OpenCV for Unity 3.0.1

🚀 About OpenCV for Unity

OpenCV for Unity is an **Assets Plugin** for using **OpenCV** from within **Unity** cross-platform game engine.

> ***OpenCV for Unity*** uses ***OpenCV*** under ***Apache 2 license***; see `Notices.txt` file in package for details.

✨ Our Asset Features

🌐 Cross Platform

- **iOS** & **Android** & **Windows10 UWP** support.

- **Win** & **Mac** & **Linux** Standalone support.
- **WebGL** support.
- **ChromeOS** support.
- **visionOS** support. (beta)
- Support for preview in the **Editor**.

🔄 Support Latest Version

- Users can utilize **OpenCV for Unity** based on the latest version of **OpenCV** (**4.12.0**) for app development. (git: opencv, opencv-contrib)

☕ OpenCV Java API Support

- As a **clone of OpenCV Java**, which means you can use the exact **same API as OpenCV Java 4.12.0**. OpenCV Java documentation

🛠 Easy to Use

- We provide helper functions for the interconversion of **Unity's** `Texture2D` and **OpenCV's** `Mat`. Many classes implement `IDisposable`, allowing you to manage resources using the `using` statement.

📚 Include Many Examples

- Includes a wide variety of example usage scenarios, which consist of **scene files** and **script codes**. By running these sample applications, **you can learn how to develop OpenCV applications effectively**.
  OpenCVForUnity Examples (GitHub)
  EnoxSoftware repositories (GitHub)

🥽 AR VR MR

- Can be utilized for developing applications using **Augmented Reality**, **Virtual Reality**, and **Mixed Reality** technologies.

🤖 Deep Learning

- Provides support for the **dnn module**, including various frameworks such as **ONNX**, **TensorFlow**, **caffe**, **Torch**, **Darknet**, and more. See OpenCV wiki (GitHub)
- The **dnn module** is supported on all platforms except **UWP**. See Support Modules
- Inference in the **Dnn module** uses the **CPU backend** by default; only **Windows** platforms

can use the **CUDA backend** by following additional steps.

📹 Use of `WebCamTexture`

- Supports input from **Unity's** `WebCamTexture`, allowing you to perform **real-time image processing** on camera footage.

🔧 Works with many hardware

- Compatible with a **wide range of hardware gadgets** beyond just PCs and smartphones, allowing it to run on various devices.
  (e.g. **HoloLens1** / **Hololens2**, **Nreal Light**, **Oculus**, **Kinect**, **RealSense**, **ZED 2** or **ZED Mini stereo camera**, and **Raspberry Pi**).

🎨 Visual Scripting Support

- You can take full advantage of all the features of **OpenCV for Unity** in **Unity's Visual Scripting**. You can learn how to integrate them through the VisualScripting With OpenCVForUnity Example (GitHub).

📦 Example Code using OpenCV for Unity

🎯 AR & Recognition Examples

- MarkerBased AR Example
- MarkerLess AR Example
- FaceMask Example
- RealTime FaceRecognition Example

🔧 Integration Examples

- AVPro with OpenCV for Unity Example
- Kinect with OpenCV for Unity Example
- HoloLens with OpenCV for Unity Example
- VisualScriptingWithOpenCVForUnityExample
- ARFoundationWithOpenCVForUnityExample
- NrealLight with OpenCVForUnity Example

🎬 Media & AI Examples

- FfmpegWithOpenCVForUnityExample
- VideoPlayerWithOpenCVForUnityExample
- NativeGalleryWithOpenCVForUnityExample
- YOLOv5WithOpenCVForUnityExample
- YOLOv8WithOpenCVForUnityExample
- KlakNDIWithOpenCVForUnityExample
- InferenceEngineWithOpenCVForUnityExample

🔗 Quick Links

- **Official Site** - Main product page
- **Example Code** - GitHub repository with examples
- **Android Demo** - Download Android demo app
- **WebGL Demo** - Try WebGL demo online
- **Product Introduction Video** - Watch product overview
- **Setup Guide Video** - Step-by-step setup tutorial
- **Forum** - Community discussions
- **API Reference** - Complete API documentation
- **Support Modules** - Additional module documentation

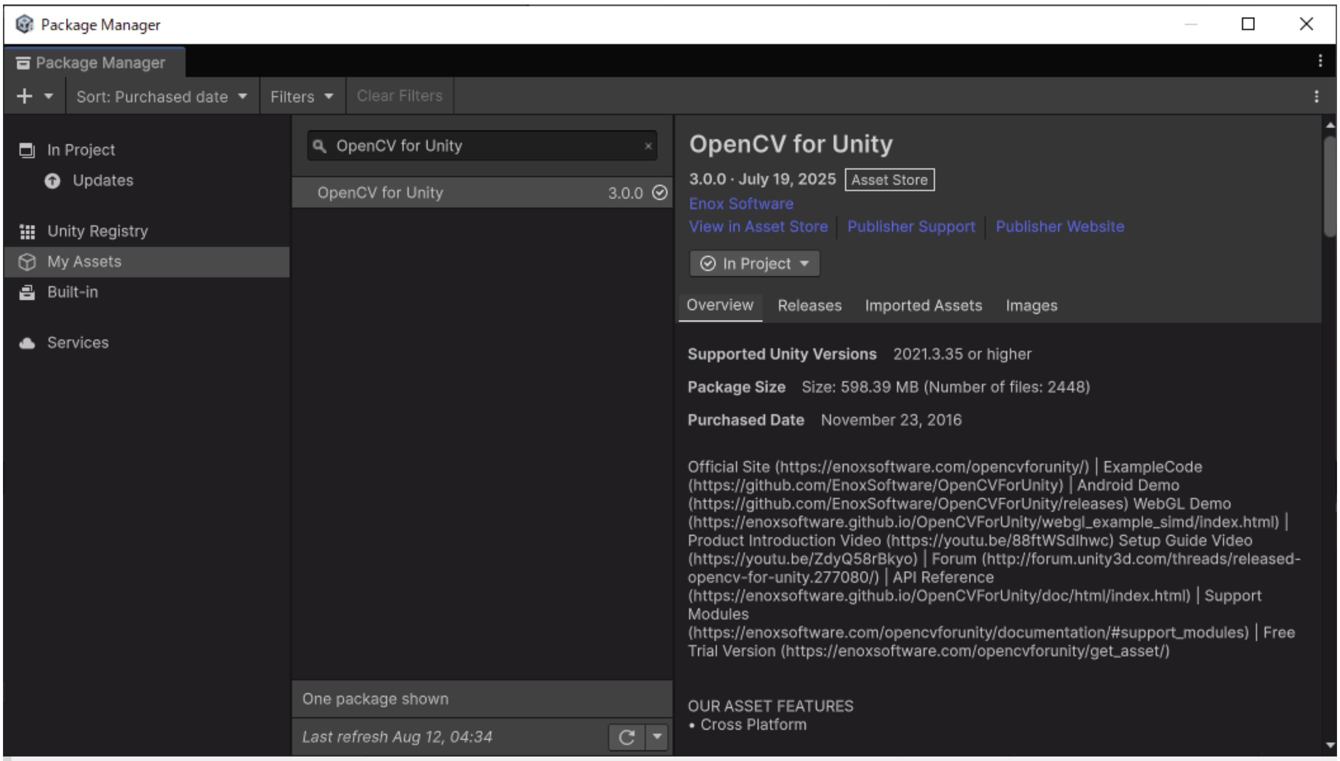
📋 System Requirements

Platform	Requirement
Windows Standalone & Editor	**Windows 8** or later
Mac Standalone & Editor	**macOS 10.13** or later
Linux Standalone & Editor	**Ubuntu 18.04** or later
Android	API level **24** or later
iOS	**iOS** Version **12.0** or later
visionOS (beta)	**visionOS 1** or later

Setup Guide for Getting Started (Setup Guide Video)

1. Import **OpenCV for Unity** from the `Package Manager`.

   > ⚠ **Important**: If your project already has a previous version of the `Assets/OpenCVForUnity` folder, issues may occur. Please delete the `Assets/OpenCVForUnity` folder first before importing the new version.



OpenCV for Unity

3.0.0 · July 19, 2025 Asset Store

Enox Software

Supported Unity Versions 2021.3.35 or higher

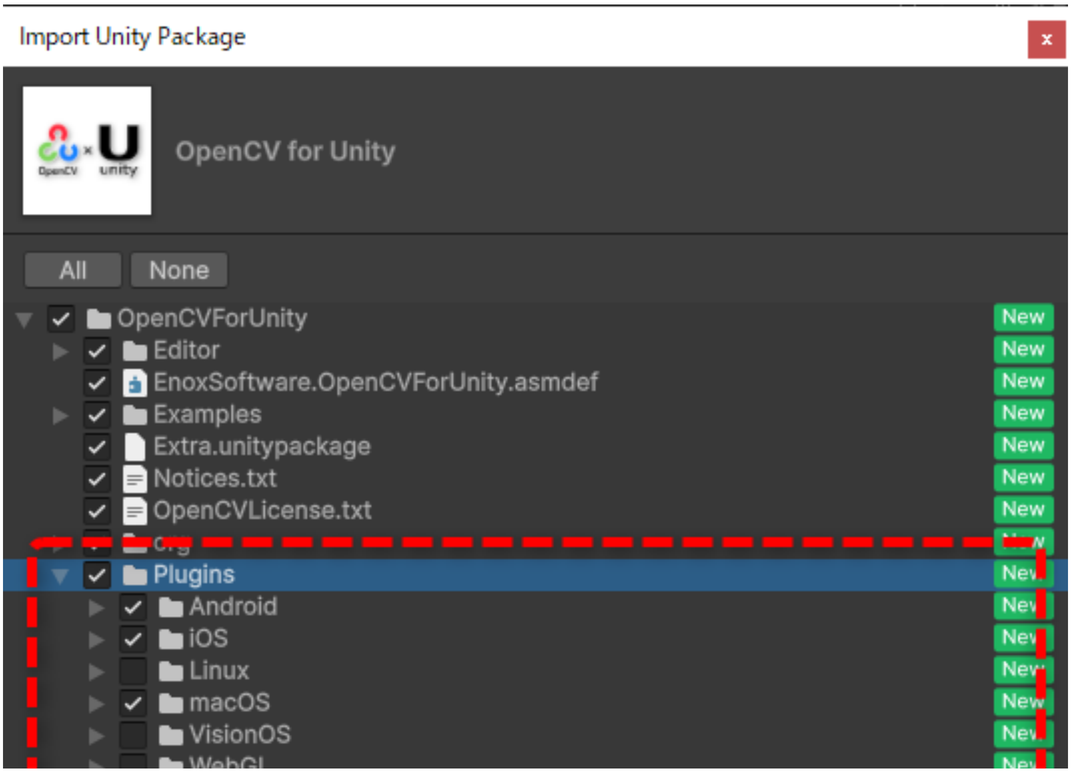
Package Size Size: 598.39 MB (Number of files: 2448)

Purchased Date November 23, 2016

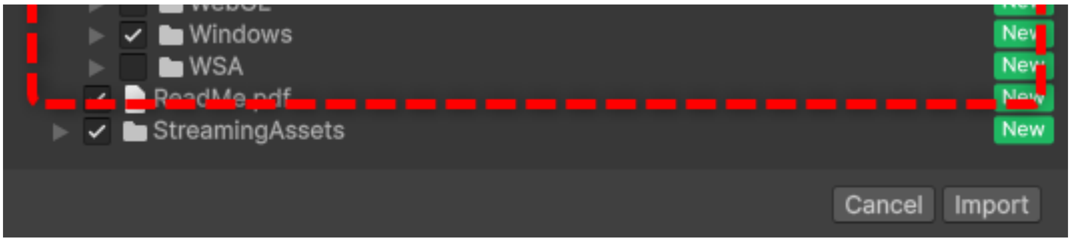
Official Site (https://enoxsoftware.com/opencvforunity/) | ExampleCode (https://github.com/EnoxSoftware/OpenCVForUnity) | Android Demo (https://github.com/EnoxSoftware/OpenCVForUnity/releases) WebGL Demo (https://enoxsoftware.github.io/OpenCVForUnity/webgl_example_simd/index.html) | Product Introduction Video (https://youtu.be/88ftWSdlhwc) Setup Guide Video (https://youtu.be/ZdyQ58rBkyo) | Forum (http://forum.unity3d.com/threads/released-opencv-for-unity.277080/) | API Reference (https://enoxsoftware.github.io/OpenCVForUnity/doc/html/index.html) | Support Modules (https://enoxsoftware.com/opencvforunity/documentation/#support_modules) | Free Trial Version (https://enoxsoftware.com/opencvforunity/get_asset/)

OUR ASSET FEATURES
- Cross Platform

   > At that time, by unchecking platforms other than those planned to be supported in your development project, unnecessary plugin files for those platforms will not be imported, reducing the project size.



