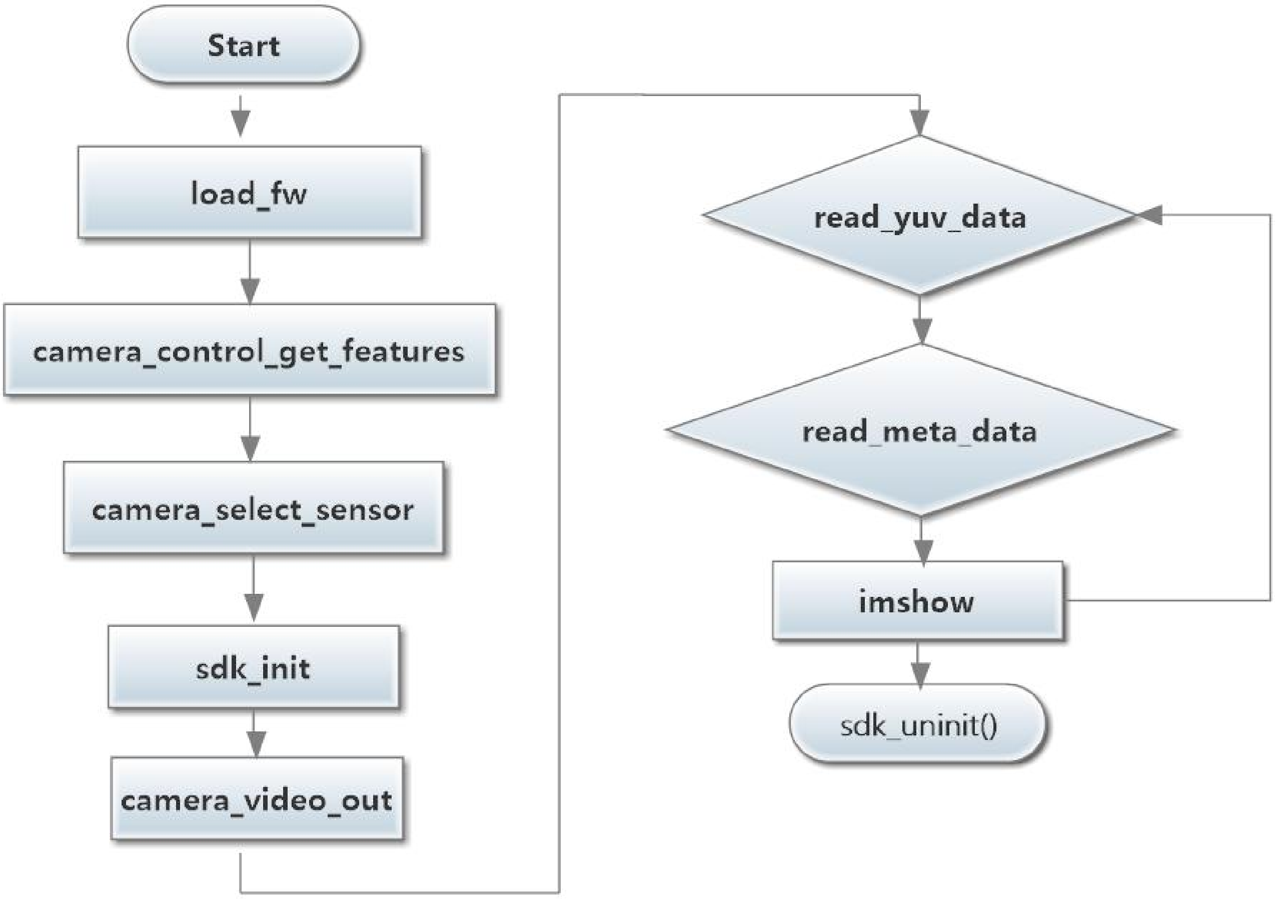
OpenNCC SDK
API 3.0.x Interface Documentation

Version History

版本	日期	修改	变更摘要	sdk 版本
1.0.0	2020/1/10	王新华	Initial version	1.0.0
1.0.1	2020/3/16	王洋	Optimized version	1.0.1
2.0.0	2020/4/7	左文平	修订接口，添加 python 接口	2.0.0
3.0.0	2020/10/14	左文平	1:添加支持 2 个模型接口 sdk_net2_init（）以及对应的结构体· 2: meta 数据格式增加了 64 字节。 3:移除了读取红外数据和深度数据接口。	3.0.1

一： C/C++ SDK Interface Description

The interface files are primarily contained in 3 files: **sdk.h**, **cameraCtrl.h**, and **Fp16Convert**.



