_algo=dai.SpatialLocationCalculatorAlgorithm.AVERAGE
    )

    oak.visualize(nn.out.main, fps=True)
    oak.visualize([nn.out.passthrough, nn.out.spatials])
    oak.start(blocking=True)
```

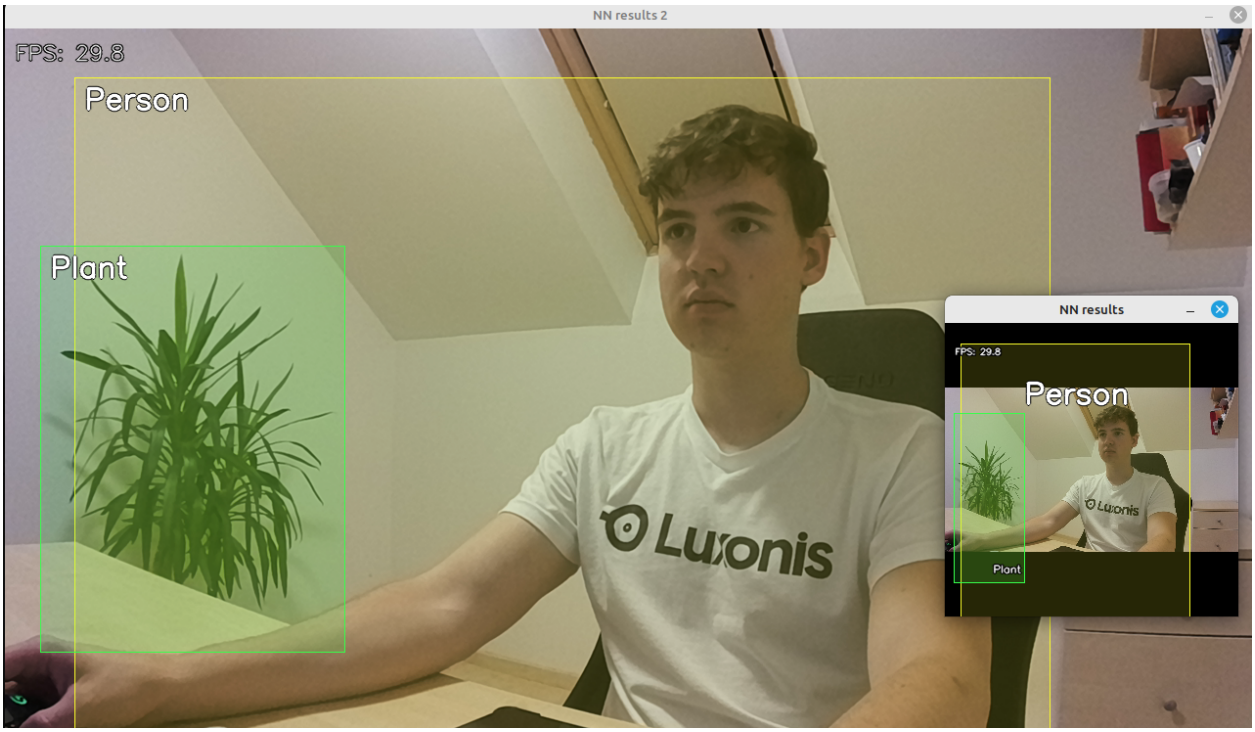
10.29 YOLO SDK

This example showcases the implementation of Yolov3 object detection network with DepthAI SDK.

For more information about tracker configuration, please refer to config tracker reference.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.29.1 Demo



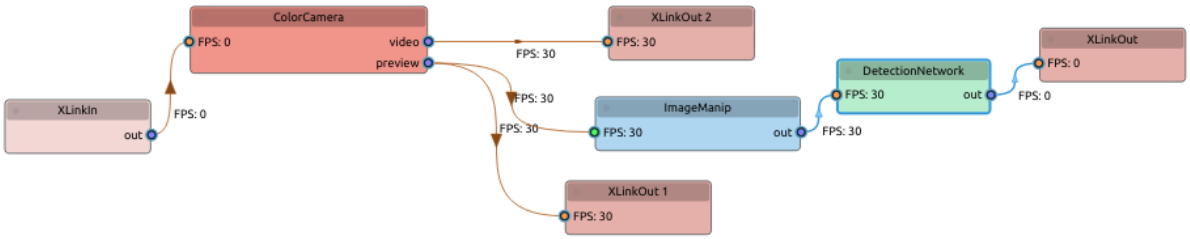
10.29.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.29.3 Pipeline



10.29.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('yolo-v3-tf', color)
    oak.visualize([nn, color], scale=2 / 3, fps=True)  # 1080P -> 720P
    # oak.show_graph()
    oak.start(blocking=True)
```

10.30 Pointcloud Demo

This example shows how to create and display pointclouds with DepthAI SDK.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.30.1 Demo

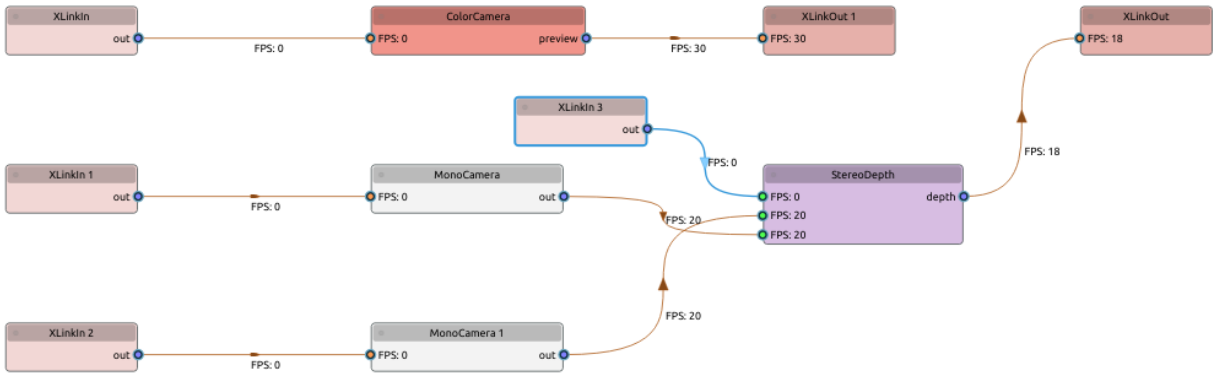
10.30.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.30.3 Pipeline