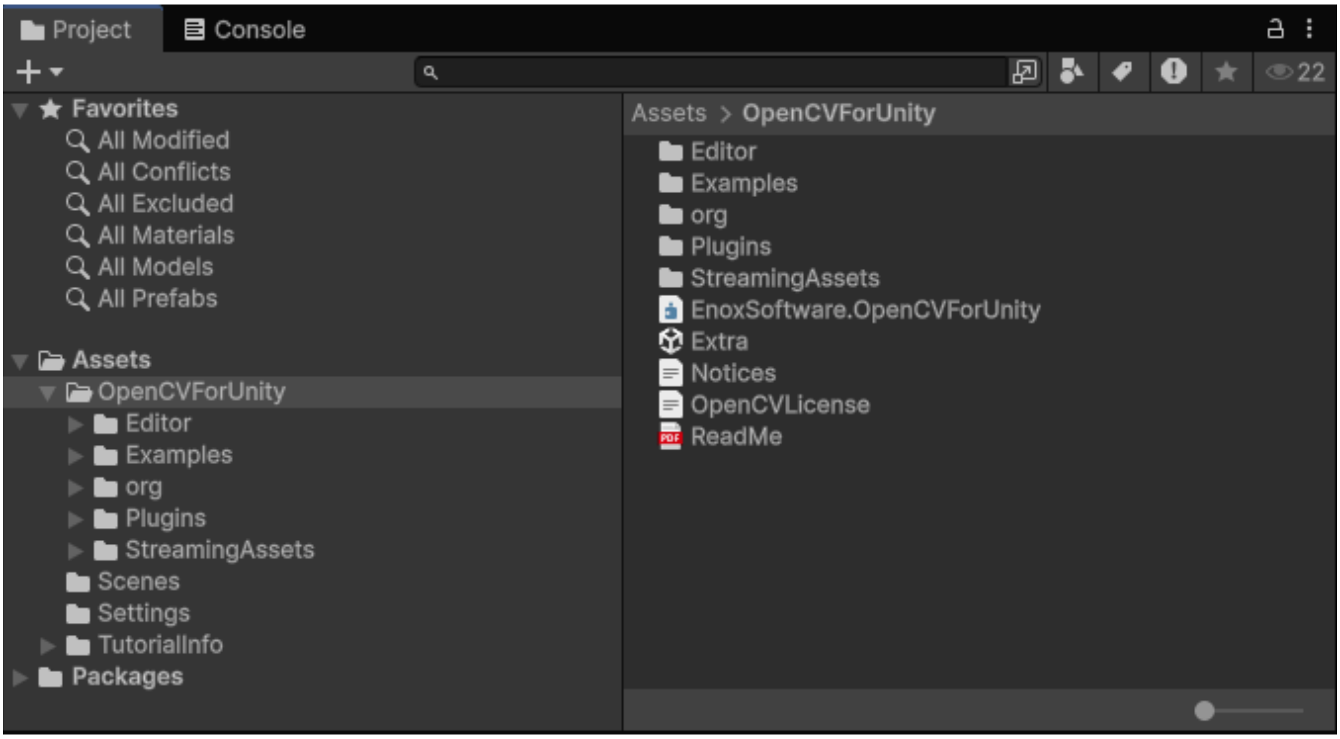
- ☑ OpenCVForUnity New
  - ☑ Editor New
  - ☑ EnoxSoftware.OpenCVForUnity.asmdef New
  - ☑ Examples New
  - ☑ Extra.unitypackage New
  - ☑ Notices.txt New
  - ☑ OpenCVLicense.txt New
  - Org New
  - ☑ Plugins New
    - ☑ Android New
    - ☑ iOS New
    - □ Linux New
    - ☑ macOS New
    - □ VisionOS New
    - □ WebGL New



Even after import, you can easily reduce unnecessary files in the `Assets/OpenCVForUnity` folder using the `Project Size Reducer`. Particularly, by removing plugin files for platforms not planned to be supported in your development project, you can significantly reduce the project size. For details, please see Project Size Reducer Window Description.

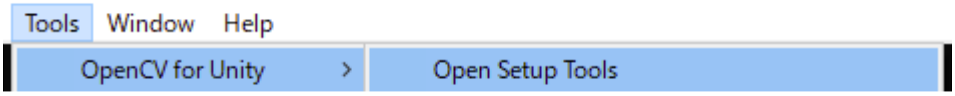
2. When the import is complete, the `Setup Tools` window will automatically appear. In the `Setup Tools` window, you can easily perform various settings. For details, please see Setup Tools Window Description.
3. Setup is now complete.

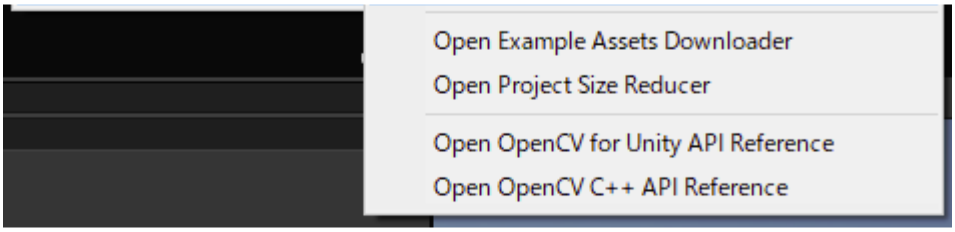
> As a starting point for development using this asset, we recommend first referring to the API usage examples in the Example Scenes. Also, since the OpenCV for Unity API is the same as the OpenCV Java API, OpenCV Java tutorials are also helpful.

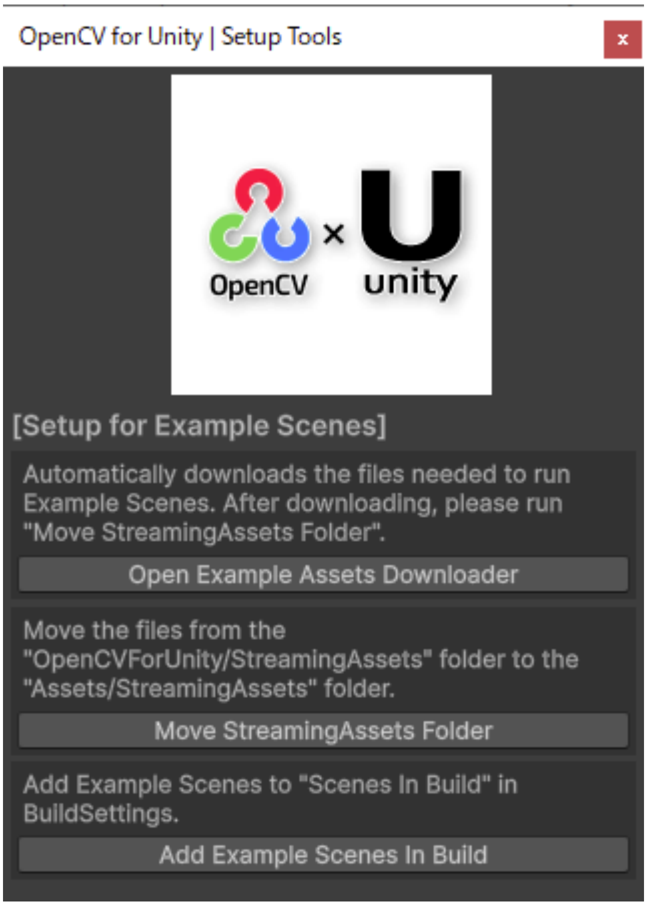


Example Scenes Setup Guide (Setup Guide Video)

1. Complete the Setup Guide for Getting Started.
2. Select the menu item `Tools > OpenCV for Unity > Open Setup Tools` to open the `Setup Tools` window.




Open Example Assets Downloader
Open Project Size Reducer
Open OpenCV for Unity API Reference
Open OpenCV C++ API Reference


OpenCV for Unity | Setup Tools
×
OpenCV
×
unity
[Setup for Example Scenes]

Automatically downloads the files needed to run Example Scenes. After downloading, please run "Move StreamingAssets Folder".

Open Example Assets Downloader

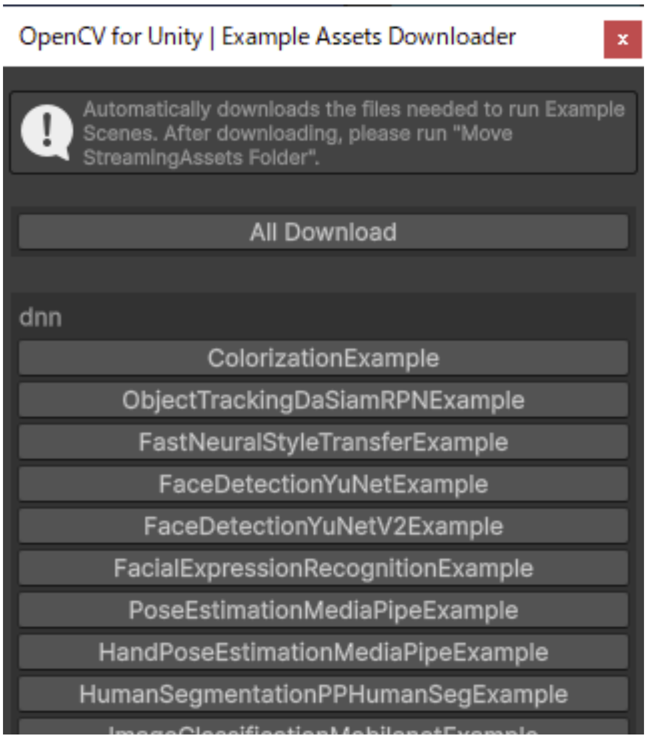
Move the files from the "OpenCVForUnity/StreamingAssets" folder to the "Assets/StreamingAssets" folder.