OpenNCC SDK Video Processing Flowchart

1. Device Initialization Related Interfaces

1.1 Load Device Firmware

Interface Name	Interface Parameters	Description
load_fw()	const char* bootExe	Path to USB boot program
	const char* firmware	Path to firmware file

Example:

load_fw("./moviUsbBoot"， "./fw/flicRefApp.mvcmd");

Returns:0 if successful, -1 otherwise

Description:

Automatically loads device firmware, device boots, host (PC) opens USB device.

1.2 Get Connected USB Information

Interface Name	Interface Parameters	Description
get_usb_version()	void	N/A

Example:

version = get_usb_version();

Returns:30 if USB 3.0, 20 if USB 2.0

Description:

Returns USB Version Information (Port and USB Cable) connected to the device.

1.3 Initializing AI Camera Parameters

Interface Name	Interface Parameters	Description
sdk_init()	vscRecvCb cb	Callback
	void* param	Callback function parameters
	const char *blob_path	Path to AI Model (.blob)
	CameraInfo *cam	Camera Configuration Parameters (See below)
	int cam_Len	Camera Configuration Structure Length

There are two ways to get media and metadata. 1: Passively obtained through callback function, 2: Actively obtained through read_XXX_data() without setting the callback function and callback parameters.

Example:

```
cam_info=ncc.CameraInfo()
cam_info.inputFormat=ncc.IMG_FORMAT_BGR_PLANAR
cam_info.stdValue=1

cam_info.isOutputYUV=1
cam_info.isOutputH26X=1
cam_info.isOutputJPEG=1

cam_info.imageWidth  = cameraCfg.camWidth
cam_info.imageHeight = cameraCfg.camHeight
cam_info.startX      = 0
cam_info.startY      = 0
cam_info.endX        = cameraCfg.camWidth
cam_info.endY        = cameraCfg.camHeight
cam_info.inputDimWidth =0
cam_info.inputDimHeight =0
ncc.SetMeanValue(cam_info,0.0,0.0,0.0)

ret = ncc.sdk_init(None, None, "./blob/face-detection-retail-0004-fp16.blob",cam_info,
struct.calcsize("13I4f"))

print("xlink_init ret=%d " % ret)
if (ret<0):
        return
```

Description:

Specifies the AI Vision model file and calculation parameters, initializes the device algorithm model, camera function switch selection, sets the video encoding parameters (if the function switch is turned on). Video output is controlled by camera_video_out().

1.4 **Initializing AI Camera 2 modes Parameters**

Interface Name	Interface Parameters	Description
sdk_net2_init()	vscRecvCb cb	Callback

	void* param	Callback function parameters
	const char *blob1_path	AI Mode 1 file(blob)
	Network1Par* par1	Mode1 param
	int par1_Len	Param1 length
	const char *blob2_path	AI Mode 2 file(blob)
	Network2Par* par2	Mode2 param
	int par2_Len	Param2 length

There are two ways to get media and metadata. 1: Passively obtained through callback function, 2: Actively obtained through read_XXX_data() without setting the callback function and callback parameters.

Description:
Specifies the 2 AI Vision model files and calculation parameters, initializes the device algorithm model, camera function switch selection, sets the video encoding parameters (if the function switch is turned on). Video output is controlled by camera_video_out().

1.5 Get Metadata Size

Interface Name	Interface Parameters	Description
get_meta_size()	void	N/A

Example:
Omitted

Returns:Size of the CNN calculation result's metadata.

Description:
Turn off the camera, reload the model, and call before changing the model.it only support one AI mode net now.