10.30.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.camera('color')
    stereo = oak.create_stereo()
    stereo.config_stereo(align=color)
    pcl = oak.create_pointcloud(depth_input=stereo, colorize=color)
    oak.visualize(pcl, visualizer='depthai-viewer')
    oak.start(blocking=True)
```

10.31 Encode Multiple Streams

This example showcases how to encode video from the camera and save it to a file. Possible encodings are: `H264`, `H265` and `MJPEG`.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

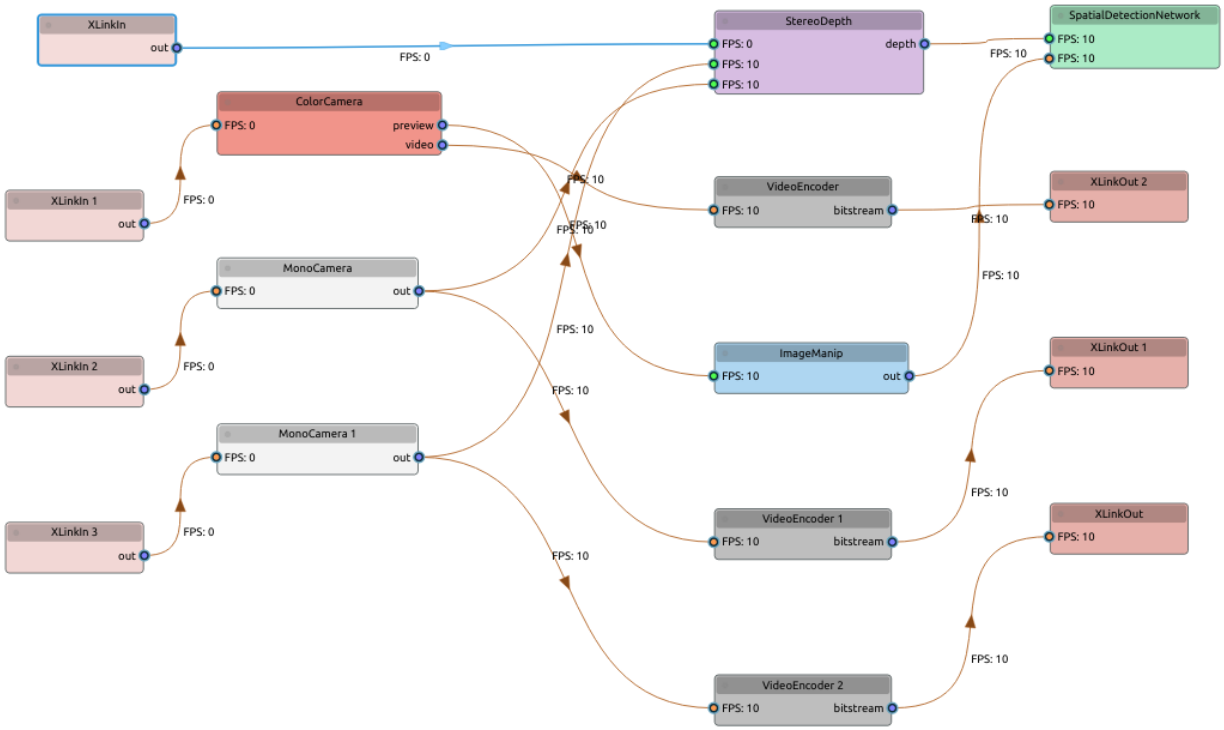
10.31.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.31.2 Pipeline



10.31.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera, RecordType

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080P', fps=10, encode='H265')
    left = oak.create_camera('left', resolution='800p', fps=10, encode='H265')
    right = oak.create_camera('right', resolution='800p', fps=10, encode='H265')

    stereo = oak.create_stereo(left=left, right=right)
    nn = oak.create_nn('mobilenet-ssd', color, spatial=stereo)

    # Sync & save all (encoded) streams
    oak.record([color.out.encoded, left.out.encoded, right.out.encoded], './record',␣
↪RecordType.VIDEO) \
        .configure_syncing(enable_sync=True, threshold_ms=50)

    oak.visualize([color.out.encoded], fps=True)

    oak.start(blocking=True)
```

10.32 Preview Encoder

This example shows how to use the callback function to write MJPEG encoded frames from color camera to a file.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.32.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.32.2 Pipeline

10.32.3 Source Code

Python

Also available on GitHub.

```
from pathlib import Path

from depthai_sdk import OakCamera
from depthai_sdk.recorders.video_writers.av_writer import AvWriter

fourcc = 'h264' # Can be 'mjpeg', 'h264', or 'hevc'

rec = AvWriter(Path('./'), 'color', fourcc=fourcc)

def save_raw_mjpeg(packet):
    rec.write(packet.msg)

with OakCamera() as oak:
    color = oak.create_camera('color', encode=fourcc, fps=20)

    # Stream encoded video packets to host. For visualization, we decode them
    # on the host side, and for callback we write encoded frames directly to disk.
    oak.visualize(color.out.encoded, scale=2 / 3, fps=True)
    oak.callback(color.out.encoded, callback=save_raw_mjpeg)

    oak.start(blocking=True)

rec.close()
```

10.33 MCAP Recording

This example showcases the use of SDK to save to MCAP file format. The MCAP file contains color as well as both left and right mono cameras and their inferred depth map.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.33.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.33.2 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera, RecordType

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080P', fps=30, encode='MJPEG')
    color.config_color_camera(isp_scale=(2, 3)) # 720P
    left = oak.create_camera('left', resolution='400p', fps=30)
    right = oak.create_camera('right', resolution='400p', fps=30)
    stereo = oak.create_stereo(left=left, right=right)

    # Sync & save all streams
    recorder = oak.record([color.out.encoded, left, right, stereo.out.depth], './',␣
↪RecordType.MCAP)
    # recorder.config_mcap(pointcloud=True)
    oak.visualize(left)
    oak.start(blocking=True)
```

10.34 MCAP IMU Recording

This example showcases how to record IMU data along with depth and save both in an MCAP file.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.34.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.34.2 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera, RecordType

with OakCamera() as oak:
    left = oak.create_camera('left', resolution='400p', fps=30)
    right = oak.create_camera('right', resolution='400p', fps=30)
    stereo = oak.create_stereo(left=left, right=right)

    imu = oak.create_imu()
    imu.config_imu(report_rate=500, batch_report_threshold=5)

    # Note that for MCAP recording, user has to have ROS installed
    recorder = oak.record([imu, stereo.out.depth], './', RecordType.MCAP)

    oak.visualize([left, stereo])
    oak.start(blocking=True)
```

10.35 Hardcode Recording Duration

This example shows how to record a video for a fixed duration of time.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

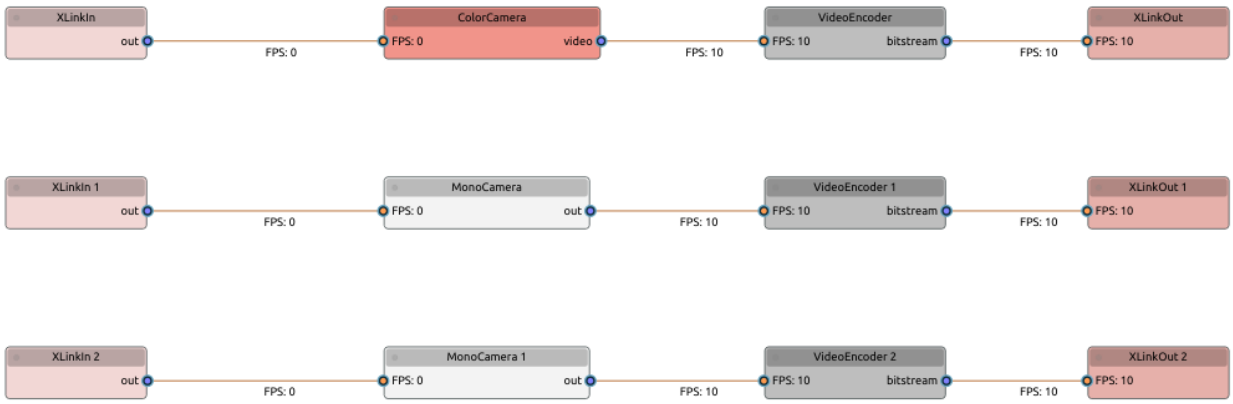
10.35.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.35.2 Pipeline