Move StreamingAssets Folder

Add Example Scenes to "Scenes In Build" in BuildSettings.

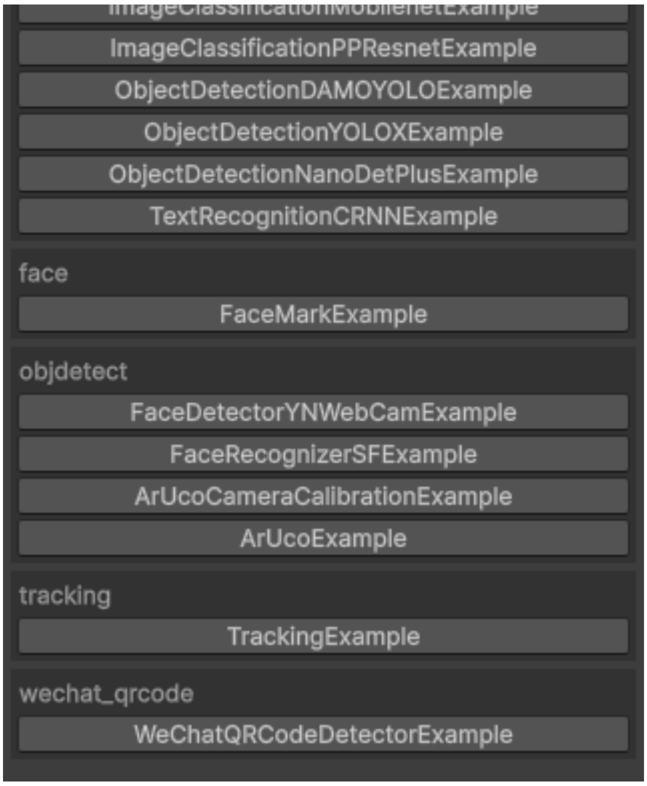
Add Example Scenes In Build

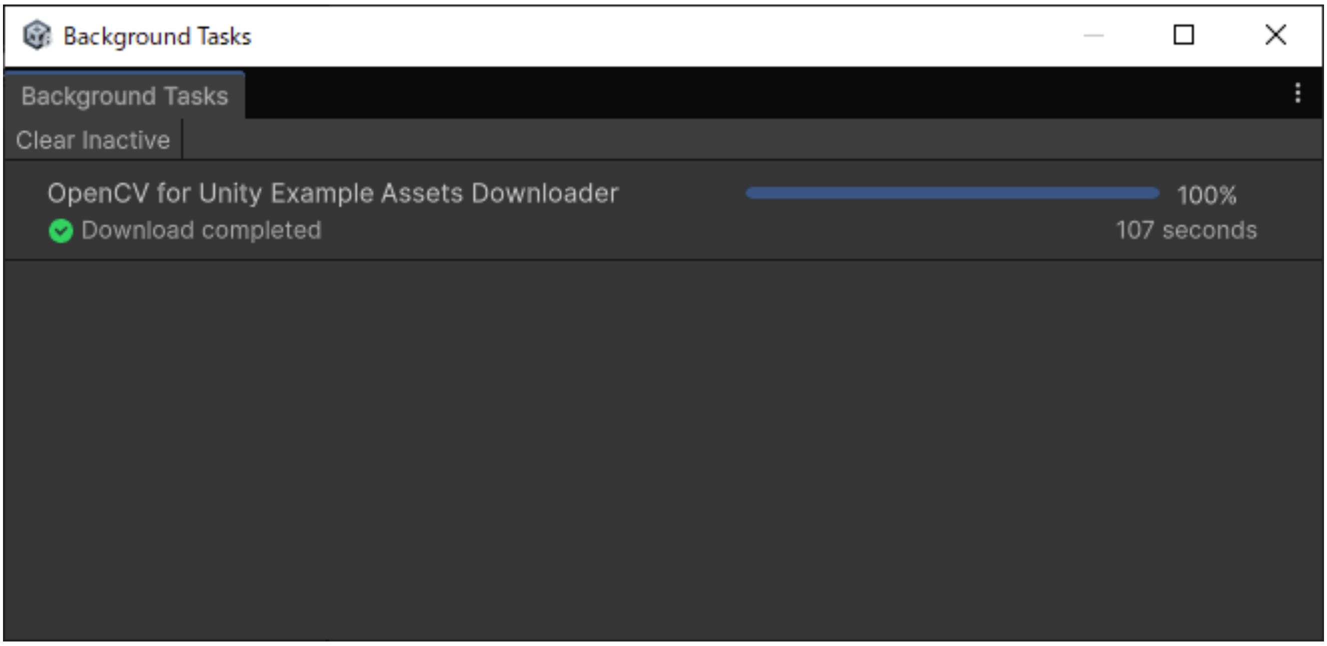
3. Click the `Open Example Assets Downloader` button in the `Setup Tools` window to open the `Example Assets Downloader` window, then click the `All Download` button to download the necessary files for Example Scenes. Example Assets Downloader Window Description


OpenCV for Unity | Example Assets Downloader
×

Automatically downloads the files needed to run Example Scenes. After downloading, please run "Move StreamingAssets Folder".

All Download
dnn
ColorizationExample
ObjectTrackingDaSiamRPNExample
FastNeuralStyleTransferExample
FaceDetectionYuNetExample
FaceDetectionYuNetV2Example
FacialExpressionRecognitionExample
PoseEstimationMediaPipeExample
HandPoseEstimationMediaPipeExample
HumanSegmentationPPHumanSegExample
ImageClassificationMobilenetExample

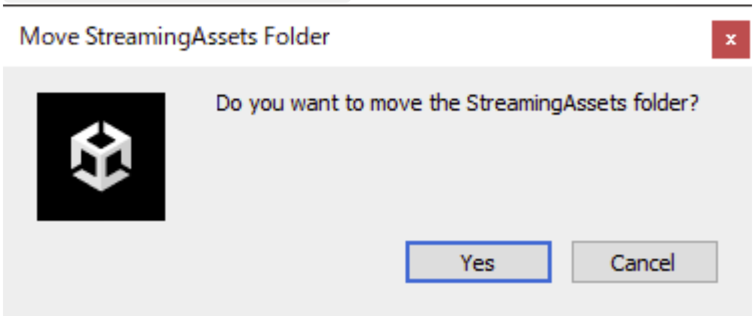

ImageClassificationMobilenetExample
ImageClassificationPPResnetExample
ObjectDetectionDAMOYOLOExample
ObjectDetectionYOLOXExample
ObjectDetectionNanoDetPlusExample
TextRecognitionCRNNExample
face
FaceMarkExample
objdetect
FaceDetectorYNWebCamExample
FaceRecognizerSFExample
ArUcoCameraCalibrationExample
ArUcoExample
tracking
TrackingExample
wechat_qrcode
WeChatQRCodeDetectorExample



OpenCV for Unity Example Assets Downloader 100%

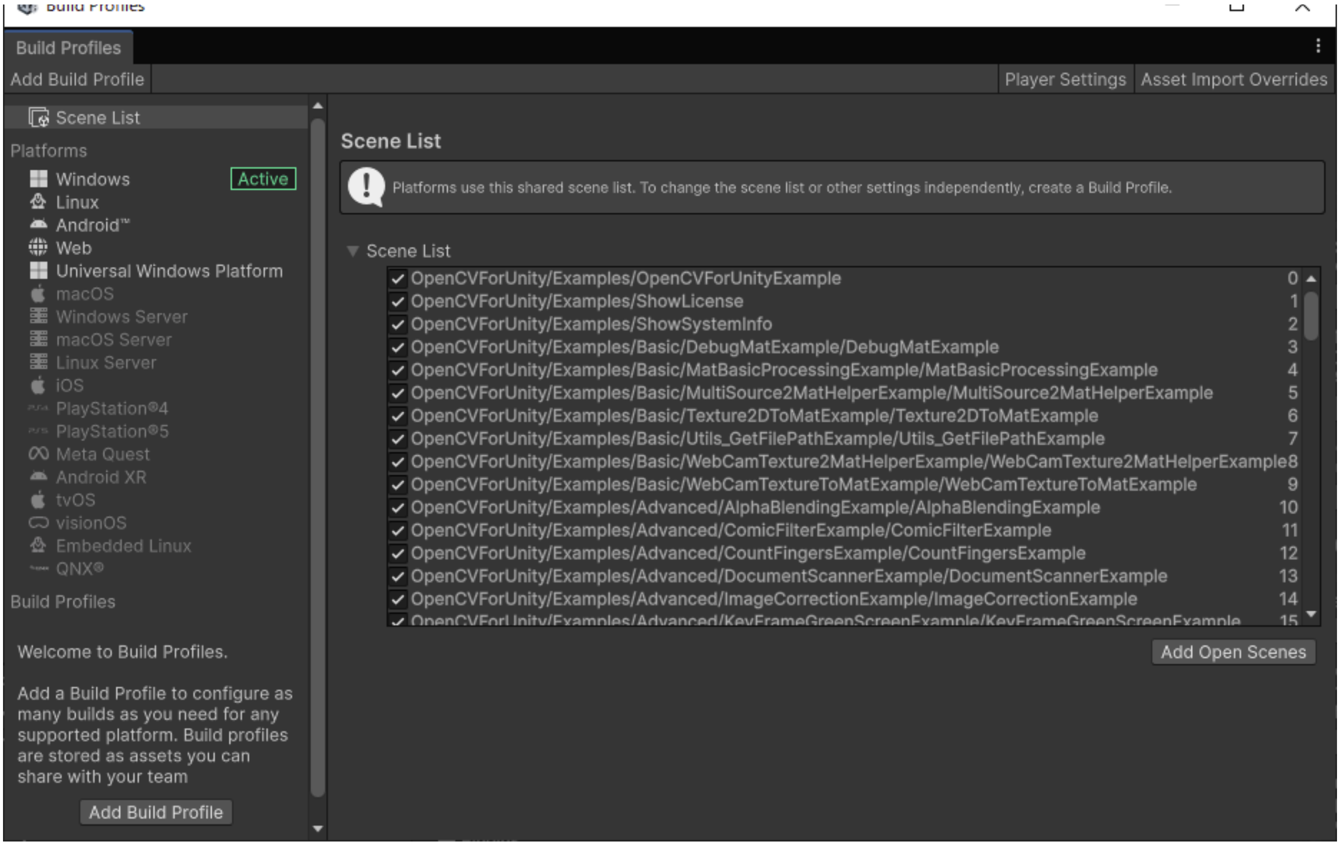
✓ Download completed 107 seconds

4. Click the `Move StreamingAssets Folder` button in the `Setup Tools` window to move the `Assets/OpenCVForUnity/StreamingAssets/OpenCVForUnityExamples` folder to directly under the `Assets/StreamingAssets` folder.



Do you want to move the StreamingAssets folder?

5. Click the `Add Example Scenes in Build` button in the `Setup Tools` window to add all Example Scene files in the `Examples` folder to `Scenes In Build` in `Build Settings`.



Welcome to Build Profiles.