1.5 Remove SDK

Interface Name	Interface Parameters	Description
sdk_uninit()	void	N/A

Example:
```
sdk_uninit();
```

Returns: N/A

Description:
Turn off the camera, reload the model, and call before changing the model.

1.6 Get SDK Version Information

Interface Name	Interface Parameters	Description
get_sdk_version()	char* version	Version Information

Example:
```
char version[100];
get_sdk_version(version);
```

Returns:void

Description:
Gets SDK version information.

2. Video Streaming Related Interfaces

2.1 Get YUV Data

Interface Name	Parameters	Description
read_yuv_data()	char* pbuf	Receive Buffer
	int * size	Input and output parameters. Input is the size of the input buffer , output is the size of the returned video data.
	int blocked	0: If there is no data, return immediately. 1: Wait until data is read to return.

Example:
read_yuv_data(data_yuv,&size,1)

Returns:0 if successful, -1 otherwise

Description:
Gets a YUV data stream from the device. Content: struct frameSpecOut+YUV （NV12).

2.2 Get H.264 or H.265 Data

Interface Name	Parameters	Description
read_26x_data()	char* pbuf	Receive Buffer
	int * size	Input and output parameters. Input is the size of the input buffer , output is the size of the returned video data.
	int blocked	0: If there is no data, return immediately. 1: Wait until data is read to return.

Example:
read_26x_data(data_26x,&size,1)

Returns:0 if successful, -1 otherwise

Description:
Gets a H.264 or H.265 data stream from the device.Content: struct frameSpecOut+H26X data.

2.3 Get JPEG data

Interface Name	Parameters	Description
read_jpg_data()	char* pbuf	Receive Buffer
	int * size	Input and output parameters. Input is the size of the input buffer area, output is the size of the returned video data.
	int blocked	0: If there is no data, return immediately. 1: Wait until data is read to return.

Example:
read_jpg_data(yuv420p,&size,1)

Returns:0 if successful, -1 otherwise

Description:
Gets a JPEG data stream from the device.Content: struct frameSpecOut+MJPEG data.

2.4 Get the output of the AI Network algorithm

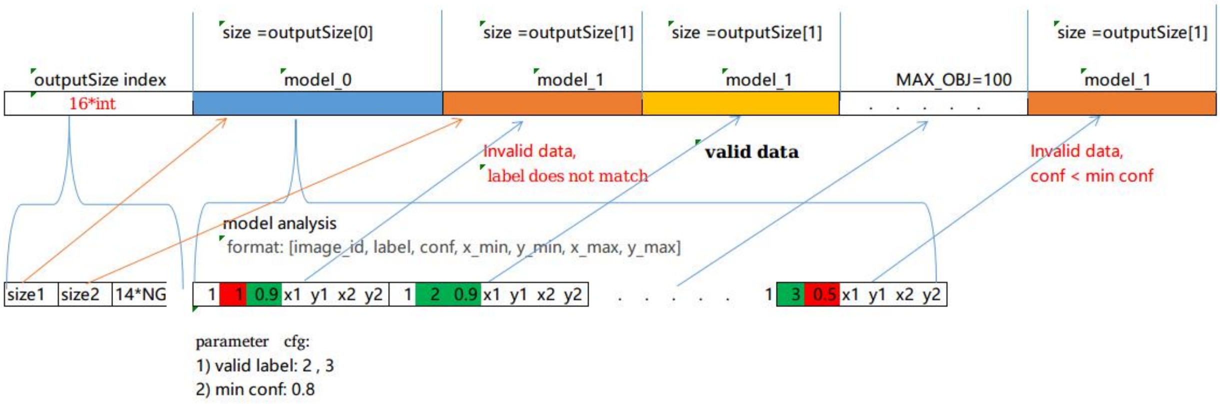
Interface Name	Parameters	Description
read_meta_data()	char* pbuf	Receive Buffer
	int * size	Input and output parameters. Input is the size of the input buffer area, output is the size of the returned video data.

	int blocked	0: If there is no data, return immediately. 1: Wait until data is read to return.