10.35.3 Source Code

Python

Also available on GitHub.

```python
from depthai_sdk import OakCamera, RecordType
import time

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080P', fps=10, encode='H265')
    left = oak.create_camera('left', resolution='800p', fps=10, encode='H265')
    right = oak.create_camera('right', resolution='800p', fps=10, encode='H265')

    # Sync & save all (encoded) streams
    oak.record([color.out.encoded, left.out.encoded, right.out.encoded], './record')
    oak.start()
    start_time = time.monotonic()
    while oak.running():
        if time.monotonic() - start_time > 5:
            break
        oak.poll()
```

10.36 ROSBAG Recording

This example showcases the use of SDK to save color, mono, depth and IMU data to a ROSBAG file. This can be useful for recording data for later use, or for testing purposes.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

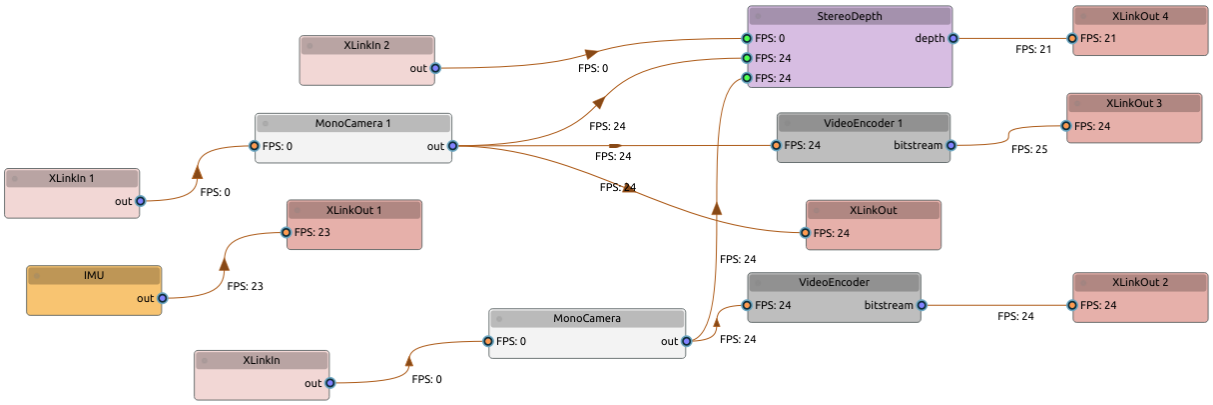
10.36.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.36.2 Pipeline



10.36.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera, RecordType

with OakCamera() as oak:
    color = oak.create_camera('color', encode='jpeg', fps=30)
    left = oak.create_camera('left', resolution='800p', encode='jpeg', fps=30)
    right = oak.create_camera('right', resolution='800p', encode='jpeg', fps=30)
    stereo = oak.create_stereo(left=left, right=right)
    stereo.config_stereo(align=color)
    imu = oak.create_imu()
    imu.config_imu(report_rate=400, batch_report_threshold=5)

    # DB3 / ROSBAG. ROSBAG doesn't require having ROS installed, while DB3 does.
    record_components = [left.out.encoded, color.out.encoded, right.out.encoded,
↪stereo.out.depth, imu]
    oak.record(record_components, 'record', record_type=RecordType.ROSBAG)

    # Visualize only color stream
    oak.visualize(color.out.encoded)
    oak.start(blocking=True)
```

10.37 Stereo Recording

This example shows how to record disparity map to a file.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

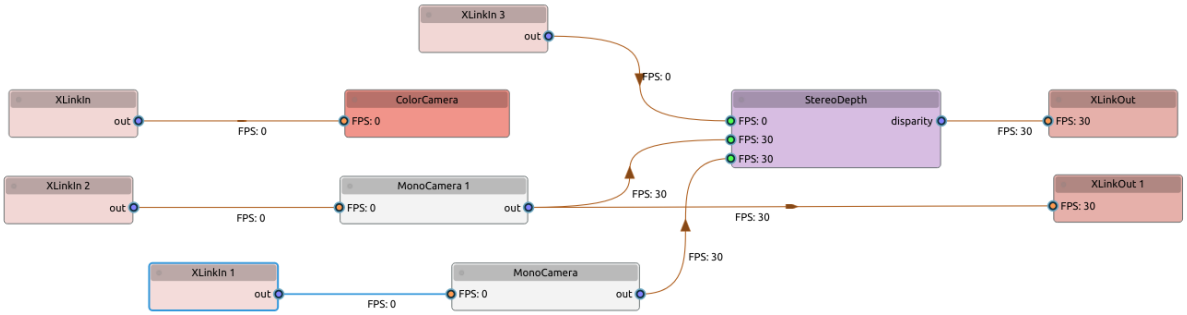
10.37.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.37.2 Pipeline



10.37.3 Source Code

Python

Also available on GitHub.

```
1  import cv2
2
3  from depthai_sdk import OakCamera
4  from depthai_sdk.visualize.configs import StereoColor
5
6  with OakCamera() as oak:
7      color = oak.create_camera('color', resolution='1080p', fps=30)
8      stereo = oak.create_stereo('400p', fps=30)
9
10     stereo.config_postprocessing(
```

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```
        colorize=StereoColor.RGB,
        colormap=cv2.COLORMAP_JET
    )

    stereo.config_wls(
        wls_level='high'  # options: 'low', 'medium', 'high'
    )

    # Record RGB and disparity to records folder
    # Record doesn't work with visualize so the config is ignored
    # oak.record([color.out.main, stereo.out.disparity], 'records')

    # Record depth only
    oak.visualize(stereo.out.disparity, record_path='disparity.mp4')

    oak.start(blocking=True)
```

10.38 Object counting on images

This example cycles through a folder of images and counts the number of objects (people in our case) in each image. It displays the count number on the top of the image. It cycles through each image every 3 seconds, but you can change that with:

```
with OakCamera('path/to/folder') as oak:
  oak.replay.set_fps(0.5) # For switching cycling through image every 2 seconds
  # ...
```