Add a Build Profile to configure as many builds as you need for any supported platform. Build profiles are stored as assets you can share with your team

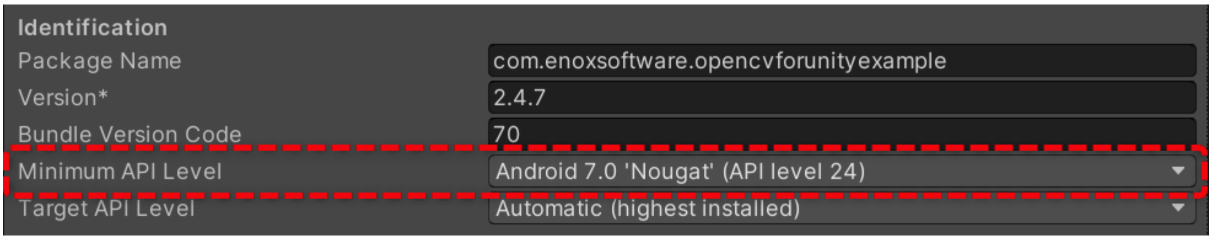
Scene List

Platforms use this shared scene list. To change the scene list or other settings independently, create a Build Profile.

Scene List

```
✓ OpenCVForUnity/Examples/OpenCVForUnityExample                                                      0
✓ OpenCVForUnity/Examples/ShowLicense                                                                1
✓ OpenCVForUnity/Examples/ShowSystemInfo                                                             2
✓ OpenCVForUnity/Examples/Basic/DebugMatExample/DebugMatExample                                      3
✓ OpenCVForUnity/Examples/Basic/MatBasicProcessingExample/MatBasicProcessingExample                  4
✓ OpenCVForUnity/Examples/Basic/MultiSource2MatHelperExample/MultiSource2MatHelperExample            5
✓ OpenCVForUnity/Examples/Basic/Texture2DToMatExample/Texture2DToMatExample                          6
✓ OpenCVForUnity/Examples/Basic/Utils_GetFilePathExample/Utils_GetFilePathExample                    7
✓ OpenCVForUnity/Examples/Basic/WebCamTexture2MatHelperExample/WebCamTexture2MatHelperExample8
✓ OpenCVForUnity/Examples/Basic/WebCamTextureToMatExample/WebCamTextureToMatExample                  9
✓ OpenCVForUnity/Examples/Advanced/AlphaBlendingExample/AlphaBlendingExample                        10
✓ OpenCVForUnity/Examples/Advanced/ComicFilterExample/ComicFilterExample                            11
✓ OpenCVForUnity/Examples/Advanced/CountFingersExample/CountFingersExample                          12
✓ OpenCVForUnity/Examples/Advanced/DocumentScannerExample/DocumentScannerExample                    13
✓ OpenCVForUnity/Examples/Advanced/ImageCorrectionExample/ImageCorrectionExample                    14
✓ OpenCVForUnity/Examples/Advanced/KeyFrameGreenScreenExample/KeyFrameGreenScreenExample            15
```

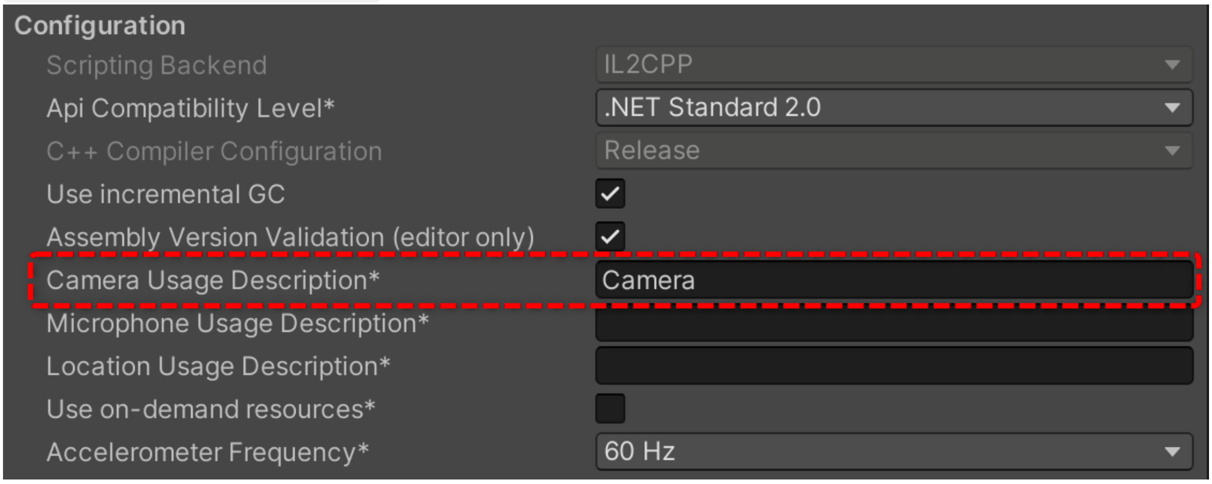
6. When building Example Scenes and running them on devices, settings may need to be changed depending on the platform.
   - **Android**
     - ○ Set `Player Settings` → `Other Settings` → `Identification` → `Minimum API Level` to **24** or higher.



Identification

Package Name	com.enoxsoftware.opencvforunityexample
Version*	2.4.7
Bundle Version Code	70
Minimum API Level	Android 7.0 'Nougat' (API level 24)
Target API Level	Automatic (highest installed)

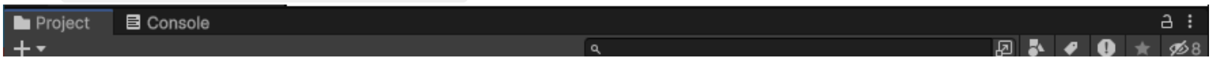
   - **iOS**
     - ○ Set `Player Settings` → `Other Settings` → `Configuration` → `Camera Usage Description`.

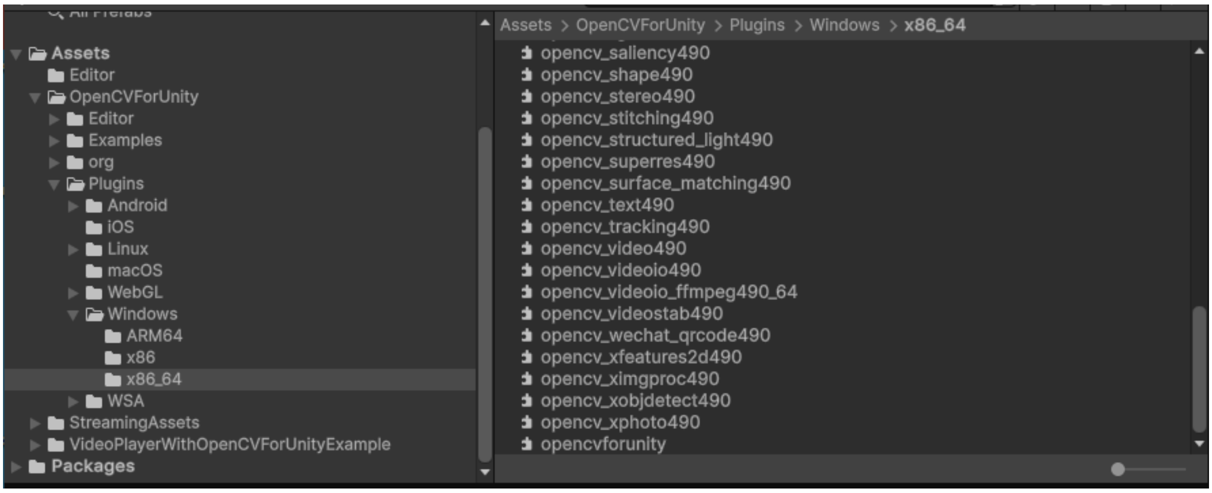


Configuration

Scripting Backend	IL2CPP
Api Compatibility Level*	.NET Standard 2.0
C++ Compiler Configuration	Release
Use incremental GC	☑
Assembly Version Validation (editor only)	☑
Camera Usage Description*	Camera
Microphone Usage Description*	
Location Usage Description*	
Use on-demand resources*	□
Accelerometer Frequency*	60 Hz

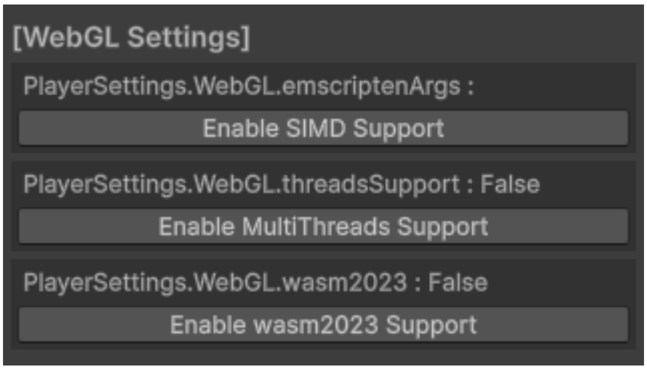
     - ○ Set `Target minimum iOS Version` to **12.0** or higher.





- **WebGL**
  - If you want to enable multi-threading or SIMD optimization, click the `Enable MultiThreads Support` button or `Enable SIMD Support` button in the `Setup Tools` window. Setup Tools Window Description

    > ⚠ The browser you run must support multi-threading and SIMD.



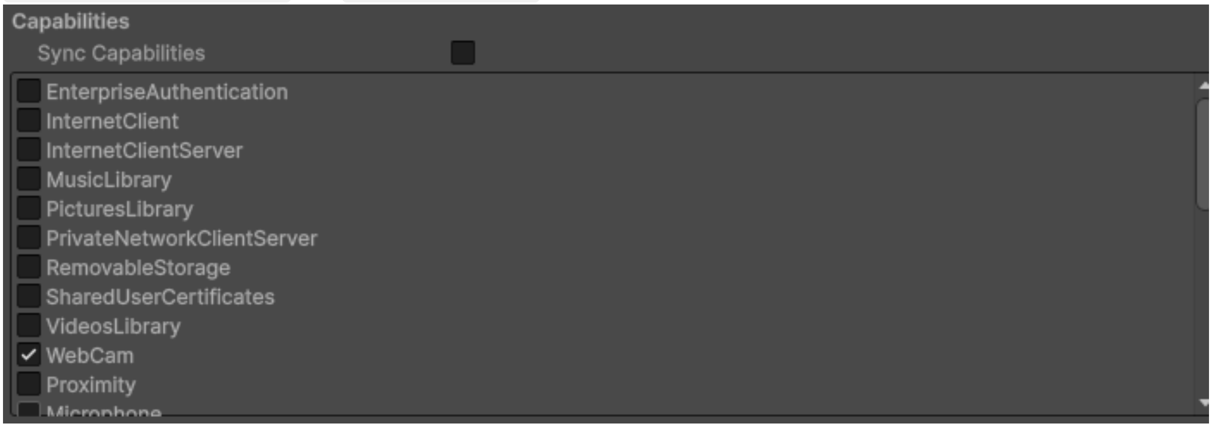
[WebGL Settings]

PlayerSettings.WebGL.emscriptenArgs :

PlayerSettings.WebGL.threadsSupport : False

PlayerSettings.WebGL.wasm2023 : False

- **Windows10 UWP**
  - If using the `WebCamTexture` class, check `WebCam` in `Player Settings` → `PublishingSettings` → `Capabilities`.