Example:
read_meta_data(data_meta,&size,1)

Returns:0 if successful, -1 otherwise

Description:
Get the number of operations from the device's AI Network.Content: struct frameSpecOut+AI data.and AI data format is below:



3. Camera Control Related Interfaces

3.1 Obtain Camera Module Information

Interface Name	Parameters	Description
camera_control_get_features()	SensorModesConfig *	Device information structure pointer

Example:
SensorModesConfig cameraCfg;
camera_control_get_features(&cameraCfg);

Returns:0 if successful, -1 otherwise

cameraCfg.moduleName: *Camera Module Name*
cameraCfg.camWidth: *Image Width*
cameraCfg.camHeight: *Image Height*
cameraCfg.camFps: *Camera Frame Rate*
cameraCfg.AFmode: *Autofocus (1 if supported, 0 otherwise)*
cameraCfg.maxEXP: *Maximum exposure time in microsecond (μs)*
cameraCfg.minGain: *Minimum Gain Multiplier*
cameraCfg.maxGain: *Maximum Gain Multiplier*

Description:
Obtain information about the mode of the camera (获取相机可见光模组模式信息). Some cameras will support multiple video modes, which can be selected through camera_select_sensor().

3.2 Select Module's Working Mode

Interface Name	Parameters	Description
camera_select_sensor()	int sensorid	camera_control_get_features() obtains the array of information of supported camera modes. *sensorid* is the serial number of the array.

Example:

```
 camera_select_sensor(0);
```

Returns: 0 if successful, -1 otherwise

Description:

Sets the working mode of the camera’s visible light module.

3.3 Control Camera’s Video Output

Interface Name	Parameters	Description
camera_video_out()	int video_type	YUV Data output mode
	camera_ctrl_VIDEO_out mode	Disabled, Single (For photos), Continuous

```
typedef enum
{
   VIDEO_OUT_DISABLE,       /* Output  Disabled */
   VIDEO_OUT_SINGLE,        /* Single Output */
   VIDEO_OUT_CONTINUOUS,    /* Continuous Output */
}camera_ctrl_video_out;
```

Example:

```
camera_video_out(YUV420p,VIDEO_OUT_CONTINUOUS);
```

Returns:0 if successful, -1 otherwise

Description:

Sets the device to output video data. This works for YUV420p，H26X，JPEG. H26X does not support single output.

3.4 Set Camera’s Focus Mode

Interface Name	Parameters	Description
camera_control_af_mode()	camera_ctrl_af_mode af_mode	CAMERA_CONTROL__AF_MODE_OFF :Manual Focus CAMERA_CONTROL__AF_MODE_AUTO:Automatic Focus

Example:

```
 camera_control_af_mode(CAMERA_CONTROL__AF_MODE_OFF)；
```

Returns:0 if successful, -1 otherwise

Description:

Sets the camera to manual focus. Using camera_control_get_features() one can check if the camera supports manual focusing (cameraCfg.AFmode). If not supported, the setting is invalid and the camera defaults to automatic.

3.5 Set Camera’s Lens Distance

Interface Name	Parameters	Description
camera_control_lens_move()	uint32_t lens_position	Range of distances（1-100)

Example:

```
 camera_control_lens_move(10);
```

Returns:0 if successful, -1 otherwise

Description:

Used when focusing manually, greater value is a greater distance。

3.6 Trigger Single Focus

Interface Name	Parameters	Description

camera_control_focus_trigger()	void	N/A

Example:

camera_control_focus_trigger();

Returns:0 if successful, -1 otherwise

Description:

Focuses the camera once

3.7 Set Camera's Exposure Mode

Interface Name	Parameters	Description
camera_control_ae_mode()	camera_ctrl_ae_mode flash_mode	Manual or Automatic

Example:

camera_control_ae_mode(CAMERA_CONTROL__AE_AUTO__FLASH_MODE__AUTO);

Returns: 0 if successful, -1 otherwise

Description:

Sets exposure mode.