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.38.1 Demo

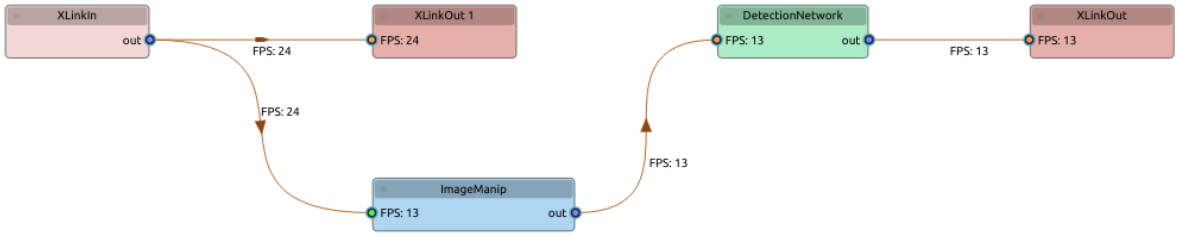
10.38.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.38.3 Pipeline



10.38.4 Source Code

Python

Also available on GitHub.

```python
#!/usr/bin/env python3

import cv2

from depthai_sdk import OakCamera
from depthai_sdk.classes import DetectionPacket
from depthai_sdk.visualize.configs import TextPosition


def callback(packet: DetectionPacket):
    visualizer = packet.visualizer
    num = len(packet.img_detections.detections)
    print('New msgs! Number of people detected:', num)

    visualizer.add_text(f"Number of people: {num}", position=TextPosition.TOP_MID)
    visualizer.draw(packet.frame)
    cv2.imshow(f'frame {packet.name}', packet.frame)


with OakCamera(replay='people-images-01') as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('person-detection-retail-0013', color)
    oak.replay.set_fps(0.5)

    oak.visualize(nn, callback=callback)
    # oak.show_graph()
    oak.start(blocking=True)
```

10.39 Looped Replay

This example shows how to run replay in a loop. This means the device won't close when the replay file ends.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

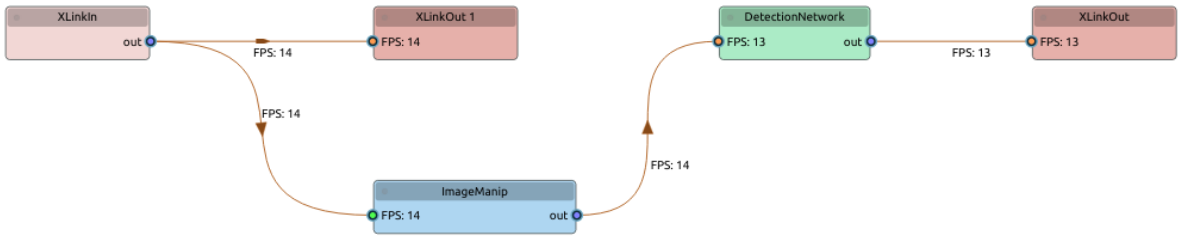
10.39.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.39.2 Pipeline



10.39.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera(replay='https://www.youtube.com/watch?v=Y1jTEyb3wiI') as oak:
    oak.replay.set_loop(True)  # <--- Enable looping of the video, so it will never end

    color = oak.create_camera('color')
    nn = oak.create_nn('vehicle-detection-0202', color)
    oak.visualize(nn, fps=True)
    oak.start(blocking=True)
```

10.40 People Tracker on Video Replay

This example shows how to run the people tracker pipeline on a video file.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

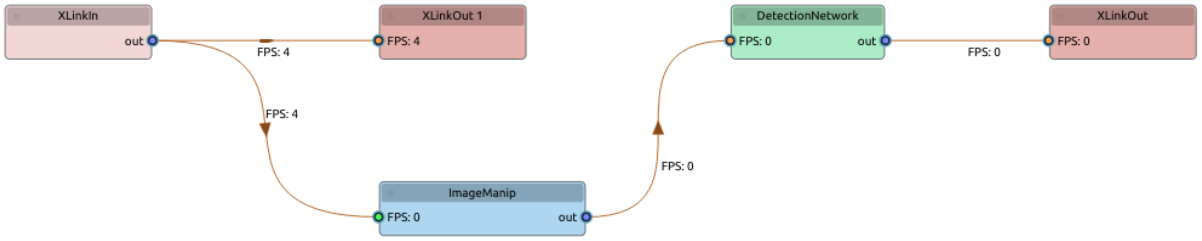
10.40.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.40.2 Pipeline



10.40.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera, ResizeMode

with OakCamera(replay="people-tracking-above-02") as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('person-detection-0200', color)
    nn.config_nn(resize_mode=ResizeMode.LETTERBOX)
    oak.visualize([color, nn], fps=True)  # 1080P -> 720P
    oak.start(blocking=True)
```

10.41 Face Detection Inference on Downloaded Image

This example shows how to run the face detection neural network model on a downloaded image from a specified url.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.41.1 Demo

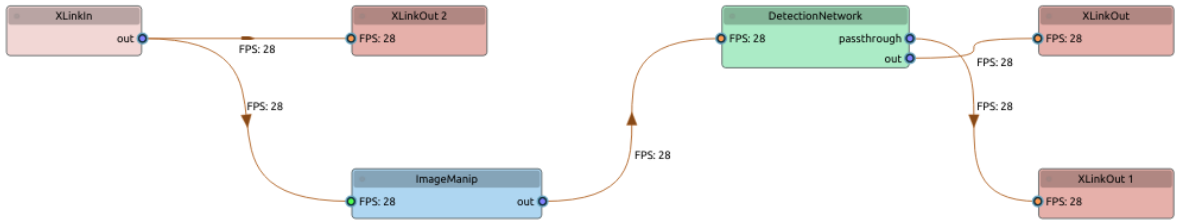
10.41.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.41.3 Pipeline



10.41.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera(replay='https://images.pexels.com/photos/3184398/pexels-photo-3184398.
↪jpeg?w=800&h=600') as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('face-detection-retail-0004', color)
    oak.visualize([nn.out.passthrough, nn])
    oak.start(blocking=True)
```

10.42 Vehicle Detection on a Youtube Video

This example shows how to run the vehicle detection neural network model on a downloaded Youtube video.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

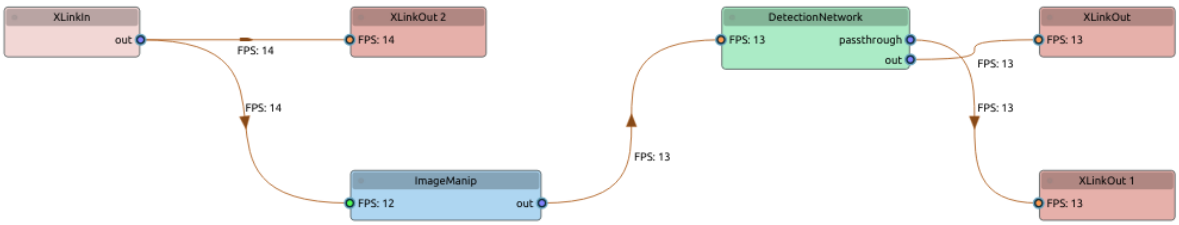
10.42.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.42.2 Pipeline



10.42.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera(replay='https://www.youtube.com/watch?v=Y1jTEyb3wiI') as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('vehicle-detection-0202', color)
    oak.visualize([nn.out.passthrough], fps=True)
    oak.visualize(nn, scale=2 / 3, fps=True)
    oak.start(blocking=True)
```