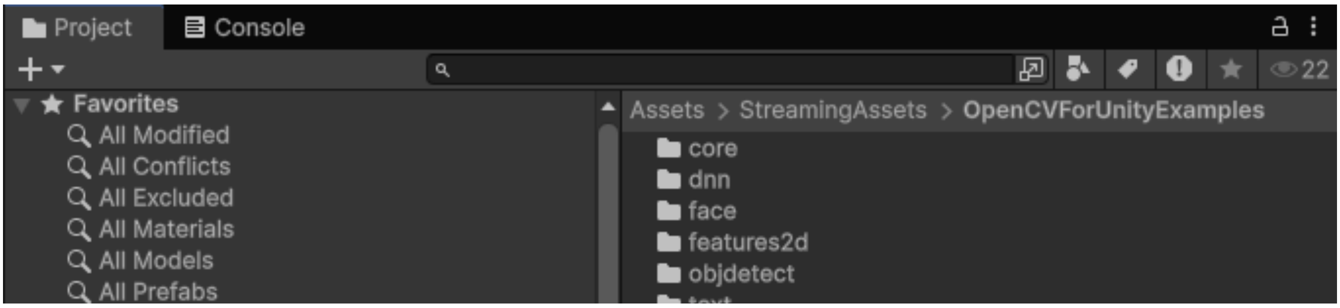


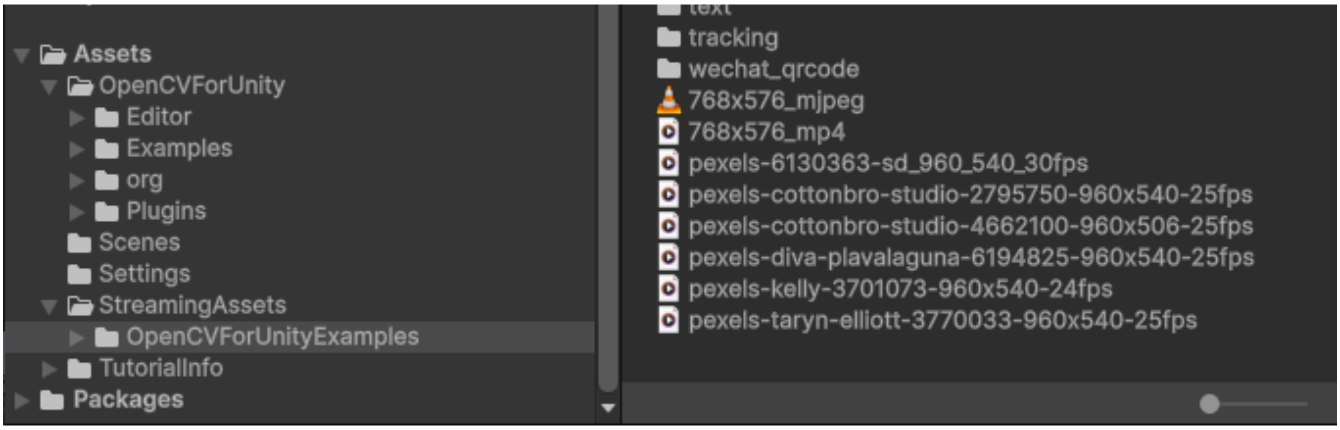
Capabilities

Sync Capabilities □

□ EnterpriseAuthentication
□ InternetClient
□ InternetClientServer
□ MusicLibrary
□ PicturesLibrary
□ PrivateNetworkClientServer
□ RemovableStorage
□ SharedUserCertificates
□ VideosLibrary
☑ WebCam
□ Proximity
□ Microphone

7. Setup is now complete.





Assets
OpenCVForUnity
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StreamingAssets
OpenCVForUnityExamples
TutorialInfo
Packages

text
tracking
wechat_qrcode
768x576_mjpeg
768x576_mp4
pexels-6130363-sd_960_540_30fps
pexels-cottonbro-studio-2795750-960x540-25fps
pexels-cottonbro-studio-4662100-960x506-25fps
pexels-diva-plavalaguna-6194825-960x540-25fps
pexels-kelly-3701073-960x540-24fps
pexels-taryn-elliott-3770033-960x540-25fps

For each Example, please see Example Scenes Description.

Example Scenes Description

The Example Scenes in **OpenCV for Unity** are structured to allow you to learn various **OpenCV** features progressively. They are divided into the following **4** categories, and by starting from **Basic** and progressing to **Advanced**, you can learn **OpenCV** features practically.

`Basic` Folder

Contains Examples related to **basic functionality and setup**:

- **Texture2DToMatExample**: Demonstrates bidirectional conversion between Unity's `Texture2D` and OpenCV's `Mat` format, including loading images from `Resources` and displaying processed results
- **WebCamTextureToMatExample**: Real-time video conversion example that processes `WebCamTexture` frames to `Mat` format with camera device selection, resolution, and FPS configuration options
- **WebCamTexture2MatHelperExample**: Efficient video processing using `WebCamTexture2MatHelper` helper class for automatic frame synchronization and optimized conversion from `WebCamTexture` to `Mat`
- **MultiSource2MatHelperExample**: Multi-source video input example that allows switching between different video sources (webcam, video files, etc.) in the `inspector` and converts them to `Mat` format using `MultiSource2MatHelper`
- **MatBasicProcessingExample**: Comprehensive demonstration of fundamental `Mat` operations including initialization, matrix operations, data access, filtering, morphological operations, and multi-dimensional array handling
- **DebugMatExample**: Visual debugging tool for `Mat` objects that displays matrix contents in various formats (`dump` , `toString` , `visualization`) with different layout options for inspection and troubleshooting

- **Utils_GetFilePathExample**: Utility example for acquiring file paths from `StreamingAssets` directory, demonstrating asynchronous file access methods for cross-platform file handling

`MainModules` Folder

Contains Examples related to **OpenCV's main modules**:

Important Modules

- `core` : Basic functionality
  - **PCAExample**: **Principal Component Analysis** example that demonstrates dimensionality reduction and data projection using the `PCA` class for statistical analysis and feature extraction
  - **KMeansClusteringExample**: **K-means** clustering algorithm example that segments image pixels into color clusters, demonstrating unsupervised learning for image quantization and color reduction
- `imgproc` : Image processing
  - **ThresholdExample**: Image binarization example using `Imgproc.threshold` with **Otsu's** automatic threshold selection method for converting grayscale images to binary format
  - **DrawingExample**: Comprehensive drawing example demonstrating various shape drawing functions including lines, rectangles, circles, ellipses, arrows, and text rendering with multiple font styles and colors
  - **HoughLinesPExample**: Straight line detection example using probabilistic **Hough transform** (`Imgproc.HoughLinesP`) with **Canny** edge detection preprocessing to detect and draw lines in images
  - **CircleDetectionExample**: Real-time circle detection example using **Hough circle transform** (`Imgproc.HoughCircles`) to detect circular objects in video streams with configurable parameters
  - **ConvexHullExample**: **Convex hull** calculation example that finds the smallest convex polygon containing a set of random points, demonstrating geometric shape analysis using `Imgproc.convexHull`
  - **ConnectedComponentsExample**: **Connected component** analysis example that identifies and labels separate regions in binary images, useful for object counting and region analysis
  - **MatchTemplateExample**: Template matching example using `Imgproc.matchTemplate` to find occurrences of a template image within a larger image, demonstrating pattern detection and object localization
  - **MatchShapesExample**: Shape matching example that compares shapes using contour matching algorithms to find similar objects regardless of their position or scale
  - **GrabCutExample**: Foreground extraction example using **GrabCut** algorithm

  (`Imgproc.grabCut`) with mask-based initialization to separate foreground objects from background in images
  - **WrapPerspectiveExample**: Perspective transformation example using `Imgproc.warpPerspective` to apply perspective corrections and geometric transformations, useful for document scanning and image rectification
- `features2d`: Feature point detection
  - **FeatureMatchingExample**: Descriptor extraction and matching example demonstrating **SIFT** feature detection with **FLANN**-based matcher to find correspondences between two images
  - **SimpleBlobExample**: Blob detection example using `SimpleBlobDetector` to identify and track blob-like objects in images based on color, size, and shape characteristics
  - **MSERExample**: **MSER** (**Maximally Stable Extremal Regions**) detection example that finds stable regions in images, useful for text detection and region-of-interest identification
  - **HomographyToFindAKnownObjectExample**: Object detection example using homography transformation (`findHomography` and `perspectiveTransform`) to locate and track known objects in scenes based on feature point matching
- `objdetect`: Object detection
  - **ArUcoExample**: Marker-based **AR** example that detects **ArUco** markers and estimates camera pose for **augmented reality** applications, supporting canonical markers, grid boards, and **ChArUco** boards
  - **FaceDetectionExample**: Face detection example using `CascadeClassifier` with **Haar** or **LBP** cascades for real-time face detection in video streams, with configurable detection parameters
  - **FaceDetectorYNExample**: Face detection example using `FaceDetectorYN` class with deep learning models (**YuNet**) for high-accuracy face detection with optional face blurring feature
  - **FaceIdentificationEstimatorExample**: Face identification example that combines face detection and recognition using deep learning models, allowing face registration and identification in real-time
  - **FaceRecognizerSFExample**: Face recognition example using `FaceRecognizerSF` class with **SFace** model for face identification and verification from registered face images
  - **QRCodeDetectorExample**: **QR code** detection example using `QRCodeDetector` class to detect and decode **QR codes** in real-time video streams with corner point visualization
  - **QRCodeEncoderExample**: **QR code** generation example using `QRCodeEncoder` class to create **QR code** images from text strings with configurable size and encoding parameters
  - **BarcodeDetectorExample**: Barcode detection example using `BarcodeDetector` class to detect and decode various barcode formats (**EAN-13**, **UPC-A**, etc.) in video streams with optional super-resolution support

    - **HOGDescriptorExample**: People detection example using `HOGDescriptor` with **Histogram of Oriented Gradients** (**HOG**) features and **SVM** classifier for detecting pedestrians in images and videos
- `dnn`: Deep learning
    - **ObjectDetectionYOLOXExample**: Real-time object detection example using **YOLOX** model with **ONNX** format, supporting async inference and multiple object classes with bounding box visualization
    - **ObjectDetectionDAMOYOLOExample**: Object detection example using **DAMO-YOLO** model for high-performance detection with configurable confidence thresholds and **NMS** parameters
    - **ObjectDetectionNanoDetPlusExample**: Lightweight object detection example using **NanoDetPlus** model optimized for mobile and edge devices with efficient inference
    - **ImageClassificationMobilenetExample**: Image classification example using **MobileNet** model for efficient mobile-optimized classification of images into predefined categories
    - **ImageClassificationPPResnetExample**: Image classification example using **PP-ResNet** (**PaddlePaddle ResNet**) model for high-accuracy image classification tasks
    - **FaceDetectionYuNetExample**: Face detection example using **YuNet** model (*older version*) that detects faces and facial landmarks including eye positions, nose tip, and mouth corners
    - **FaceDetectionYuNetV2Example**: Face detection example using **YuNetV2** model (*recommended*) with improved accuracy and performance for detecting faces and facial landmarks in real-time
    - **FacialExpressionRecognitionExample**: Facial expression recognition example that classifies emotions (happy, sad, angry, etc.) from facial images using deep learning models
    - **HandPoseEstimationMediaPipeExample**: Hand pose estimation example using **MediaPipe** models to detect and track 21 hand landmarks in real-time, useful for gesture recognition applications
    - **PoseEstimationMediaPipeExample**: Human pose estimation example using **MediaPipe** models to detect and track 33 body keypoints including joints and body parts for motion analysis
    - **HumanPoseStreamEstimationMediaPipeExample**: Continuous human pose stream estimation example using specialized stream estimators for more stable tracking in video sequences with temporal smoothing
    - **HumanSegmentationPPHumanSegExample**: Human segmentation example that separates human subjects from background using **PP-HumanSeg** model, useful for virtual backgrounds and video effects
    - **TextRecognitionCRNNExample**: Text recognition example using **CRNN** (**Convolutional Recurrent Neural Network**) model to recognize and extract text from images with

sequence-to-sequence learning
    - **ObjectTrackingDaSiamRPNExample**: Object tracking example using **DaSiamRPN** (**Distractor-aware Siamese Region Proposal Network**) for robust single-object tracking in video sequences
    - **FastNeuralStyleTransferExample**: Neural style transfer example that applies artistic styles to images using fast style transfer models, transforming photos into paintings with different artistic styles
    - **ColorizationExample**: Automatic image colorization example that adds color to grayscale images using deep learning models trained on color images, restoring historical photos or monochrome images