3.8 Set Exposure Time

Interface Name	Parameters	Description
camera_control_ae_set_exp()	uint32_t exp_compensation	Exposure duration in microsecond (μs) range (1-1 / fps)

Example:

camera_control_ae_set_exp(20000);

Returns: 0 if successful, -1 otherwise

Description:

Sets the exposure time for the manual exposure mode.

3.9 Set Camera Gain

Interface Name	Parameters	Description
camera_control_ae_set_gain（）	uint32_t iso_val	Gain value

Example:

camera_control_ae_set_gain(100);

Returns: 0 if successful, -1 otherwise

Description:

Sets the gain in manual exposure mode. Min/max gain values can be retrieved through *camera_control_get_features()* and set manually.

3.10 Set Camera White Balance Mode

Interface Name	Parameters	Description
camera_control_awb_mode()	camera_ctrl_awb_mode awb_mode	Manual or Auto

Example:

camera_control_awb_mode(CAMERA_CONTROL__AWB_MODE__AUTO);

Returns: 0 if successful, -1 otherwise

Description:

Sets camera to automatic white balance mode.

3.11 Float Conversion

Interface Name	Parameters	Description
f16Tof32()	unsigned int x	16-bit Data

Example:

```
 Float f=f16Tof32(100);
```

Returns: Float

Description:

Converts 16-bit short data to a floating point number. Used for metadata calculations and analysis.

二:Python SDK Interface Documentation

Starting from version 2.0.X onwards, the API will support Python. The SDK Interface can be found in the openncc.py file. To use the module, import it using: import openncc as ncc

1. Device Initialization Related Interfaces

1.1 Get SDK Version

Interface Name	Parameters	Description
get_sdk_version()	void	N/A

Example:

```
print("get usb %d sdk versin %s" % (ncc.get_usb_version() ,ncc.get_sdk_version()))
```

Returns:SDK Version

Description:

Gets the SDK version.

1.2 Get Version of Connected USB Device

Interface Name	Parameters	Description
get_usb_version()	void	N/A

Example:

```
print("get usb %d sdk versin %s" % (ncc.get_usb_version() ,ncc.get_sdk_version()))
```

Returns:30 if USB 3.0, 20 if USB 2.0

Description:

Returns USB Version Information (Port and USB Cable) connected to the device

1.3 Load Device Firmware

Interface Name	Parameters	Description
load_fw()	bootExe	Path to USB boot program
	firmware	Path to firmware file

Example:

```
res = ncc.load_fw("./moviUsbBoot","fw/flicRefApp.mvcmd")
if res<0:
        printf('load firmware error!')
        sys.exit(1)
        Returns:0 if successful, -1 otherwise
```

Description:

Automatically loads device firmware, device boots, host (PC) opens USB device.

1.4 Initializing Camera Parameters

Interface Name	Parameters	Description
sdk_init()	vscRecvCb cb	Callback
	param	Callback function parameters
	blob_path	Path to AI Model (.blob)
	cam	Camera Configuration Parameters (See below)
	Cam_len	Camera configuration structure length

There are two ways to get Media and Metadata. 1: Passively obtained through callback function, 2: Actively obtained through read_XXX_data() without setting the callback function and callback parameters.

Example:

```
cam_info=ncc.CameraInfo()
cam_info.inputFormat=ncc.IMG_FORMAT_BGR_PLANAR
cam_info.stdValue=1

cam_info.isOutputYUV=1
cam_info.isOutputH26X=1
cam_info.isOutputJPEG=1

cam_info.imageWidth  = cameraCfg.camWidth
cam_info.imageHeight = cameraCfg.camHeight
cam_info.startX      = 0
cam_info.startY      = 0
cam_info.endX        = cameraCfg.camWidth
cam_info.endY        = cameraCfg.camHeight
cam_info.inputDimWidth =0
cam_info.inputDimHeight =0
ncc.SetMeanValue(cam_info,0.0,0.0,0.0)

ret = ncc.sdk_init(None, None, "./blob/face-detection-retail-0004-fp16.blob",cam_info, struct.calcsize("13I4f"))

print("xlink_init ret=%d " % ret)
if (ret<0):
        return
```

Description:

Specifies the AI Vision model file and calculation parameters, initializes the device algorithm model, camera function switch selection, sets the video encoding parameters (if the function switch is turned on). Video output is controlled by camera_video_out().