10.43 Stereo Preview

This example shows how to display WLS filtered disparity map using OpenCV.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

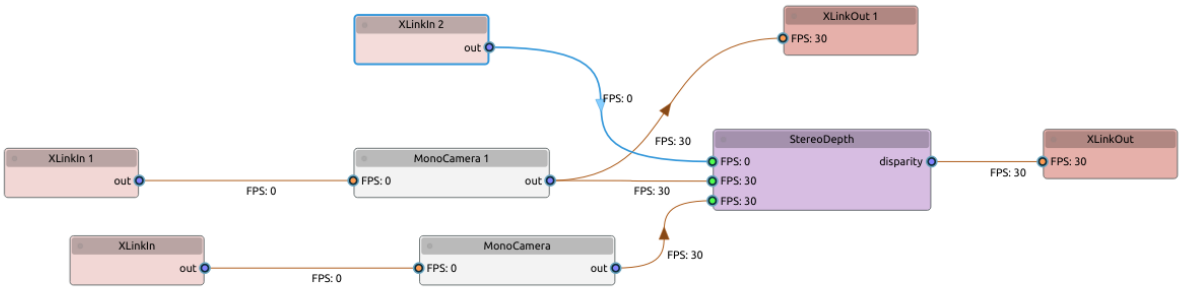
10.43.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.43.2 Pipeline



10.43.3 Source Code

Python

Also available on GitHub.

```
import cv2

from depthai_sdk import OakCamera
from depthai_sdk.components.stereo_component import WLSLevel
from depthai_sdk.visualize.configs import StereoColor

with OakCamera() as oak:
    stereo = oak.create_stereo('800p', fps=30)

    # Configure postprocessing (done on host)
    stereo.config_postprocessing(colorize=StereoColor.RGBD, colormap=cv2.COLORMAP_
↪MAGMA)
    stereo.config_wls(wls_level=WLSLevel.MEDIUM)  # WLS filtering, use for smoother␣
↪results

    oak.visualize(stereo.out.depth)
    oak.start(blocking=True)
```

10.44 Auto IR Brightness

This example shows how to use the automatic IR brightness feature of the DepthAI Stereo Camera. The function `set_auto_ir(auto_mode=True)` enables/disables auto IR dot projector and flood brightness. If enabled, it selects the best IR brightness level automatically.

Can be set to continious mode, which will continuously adjust the IR brightness. Set to `False` by default and which will automatically adjust the IR brightness only at device bootup.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

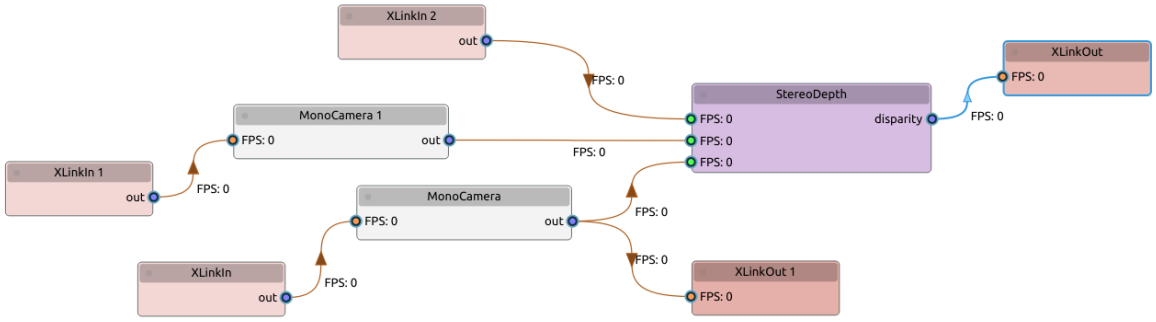
10.44.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.44.2 Pipeline



10.44.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    left = oak.create_camera('left')
    right = oak.create_camera('right')
    stereo = oak.create_stereo(left=left, right=right)

    # Automatically estimate IR brightness and adjust it continuously
    stereo.set_auto_ir(auto_mode=True, continuous_mode=True)

    oak.visualize([stereo.out.disparity, left])
    oak.start(blocking=True)
```

10.45 Stereo Control

This example shows how to change stereo parameter such as confidence threshold, median filter and decimating factor on the fly.

```
Control:                  key[dec/inc]    min..max
Confidence threshold:          I   O      1....255

Switches:
'K' - Switch median filter
'1' - Switch to decimation factor 1
'2' - Switch to decimation factor 2
'3' - Switch to decimation factor 3
```

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.45.1 Demo

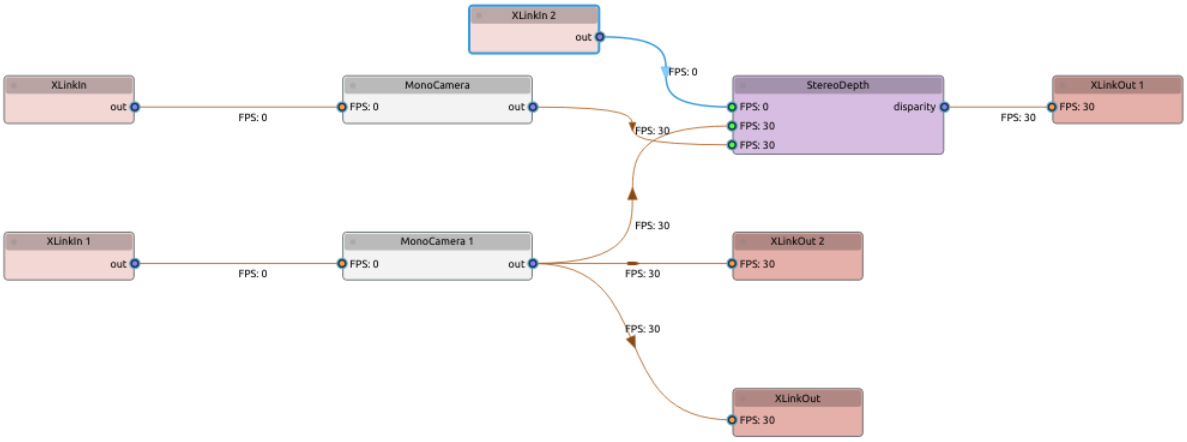
10.45.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.45.3 Pipeline



10.45.4 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    left = oak.create_camera('left')
    right = oak.create_camera('right')
    stereo = oak.create_stereo(left=left, right=right)
    stereo.config_stereo(lr_check=True)

    oak.visualize([right, stereo.out.disparity], fps=True)
    oak.start()

    while oak.running():
        key = oak.poll()

        if key == ord('i'):
            stereo.control.confidence_threshold_down()
        if key == ord('o'):
            stereo.control.confidence_threshold_up()
        if key == ord('k'):
            stereo.control.switch_median_filter()

        if key == ord('1'):
            stereo.control.send_controls({'postprocessing': {'decimation': {'factor': 1}}})
        if key == ord('2'):
            stereo.control.send_controls({'postprocessing': {'decimation': {'factor': 2}}})
        if key == ord('3'):
            stereo.control.send_controls({'postprocessing': {'decimation': {'factor': 3}}})
```