Other Modules

- `calib3d`: Camera calibration and 3D processing
- `imgcodecs`: Image loading and saving
- `video`: Video processing
- `videoio`: Video input/output
- `photo`: Image restoration and noise removal
- `ml`: Machine learning

`ContribModules` Folder

Contains Examples related to **OpenCV's additional modules**:

- `face`: Face recognition and facial feature point detection
    - **FaceRecognizerExample**: Face recognition example using **Eigenfaces** algorithm that trains a face recognizer on sample images and performs face identification from test images
    - **FaceMarkExample**: Facial feature point detection example that detects and marks facial landmarks such as eyes, nose, mouth, and facial contours using face landmark detection models
- `wechat_qrcode`: QR code detection
    - **WeChatQRCodeDetectorExample**: **WeChat QR code** detector example that detects **QR codes** in video streams using deep learning models with super-resolution capabilities for detecting **QR codes** in low-resolution or blurry images
- `tracking`: Object tracking
- `text`: Text detection and recognition
- `plot`: Graph drawing
- `bgsegm`: Background segmentation

`Advanced` Folder

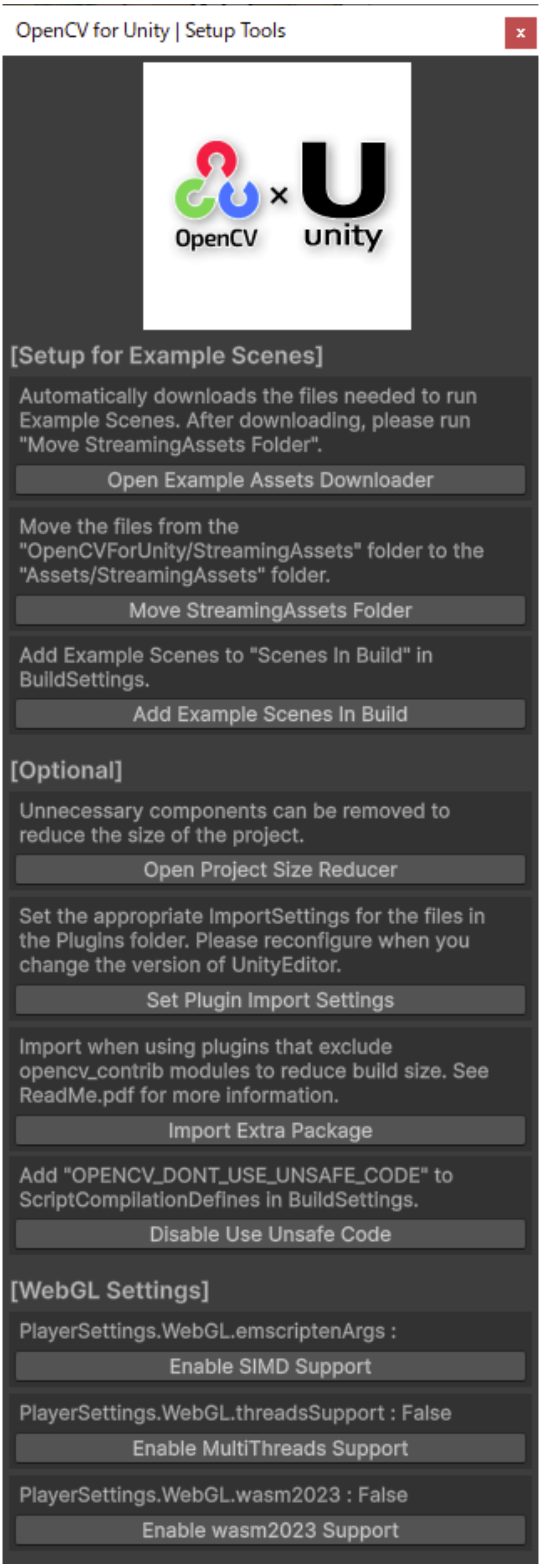
Contains **advanced implementation examples**:

- **AlphaBlendingExample**: **Alpha blending** implementation example that demonstrates compositing two images with transparency control, useful for creating overlay effects and image blending
- **BallTrackingBasedOnColorExample**: Ball tracking example using **HSV** color space segmentation to detect and track colored balls in video streams with configurable color ranges and tracking visualization
- **ComicFilterExample**: Comic-style filter implementation that applies artistic effects to images, converting photos into comic book-style illustrations using image processing techniques
- **CountFingersExample**: Finger counting implementation using color segmentation in **HSV** space, **convex hull**, and **convex defect** algorithms to detect and count fingers in real-time hand gestures
- **DocumentScannerExample**: Document scanner implementation that automatically detects document edges, applies perspective correction, and extracts documents from images, useful for digitizing receipts and business cards
- **ImageCorrectionExample**: Image correction example with adjustable contrast, brightness, gamma correction, and thresholding controls for real-time image enhancement and adjustment
- **KeyFrameGreenScreenExample**: Keyframe-based **green screen** implementation that uses reference keyframes for **chroma keying**, allowing background replacement with improved edge handling
- **MultiObjectTrackingExample**: Multi-object tracking implementation that tracks multiple objects simultaneously using advanced tracking algorithms, maintaining object identities across frames
- **MultiObjectTrackingBasedOnColorExample**: Color-based multi-object tracking implementation that tracks multiple objects by their color characteristics, useful for tracking similarly colored objects
- **PhysicalGreenScreenExample**: Physics-based **green screen** implementation using color similarity and physical constraints for more natural edge blending and background replacement effects
- **PolygonFilterExample**: Polygon filter implementation that applies geometric transformations within polygon regions, allowing selective image processing within defined areas

---

`Setup Tools` Window Description

Select the menu item `Tools > OpenCV for Unity > Open Setup Tools` to open the `Setup Tools` window.


OpenCV for Unity | Setup Tools
×
OpenCV
unity

[Setup for Example Scenes]

Automatically downloads the files needed to run Example Scenes. After downloading, please run "Move StreamingAssets Folder".

Open Example Assets Downloader

Move the files from the "OpenCVForUnity/StreamingAssets" folder to the "Assets/StreamingAssets" folder.

Move StreamingAssets Folder

Add Example Scenes to "Scenes In Build" in BuildSettings.

Add Example Scenes In Build

[Optional]

Unnecessary components can be removed to reduce the size of the project.

Set the appropriate ImportSettings for the files in the Plugins folder. Please reconfigure when you change the version of UnityEditor.

Import when using plugins that exclude opencv_contrib modules to reduce build size. See ReadMe.pdf for more information.

Add "OPENCV_DONT_USE_UNSAFE_CODE" to ScriptCompilationDefines in BuildSettings.

[WebGL Settings]

PlayerSettings.WebGL.emscriptenArgs :

PlayerSettings.WebGL.threadsSupport : False

PlayerSettings.WebGL.wasm2023 : False

This window is a collection of tools to make **OpenCV for Unity** project setup easier.

Each section has a specific role and is structured as follows.

Setup for Example Scenes

This section contains tools for preparing and setting up files necessary to run Example Scenes.

- `Open Example Assets Downloader`
  Opens the `Example Assets Downloader` window that automatically downloads files necessary to run Example Scenes. For details, please see Example Assets Downloader Window Description.

  > After downloading, please execute the next step `Move StreamingAssets Folder`.

- `Move StreamingAssets Folder`
  Moves downloaded files from the `Assets/OpenCVForUnity/StreamingAssets` folder to the `Assets/StreamingAssets` folder.
- `Add Example Scenes In Build`
  Automatically adds Example Scenes to `Scenes In Build` in `Build Settings`.

Optional

This section contains convenient tools for optional use, such as project size reduction and importing `Extra` packages.

- `Open Project Size Reducer`
  Opens the `Project Size Reducer` window that removes unnecessary components and reduces project size. For details, please see Project Size Reducer Window Description.
- `Set Plugin Import Settings`
  Sets import settings for files in the `Plugins` folder appropriately in bulk.

  > Please execute when changing Unity editor version or settings.

- `Import Extra Package`
  Imports additional packages necessary when you want to reduce build size by excluding the `opencv_contrib` module. For details, please see Tips for Each Platform.
- `Disable Use Unsafe Code`
  Adds `OPENCV_DONT_USE_UNSAFE_CODE` to `ScriptCompilationDefines` in `Build Settings`. With this setting, OpenCV for Unity's internal code will not use unsafe code.

  > Enabling unsafe code often results in faster code, so we recommend keeping it enabled.

WebGL Settings

This section is for settings to improve performance during **WebGL** builds.

- `Enable SIMD Support`
  Adds settings to enable **SIMD** (Single Instruction Multiple Data) instruction set to

`PlayerSettings.WebGL.emscriptenArgs` to improve performance.

> Please enable when aiming for significant speedup in WebGL builds.

- `Enable MultiThreads Support`

  Enables `PlayerSettings.WebGL.threadsSupport` to enable multi-threading in WebGL.

  > Please enable when aiming for speedup in WebGL builds.

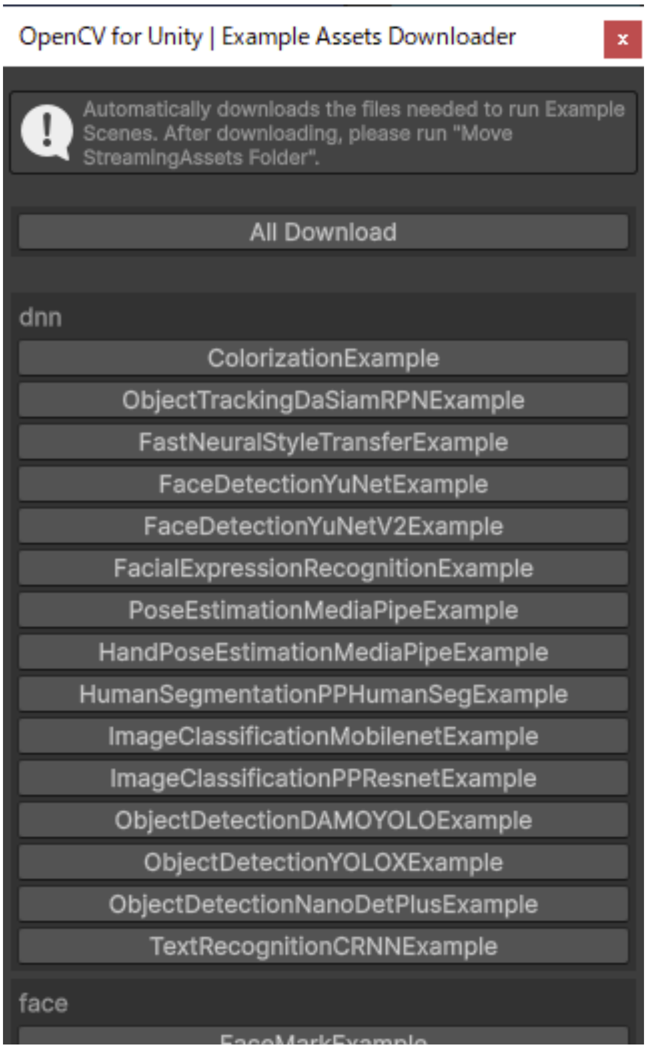
- `Enable wasm2023 Support`

  Enables `PlayerSettings.WebGL.wasm2023` to enable the latest **WebAssembly 2023** support.