1.4 **Initializing AI Camera 2 modes Parameters**

Interface Name	Interface Parameters	Description
sdk_net2_init()	vscRecvCb cb	Callback
	void* param	Callback function parameters
	const char *blob_path	AI Mode 1 file(blob)
	Network1Par* par1	Model param
	int par1_Len	Param1 length
	const char *blob2_path	AI Mode 2 file(blob)
	Network2Par* par2	Mode2 param
	int par2_Len	Param2 length

There are two ways to get media and metadata. 1: Passively obtained through callback function, 2: Actively obtained through read_XXX_data() without setting the callback function and callback parameters.

Example:

```
    char *blob =   "./blob/vehicle-license-plate-detection-barrier-0106/vehicle-license-plate-detection-barrier-0106.blob";
    char *blob2 = "./blob/license-plate-recognition-barrier-0001/license-plate-recognition-barrier-0001.blob";



    ret = sdk_net2_init(0,0,\
           blob,  &cnn1PrmSet, sizeof(cnn1PrmSet), \
           blob2,  &cnn2PrmSet, sizeof(cnn2PrmSet));
```

Returns:0 if successful. -1 otherwise

Description:
Specifies the 2 AI Vision model files and calculation parameters, initializes the device algorithm model, camera function switch selection, sets the video encoding parameters (if the function switch is turned on). Video output is controlled by camera_video_out().

1.5 Initializing Camera with 2 AI Parameters

Interface Name	Parameters	Description
sdk_init()	vscRecvCb cb	Callback
	param	Callback function parameters
	Blob1_path	Path to AI Model (.blob)
	Par1	Model param
	Par1_len	Param1 length
	blob2_path	

There are two ways to get Media and Metadata. 1: Passively obtained through callback function, 2: Actively obtained through read_XXX_data() without setting the callback function and callback parameters.

Example:

```
cam_info=ncc.CameraInfo()
cam_info.inputFormat=ncc.IMG_FORMAT_BGR_PLANAR
cam_info.stdValue=1

cam_info.isOutputYUV=1
cam_info.isOutputH26X=1
cam_info.isOutputJPEG=1

cam_info.imageWidth  = cameraCfg.camWidth
cam_info.imageHeight = cameraCfg.camHeight
cam_info.startX      = 0
cam_info.startY      = 0
cam_info.endX        = cameraCfg.camWidth
cam_info.endY        = cameraCfg.camHeight
cam_info.inputDimWidth =0
cam_info.inputDimHeight =0
ncc.SetMeanValue(cam_info,0.0,0.0,0.0)

ret = ncc.sdk_init(None, None, "./blob/face-detection-retail-0004-fp16.blob",cam_info, struct.calcsize("13I4f"))
```

```
print("xlink_init ret=%d " % ret)
if (ret<0):
        return
```

Description:

Specifies the AI Vision model file and calculation parameters, initializes the device algorithm model, camera function switch selection, sets the video encoding parameters (if the function switch is turned on). Video output is controlled by camera_video_out().

1.5 get meta data size

Interface Name	Parameters	Description
get_meta_size()	void	N/A

Example:

```
metasize=ncc.get_meta_size()
print("xlink_init ret= %d" % (metasize))
```

Returns:meta data size

Description:

Turn off the camera, reload the model, and call before changing the model.only support one AI mode now.

1.6 Uninitialize SDK

Interface Name	Parameters	Description
sdk_uninit()	void	N/A

Example:

```
sdk_uninit();
```

Returns:N/A

Description:

Turn off the camera, reload the model, and call before changing the model.