10.46 Stereo Encoding

This example shows how to encode disparity map and display it using OpenCV.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

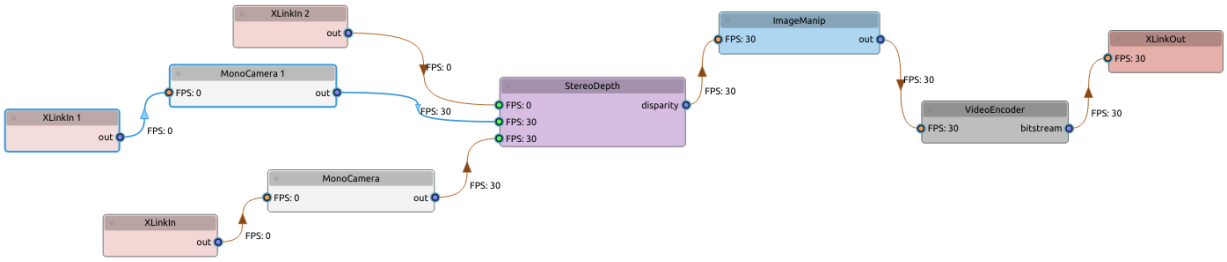
10.46.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.46.2 Pipeline



10.46.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera
import depthai as dai


with OakCamera() as oak:
    stereo = oak.create_stereo('800p', fps=30, encode='h264')

    # Set on-device output colorization, works only for encoded output
    stereo.set_colormap(dai.Colormap.JET)

    oak.visualize(stereo.out.encoded, fps=True)
    oak.start(blocking=True)
```

10.47 ROS Publishing

This example shows how to use DepthAI SDK to create a ROS Publisher for left, right, color and IMU streams.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.47.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.47.2 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera

with OakCamera() as oak:
    color = oak.create_camera('color', resolution='1080p', encode='jpeg', fps=30)
    color.config_color_camera(isp_scale=(2,3))
    left = oak.create_camera('left', resolution='400p', encode='jpeg',fps=30)
    right = oak.create_camera('right', resolution='400p', encode='jpeg',fps=30)
    imu = oak.create_imu()
    imu.config_imu(report_rate=400, batch_report_threshold=5)

    oak.ros_stream([left, right, color, imu])
    # oak.visualize(left)
    oak.start(blocking=True)
```

10.48 Custom Trigger Action

This example shows how to set custom action to be triggered when a certain event occurs. In this case, we will trigger an action when a person is detected in the frame. The action will save the exact frame to a file.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

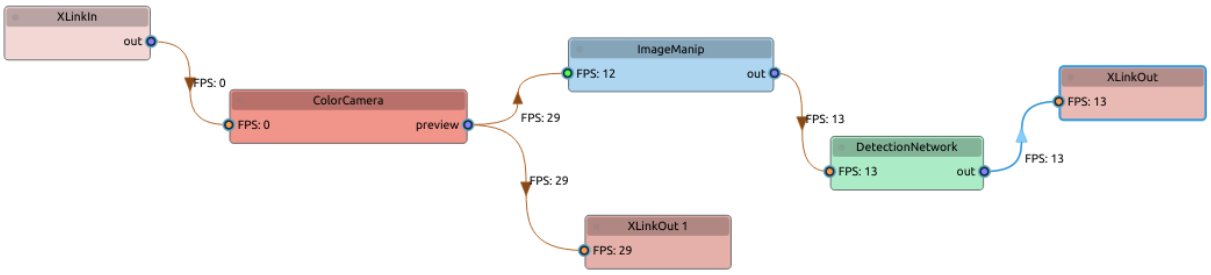
10.48.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.48.2 Pipeline



10.48.3 Source Code

Python

Also available on GitHub.

```
from pathlib import Path
from typing import Dict

import cv2

from depthai_sdk import OakCamera, FramePacket
from depthai_sdk.trigger_action import Action, DetectionTrigger


class MyAction(Action):
    """
    Saves the latest frame from the input stream to a file.
    """

    def __init__(self, inputs, dir_path):
        super().__init__(inputs)

        self.dir_path = Path(dir_path)
        self.dir_path.mkdir(parents=True, exist_ok=True)

        self.latest_packets = None

    def activate(self):
        print('+', self.latest_packets)
```

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```
        if self.latest_packets:
            for stream_name, packet in self.latest_packets.items():
                print(f'Saving {stream_name} to {self.dir_path / f"{stream_name}.jpg"}
↪')
                cv2.imwrite(str(self.dir_path / f'{stream_name}.jpg'), packet.frame)

    def on_new_packets(self, packets: Dict[str, FramePacket]) -> None:
        self.latest_packets = packets


with OakCamera() as oak:
    color = oak.create_camera('color', '1080p')
    nn = oak.create_nn('mobilenet-ssd', color)

    oak.trigger_action(
        trigger=DetectionTrigger(input=nn, min_detections={'person': 1}, cooldown=30),
        action=MyAction(inputs=[nn], dir_path='./images/')  # `action` can be Callable␣
↪as well
    )

    oak.start(blocking=True)
```

10.49 Custom Trigger

This example shows how to set custom trigger condition in DepthAI SDK. The trigger condition returns a boolean value if the condition is met. In this case the trigger will start a recording of disparity stream when all depth values are below 1 meter.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

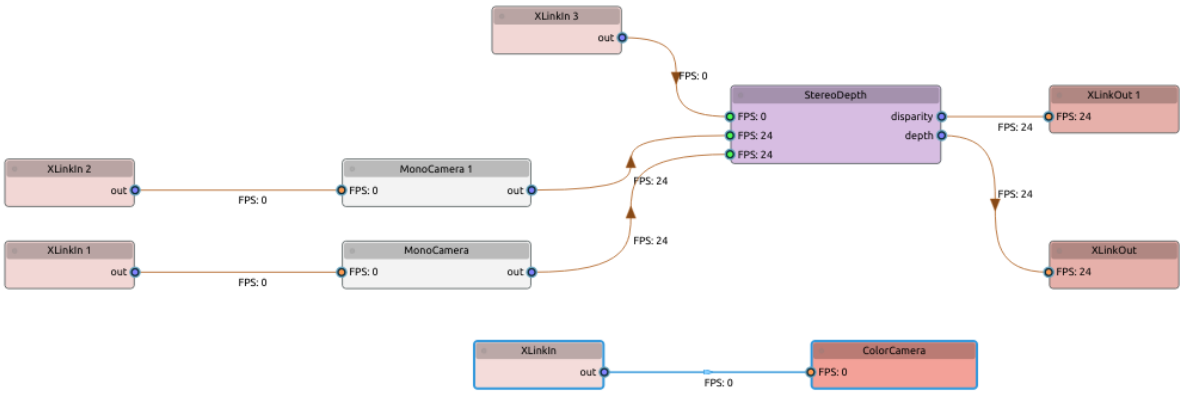
10.49.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.49.2 Pipeline



10.49.3 Source Code

Python

Also available on GitHub.