  > This setting automatically enables SIMD, WebAssembly native exceptions, BigInt, WebAssembly.Table, optimized data operations, and faster data type conversions.
  > This setting is supported in Unity 2023.3 and later.
  > For details, please see Unity Official Documentation.

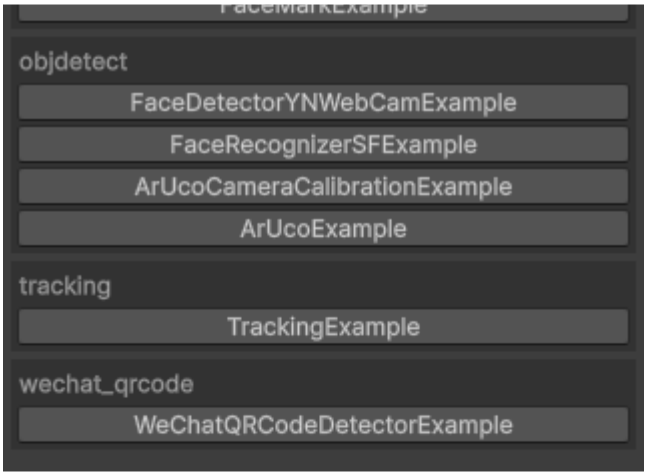
`Example Assets Downloader` Window Description

Select the menu item `Tools > OpenCV for Unity > Open Example Assets Downloader` to open the `Example Assets Downloader` window. It can also be opened from the `Setup Tools` window.



Automatically downloads the files needed to run Example Scenes. After downloading, please run "Move StreamingAssets Folder".

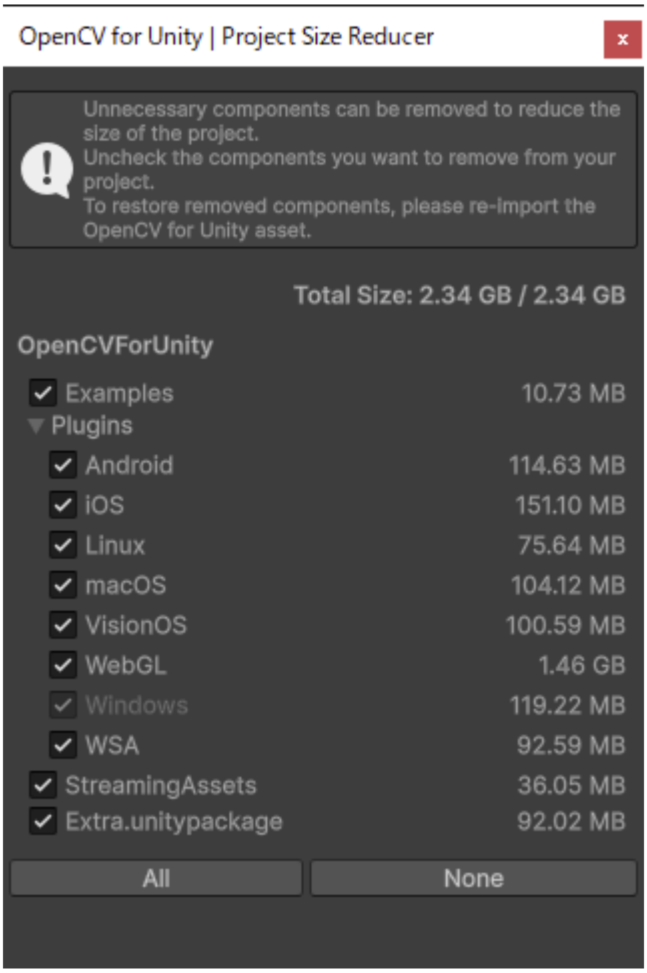
OpenCV for Unity | Example Assets Downloader
×
All Download
dnn
ColorizationExample
ObjectTrackingDaSiamRPNExample
FastNeuralStyleTransferExample
FaceDetectionYuNetExample
FaceDetectionYuNetV2Example
FacialExpressionRecognitionExample
PoseEstimationMediaPipeExample
HandPoseEstimationMediaPipeExample
HumanSegmentationPPHumanSegExample
ImageClassificationMobilenetExample
ImageClassificationPPResnetExample
ObjectDetectionDAMOYOLOExample
ObjectDetectionYOLOXExample
ObjectDetectionNanoDetPlusExample
TextRecognitionCRNNExample
face
FaceMarkExample



In this window, you can automatically download files necessary to run Example Scenes. The `All Download` button downloads files necessary for all Example Scenes. To download files necessary for specific scenes, click the respective Example Scene buttons. After downloading, please execute the `Move StreamingAssets Folder` button.

`Project Size Reducer` Window Description

Select the menu item `Tools > OpenCV for Unity > Open Project Size Reducer` to open the `Project Size Reducer` window. It can also be opened from the `Setup Tools` window.

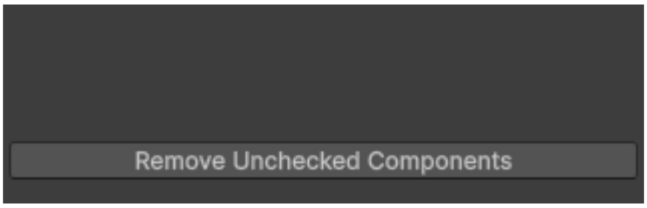

OpenCV for Unity | Project Size Reducer

Unnecessary components can be removed to reduce the size of the project.
Uncheck the components you want to remove from your project.
To restore removed components, please re-import the OpenCV for Unity asset.

Total Size: 2.34 GB / 2.34 GB

OpenCVForUnity

☑ Examples	10.73 MB
▼ Plugins	
☑ Android	114.63 MB
☑ iOS	151.10 MB
☑ Linux	75.64 MB
☑ macOS	104.12 MB
☑ VisionOS	100.59 MB
☑ WebGL	1.46 GB
☑ Windows	119.22 MB
☑ WSA	92.59 MB
☑ StreamingAssets	36.05 MB
☑ Extra.unitypackage	92.02 MB

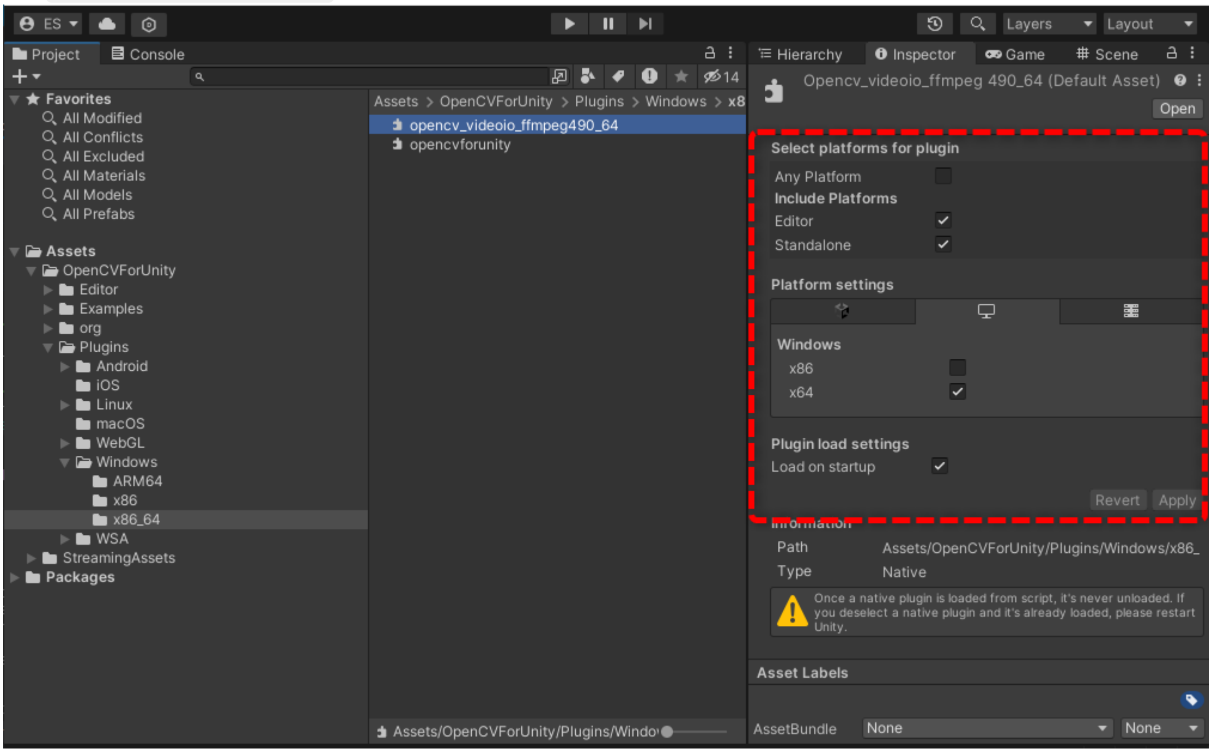


In this window, you can remove unnecessary components to reduce project size. Uncheck the components you want to remove from the project and click the `Remove Unchecked Components` button. To restore deleted components, reimport the **OpenCV for Unity** asset.

Tips for Each Platform

- **Android**
  - If you don't use the `opencv_contrib` module, you can reduce build size by using native plugin files that exclude the `opencv_contrib` module.
    a. Click the `Import Extra Package` button to import the `Assets/OpenCVForUnity/Extra` folder.
    b. Replace the `Assets/OpenCVForUnity/Plugins/Android/libs` folder with the `Assets/OpenCVForUnity/Extra/exclude_contrib/Android/libs` folder.
    c. Click the `Set Plugin Import Settings` button.
    d. Delete the `Assets/OpenCVForUnity/org/opencv_contrib` folder and `Assets/OpenCVForUnity/Examples/ContribModules` folder.
- **iOS**
  - If you don't use the `opencv_contrib` module, you can reduce build size by using native plugin files that exclude the `opencv_contrib` module.
    a. Click the `Import Extra Package` button to import the `Assets/OpenCVForUnity/Extra` folder.
    b. Replace the `Assets/OpenCVForUnity/Plugins/iOS` folder with the `Assets/OpenCVForUnity/Extra/exclude_contrib/iOS` folder.
    c. Click the `Set Plugin Import Settings` button.
    d. Delete the `Assets/OpenCVForUnity/org/opencv_contrib` folder and `Assets/OpenCVForUnity/Examples/ContribModules` folder.
- **Windows**
  - If you want to use more video formats by specifying the ffmpeg backend in `Video Capture (string filename)` or `VideoWriter` methods, setup is required.
    a. Download **OpenCV for Windows Version 4.12.0** (http://opencv.org/downloads.html).
    b. Copy `opencv/build/bin/opencv_videoio_ffmpeg412_64.dll` to the `Assets/OpenCVForUnity/Plugins/Windows/x86_64` folder.

c. Set the `Import Settings` of `opencv_videoio_ffmpeg412_64.dll` to the same settings as `opencvforunity.dll` in the same folder.