2.Video Streaming Related Interfaces

2.1 Get YUV Data

Interface Name	Parameters	Description
GetYuvData()	yuvbuf	Bytearray receive buffer

Example:

```
        metasize=ncc.get_meta_size()
offset=struct.calcsize(media_head)
yuvsize=cameraCfg.camWidth*cameraCfg.camHeight*2
yuvbuf = bytearray(yuvsize+offset)
metabuf =  bytearray(metasize+offset)
        size = ncc.GetYuvData(yuvbuf)
```

Returns:Size of the YUV data。

Description:

Gets a YUV data stream from the device.Content: struct frameSpecOut+YUV(NV12) data.

2.2 Get H.264 or H.265 Data

Interface Name	Parameters	Description
GetH26xData()	databuf	Bytearray receive buffer

Example:
Same as 2.1.

Description:

Gets a H.264 or H.265 data stream from the device.Content: struct frameSpecOut+H26X data.

2.3 Get JPEG data

Interface Name	Parameters	Description
GetJpegData()	databuf	Bytearray receive buffer

Example:

Same as 2.1

Description:

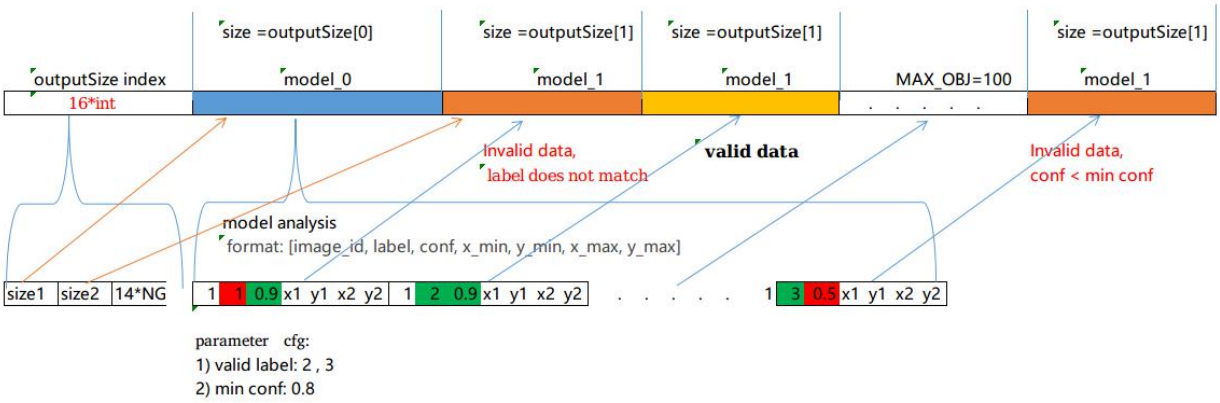
Gets a JPEG data stream from the device.Content: struct frameSpecOut+MJPEG data.

2.4 Get the results of the AI Network inference (获取设备 AI 网络数据运算结果?)

Interface Name	Parameters	Description
GetMetaData()	databuf	Bytearray receive buffer

Example:
Same as 2.1

Description:
Get the number of operations from the device's AI Network.Content: struct frameSpecOut+AI data..and AI data format is below:



3. Camera Control Related Interfaces

3.1 Obtain Camera Module Information

Interface Name	Parameters	Description
CameraSensor Class	GetFirstSensor（）， GetNextSensor（）	

Example:
sensors=ncc.CameraSensor()

```
sensor1 = ncc.SensorModesConfig()
if sensors.GetFirstSensor(sensor1)==0:
                        print("camera: %s, %dX%d@%dfps, AFmode:%d,
maxEXP:%dus,gain[%d, %d]\n" % (
          sensor1.moduleName, sensor1.camWidth, sensor1.camHeight, sensor1.camFps,
          sensor1.AFmode, sensor1.maxEXP, sensor1.minGain, sensor1.maxGain))

sensor2 = ncc.SensorModesConfig()
while sensors.GetNextSensor(sensor2)==0:
                        print("camera: %s, %dX%d@%dfps, AFmode:%d,
maxEXP:%dus,gain[%d, %d]\n" % (
          sensor2.moduleName, sensor2.camWidth, sensor2.camHeight, sensor2.camFps,
          sensor2.AFmode, sensor2.maxEXP, sensor2.minGain, sensor2.maxGain))
```

Description:

Obtains information about the mode of the camera (获取相机可见光模组模式信息). Some cameras will support multiple video modes, which can be selected through camera_select_sensor().