```
import numpy as np

from depthai_sdk import OakCamera
from depthai_sdk.trigger_action import Trigger
from depthai_sdk.trigger_action.actions import RecordAction


def my_condition(packet) -> bool:
    """
    Returns true if all depth values are within 1m range.
    """
    frame = packet.frame
    required_range = 1000  # mm --> 5m

    frame = frame[frame > 0]  # remove invalid depth values
    frame = frame[(frame > np.percentile(frame, 1)) & (frame < np.percentile(frame,
↪99))]

    min_depth = np.min(frame)
    max_depth = np.max(frame)

    if min_depth < required_range < max_depth:
        return True

    return False


with OakCamera() as oak:
    color = oak.create_camera('color', fps=30)
```

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```
    stereo = oak.create_stereo('800p')
    stereo.config_stereo(align=color)

    trigger = Trigger(input=stereo.out.depth, condition=my_condition, cooldown=30)
    action = RecordAction(
        inputs=[stereo.out.disparity], dir_path='./recordings/',
        duration_before_trigger=5, duration_after_trigger=5
    )

    oak.trigger_action(trigger=trigger, action=action)
    oak.start(blocking=True)
```

10.50 Person Record

This example shows how to set up a trigger with a RecordAction to record both color and disparity frames when a condition is met.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

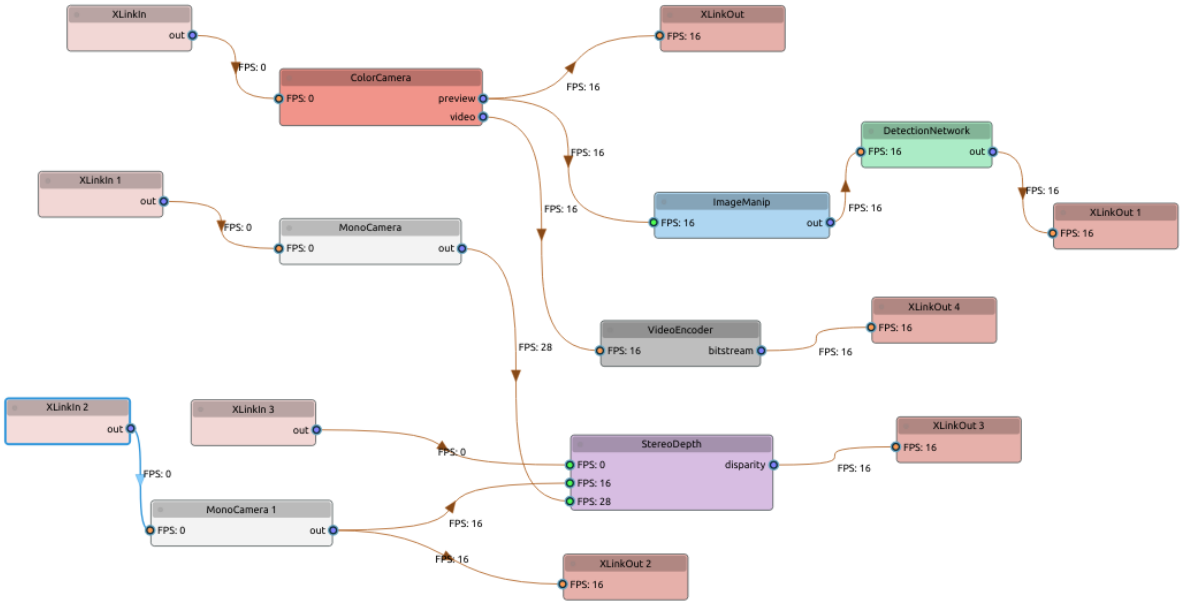
10.50.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.50.2 Pipeline



10.50.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera
from depthai_sdk.trigger_action.actions.record_action import RecordAction
from depthai_sdk.trigger_action.triggers.detection_trigger import DetectionTrigger

with OakCamera() as oak:
    color = oak.create_camera('color', encode='jpeg')
    stereo = oak.create_stereo('400p')

    nn = oak.create_nn('mobilenet-ssd', color)

    trigger = DetectionTrigger(input=nn, min_detections={'person': 1}, cooldown=30)
    action = RecordAction(inputs=[color, stereo.out.disparity], dir_path='./
↪recordings/',
                          duration_before_trigger=5, duration_after_trigger=10)
    oak.trigger_action(trigger=trigger, action=action)

    oak.visualize(nn)
    oak.start(blocking=True)
```

10.51 Visualizer Demo

This example shows how to use the visualizer component to display the detection results and configure the style of text and tracker.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

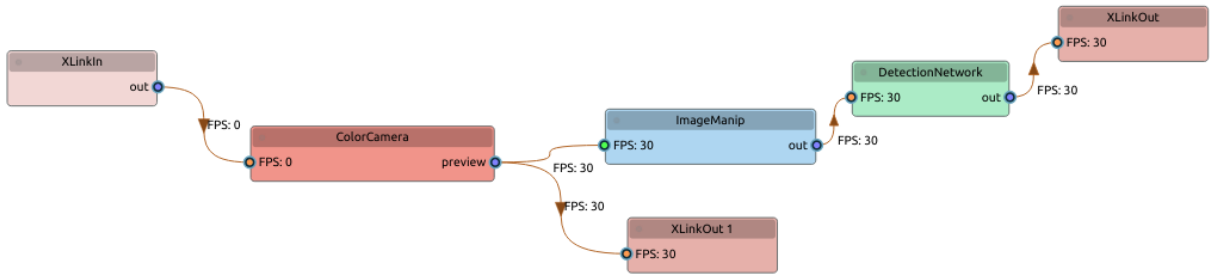
10.51.1 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.51.2 Pipeline



10.51.3 Source Code

Python

Also available on GitHub.

```
from depthai_sdk import OakCamera
from depthai_sdk.visualize.configs import BboxStyle, TextPosition

with OakCamera() as oak:
    camera = oak.create_camera('color')
    det = oak.create_nn('face-detection-retail-0004', camera)
    # Record visualized video into a mp4 file
    visualizer = oak.visualize(det.out.main, record_path='./test.mp4')
    # Chained methods for setting visualizer parameters
    visualizer.detections(  # Detection-related parameters
        color=(0, 255, 0),
```

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```
        thickness=2,
        bbox_style=BboxStyle.RECTANGLE,  # Options: RECTANGLE, CORNERS, ROUNDED_
↪RECTANGLE, ROUNDED_CORNERS
        label_position=TextPosition.MID,
    ).text(  # Text-related parameters
        font_color=(255, 255, 0),
        auto_scale=True
    ).output(  # General output parameters
        show_fps=True,
    ).tracking(  # Tracking-related parameters
        line_thickness=5
    )

    oak.start(blocking=True)
```

10.52 Visualizer Callback Function

This example demonstrates the use of a callback function to customize the visualization of detection results.

Note: Visualization in current example is done with blocking behavor. This means that the program will halt at `oak.start()` until the window is closed. This is done to keep the example simple. For more advanced usage, see *Blocking behavior* section.

10.52.1 Demo

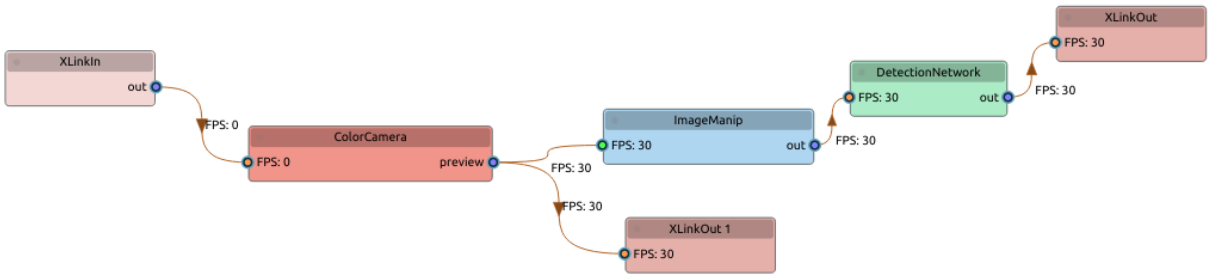
10.52.2 Setup

Please run the install script to download all required dependencies. Please note that this script must be ran from git context, so you have to download the depthai repository first and then run the script

```
git clone https://github.com/luxonis/depthai.git
cd depthai/
python3 install_requirements.py
```

For additional information, please follow our *installation guide*.

10.52.3 Pipeline



10.52.4 Source Code

Python

Also available on GitHub.

```
import cv2

from depthai_sdk import OakCamera
from depthai_sdk.classes import DetectionPacket
from depthai_sdk.visualize.visualizer_helper import FramePosition, VisualizerHelper


def callback(packet: DetectionPacket):
    visualizer = packet.visualizer
    print('Detections:', packet.img_detections.detections)
    VisualizerHelper.print(packet.frame, 'BottomRight!', FramePosition.BottomRight)
    frame = visualizer.draw(packet.frame)
    cv2.imshow('Visualizer', frame)


with OakCamera() as oak:
    color = oak.create_camera('color')
    nn = oak.create_nn('mobilenet-ssd', color)

    oak.visualize([nn], fps=True, callback=callback)
    oak.start(blocking=True)
```

Code samples are used for automated testing. They are also a great starting point for the DepthAI SDK, as different component functionalities are presented with code.

ColorCamera

- *FFC Camera Visualization* - Preview FFC Cameras
- *Camera Control* - Demonstrates RGB camera control from the host
- *Camera Preview* - Preview color, right, left and depth frames
- *Camera Control with NN* - Control camera (focus, exposure) with NN detections
- *Mono Camera Preview* - Preview mono cameras with manual 400p resolution
- *Preview All Cameras* - Preview all cameras connected to the OAK device
- *RGB and Mono Preview* - Preview RGB and mono cameras
- *Camera Rotated Preview* - Demonstrates how to rotate the camera previews

Mixed

- *API Interoperability Example* - Demonstrates interoperability between the DepthAI API and the SDK
- *Car Tracking Example* - Demonstrates how to run inference on a pre-saved video
- *Collision Avoidance* - Demonstrates how to run collision avoidance
- *Speed Calculation Preview* - Demonstrates how to calculate speed of detected objects in the frame`
- *Switch Between Models* - Demonstrates how to switch between models
- *Sync Multiple Outputs* - Demonstrates how to sync multiple outputs

IMU

- *IMU Demonstration* - Demonstrates how to use and display the IMU
- *IMU Rerun Demonstration* - Demonstrates how use and display the IMU in Rerun

NN

- *Age-Gender Inference* - Demonstrates age-gender inference
- *Custom Decode Function* - Demonstrates custom decoding function
- *Emotion Recognition* - Demonstrates emotion recognition
- *Face Detection RGB* - Run face detection on RGB camera
- *Face Detection Mono* - Run face detection on mono camera
- *Human Pose Estimation* - Run human pose estimation inference
- *MobileNet Encoded* - Pass encoded color stream to the NN (MobileNet)
- *Neural Network Component* - Run color camera stream through NN (YoloV7)
- *Object Tracking* - Tracking objects in the frame
- *Roboflow Integration* - Demonstrates how to use Roboflow platform to train a custom model
- *Spatial Detection* - Perform spatial detection with at MobileNet model
- *YOLO SDK* - Run YoloV3 inference on the color camera stream

Pointcloud

- *Pointcloud Demo* - Preview pointcloud with rerun viewer

Recording

- *Encode Multiple Streams* - Demonstrates how to encode multiple (color, left, right) streams and save them to a file
- *Preview Encoder* - Record color camera stream and save it as mjpeg
- *MCAP Recording* - Record color, left, right and depth streams and save them to a MCAP
- *MCAP IMU Recording* - Record IMU and depth streams and save them to a MCAP
- *Hardcode Recording Duration* - Record color camera stream for a specified duration
- *ROSBAG Recording* - Record IMU, left, right and depth streams and save them to a ROSBAG
- *Stereo Recording* - Records disparity stream

Replay

- *Object counting on images* - Count number of objects on a folder of images (cycle through images every 3 sec)
- *People Tracker on Video Replay* - Run people tracker on a pre-saved video
- *Face Detection Inference on Downloaded Image* - Run face detection on a downloaded image
- *Vehicle Detection on a Youtube Video* - Run vehicle detection on a Youtube video stream
- *Looped Replay* - Replay a pre-saved video in a loop

Stereo

- *Stereo Preview* - Display WLS filtered disparity map
- *Auto IR Brightness* - Demonstrates the use of auto IR brightness function
- *Stereo Control* - Demonstrates stereo control (median filter, decimation factor, confidence threshold) from the host
- *Stereo Encoding* - Demonstrates how to encode stereo stream and visualize it

Streaming

- *ROS Publishing* - Publish color, left, right and IMU streams to ROS

Trigger Action

- *Custom Trigger Action* - Demonstrates how to set a custom trigger action
- *Custom Trigger* - Demonstrates how to set a custom trigger
- *Person Record* - Demonstrates how to record a person when a person is detected

Visualizer

- *Visualizer Demo* - Demonstrates how to use the visualizer
- *Visualizer Callback Function* - Demonstrates how to set the visualizer callback function

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