3.2 Select Module's Working Mode

Interface Name	Parameters	Description
camera_select_sensor()	sensorid	camera_control_get_features() obtains the array of information of supported camera modes. *sensorid* is the serial number of the array.

Example:

ncc.camera_select_sensor(0)

Returns:0 if successful, -1 otherwise

Description:

Sets the working mode of the camera's visible light module.

3.3 Control the Camera's Video Output

Interface Name	Parameters	Description
camera_video_out()	video_type	Video data type
	out mode	Disabled, Single (For photos), or Continuous

Example:

ncc.camera_video_out(ncc.YUV420p,ncc.VIDEO_OUT_CONTINUOUS)

Returns:0 if successfuk, -1 otherwise

Description:

Sets the device to output video data. This works for YUV420p，H26X，JPEG. H26X does not support single output.

8.4 Set Camera's Focus Mode

Interface Name	Parameters	Description
camera_control_af_mode()	camera_ctrl_af_mode af_mode	CAMERA_CONTROL__AF_MODE_OFF : Manual Focus CAMERA_CONTROL__AF_MODE_AUTO:Automatic Focus

Example:

ncc.camera_control_af_mode(ncc.CAMERA_CONTROL__AF_MODE_AUTO);

Returns:0 if successful, -1 otherwise

Description:

Sets the camera to manual focus. Using camera_control_get_features() one can check if the camera supports manual focusing (cameraCfg.AFmode). If not supported, the setting is invalid and the camera defaults to automatic focusing.

3.5 Set the Camera's Lens Distance

Interface Name	Parameters	Description
camera_control_lens_move()	lens_position	Range of distances（1-100)

Example:

```
ncc.camera_control_lens_move(10);
```

Returns:0 if successful, -1 otherwise

Description:

Used when focusing manually, greater value is a greater distance.

3.6 Trigger Single Focus

Interface Name	Parameters	Description
camera_control_focus_trigger()	void	N/A

Example:

```
camera_control_focus_trigger()；
```

Returns:0 if successful, -1 otherwise

Description:

Focuses the camera once.

3.7 Set Camera's Exposure Mode

Interface Name	Parameters	Description
camera_control_ae_mode()	camera_ctrl_ae_mode flash_mode	Manual or Automatic

Example:

```
ncc.camera_control_ae_mode( ncc.CAMERA_CONTROL__AE_AUTO__FLASH_MODE__AUTO);
```

Returns:0 if successful, -1 otherwise

Description:

Sets exposure mode.

3.8 Set Exposure Time

Interface Name	Parameters	Description
camera_control_ae_set_exp()	exp_compensation	Exposure duration in microsecond (μs) range (1-1 / fps)

Example:

```
ncc.camera_control_ae_set_exp(20000);
```

Returns:0 if successful, -1 otherwise

Description:

Sets the exposure time for the manual exposure mode.

3.9 Set Camera Gain

Interface Name	Parameters	Description

camera_control_ae_set_gain（）	iso_val	Gain value

Example:

```
ncc.camera_control_lens_move(100);
```

Returns:0 if successful, -1 otherwise

Description:

Sets the gain in manual exposure mode. Min/max gain values can be retrieved through camera_control_get_features() and set manually.

3.10 Set Camera White Balance Mode

Interface Name	Parameters	Description
camera_control_awb_mode()	camera_ctrl_awb_mode awb_mode	Manual or Automatic

Example:

```
ncc.camera_control_awb_mode(ncc.CAMERA_CONTROL__AWB_MODE__AUTO);
```

Returns:0 if successful, -1 otherwise

Description:

Sets camera to automatic white balance mode.

3.11 Float Conversion

Interface Name	Parameters	Description
f16Tof32()	x	16-bit Data

Example:

```
f=f16Tof32(100);
```

Returns:Float

Description:

Converts 16-bit short data to a floating point number. Used for metadata calculations and analysis.