Opencv_videoio_ffmpeg 490_64 (Default Asset)

Select platforms for plugin

Any Platform □

Include Platforms

Editor ☑

Standalone ☑

Platform settings

Windows

x86 □

x64 ☑

Plugin load settings

Load on startup ☑

Information

Path Assets/OpenCVForUnity/Plugins/Windows/x86_

Type Native

Once a native plugin is loaded from script, it's never unloaded. If you deselect a native plugin and it's already loaded, please restart Unity.

Asset Labels

AssetBundle None None

You can use ffmpeg as the backend by setting `Videoio.CAP_FFMPEG` to `apiPreference` as shown in the following code.
The ffmpeg backend may allow you to specify more file formats than the default backend.

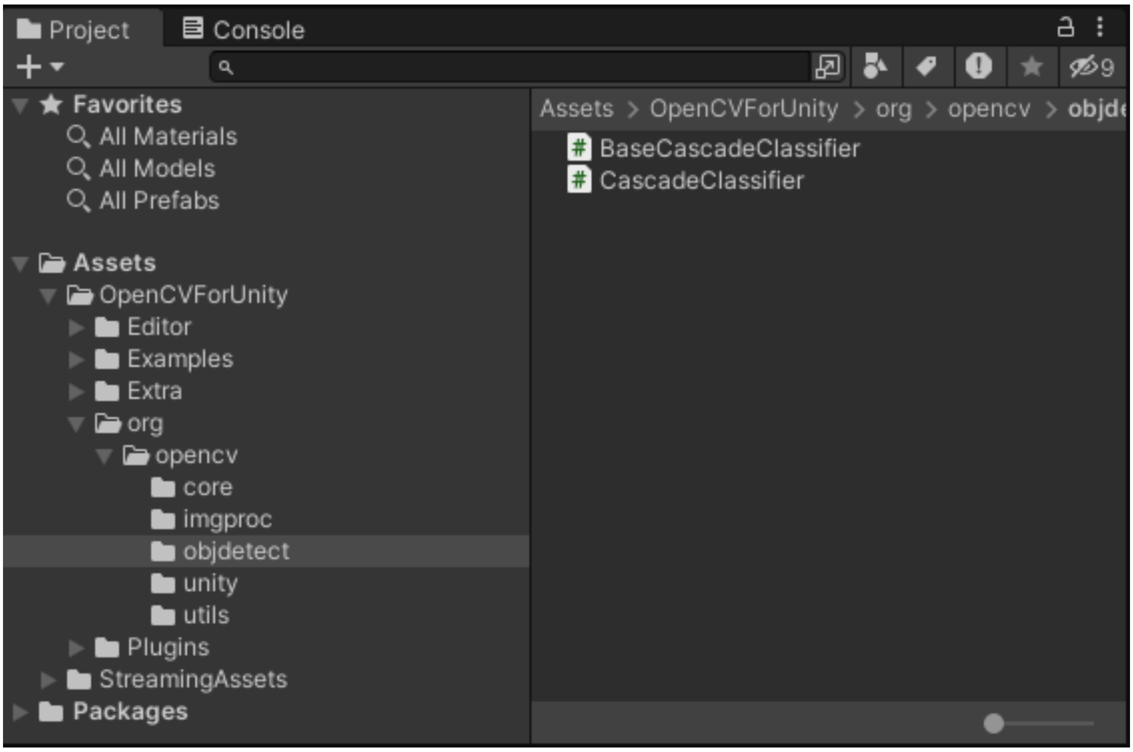
```
capture.open(Utils.getFilePath(VIDEO_FILENAME), Videoio.CAP_FFMPEG);
Debug.Log("capture.getBackendName(): " + capture.getBackendName());

writer.open(savePath, Videoio.CAP_FFMPEG, VideoWriter.fourcc('M', 'J', 'P', 'G'), 30, new Size((int)captureRectPixel.width, (int)captureRectPixel.height));
Debug.Log("writer.getBackendName(): " + writer.getBackendName());
```

- **WebGL**
  - If you want to minimize the app's build size, try the following steps.

    a. `Player Settings` settings related to build size optimization:
    `Code Optimization : Size` , `il2cppCodeGeneration : Faster (smaller) builds` , `managedStrippingLevel : High` , `DecompressionFormat : Brotli` .

    b. Remove unused code from the `Assets/OpenCVForUnity/org` folder.
    For example, the result when only the files necessary for `FaceDetectionExample` to work are left:
    `Code Optimization : Size` , `il2cppCodeGeneration : Faster (smaller) builds` , `managedStrippingLevel : High` , `DecompressionFormat : Brotli`

→ Result: **6.31 MB** (6,622,861 bytes) → Build folder only result **5.41 MB** (5,681,838 bytes)



- **visionOS (beta)**
  - On Vision Pro, even if you use `WebCamTexture`, you cannot obtain real-world camera images (pass-through images). Example Scenes using `WebCamTexture` will not work, so for applications that use camera functionality, you need to use Vision Pro-specific camera APIs.

How to use OpenCV Dynamic Link Library with customized build settings

Download **OpenCV 4.12.0** repository (git: opencv, opencv-contrib).

- **Android**
  i. Change `self.cmake_vars['ANDROID_STL'] = 'c++_shared'` to `'c++_static'` in https://github.com/opencv/opencv/blob/4.x/platforms/android/build_sdk.py.
  ii. Build the **Android SDK** with `"opencv/platforms/android/build_sdk.py"`. (`APP_STL := c++_static`)

  > ***python ../opencv/platforms/android/build_sdk.py ../build ../opencv --ndk_path=C://android-ndk --sdk_path=C://android-sdk --extra_modules_path=../opencv_contrib/modules --config=ndk-18-api-level-24.config.py --no_samples_build --no_kotlin***

  iii. Copy the output file (`native\libs\arm64-v8a\libopencv_java4.so`) to

`OpenCVForUnity\Plugins\Android\libs\arm64-v8a` folder.
Copy the output files (`native\libs\armeabi-v7a\libopencv_java4.so`) to `OpenCVForUnity\Plugins\Android\libs\armeabi-v7a` folder.
Copy the output files (`native\libs\x86_64\libopencv_java4.so`) to `OpenCVForUnity\Plugins\Android\libs\x86_64` folder.

iv. Copy `OpenCVForUnity\Extra\dll_version\Android\libs` folder to `OpenCVForUnity\Plugins\Android\libs` folder.

- **iOS**

  i. Build the **iOS framework** with `"opencv/platforms/ios/build_framework.py"` .

  > ***python opencv/platforms/ios/build_framework.py --contrib opencv_contrib --dynamic ios***

  ii. Copy the output file (`opencv2.framework`) to `OpenCVForUnity\Plugins\iOS` folder.

- **Windows**

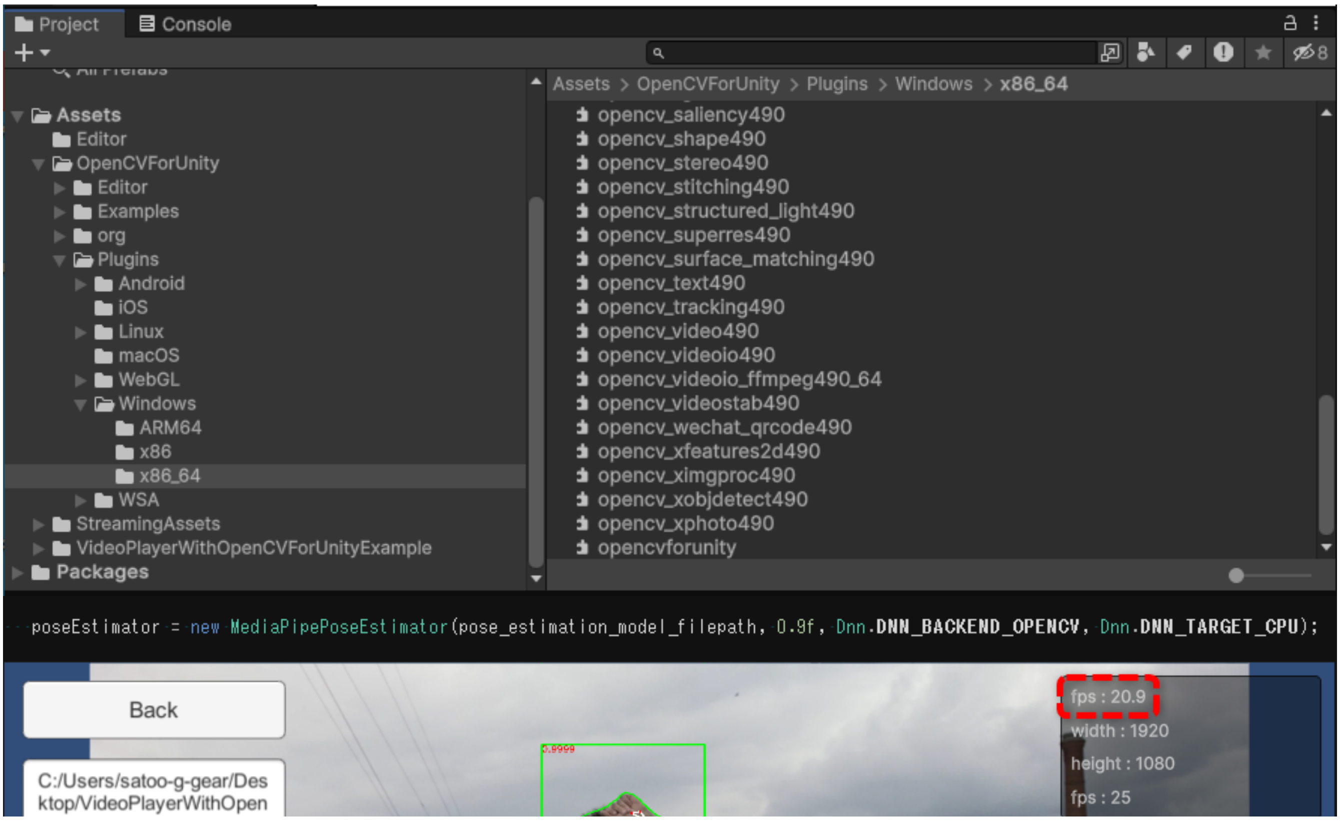
  i. Build the **OpenCV dynamic library**.

  > ***OPENCV_EXTRA_MODULES_PATH:PATH=C:/Users/xxxxx/opencv_contrib/modules BUILD_SHARED_LIBS:BOOL=ON***

  ii. Copy `install\x64\vc16\bin` to `OpenCVForUnity\Plugins\Windows\x64` folder.
  Copy `OpenCVForUnity\Extra\dll_version\Windows` to `OpenCVForUnity\Plugins\Windows` folder.

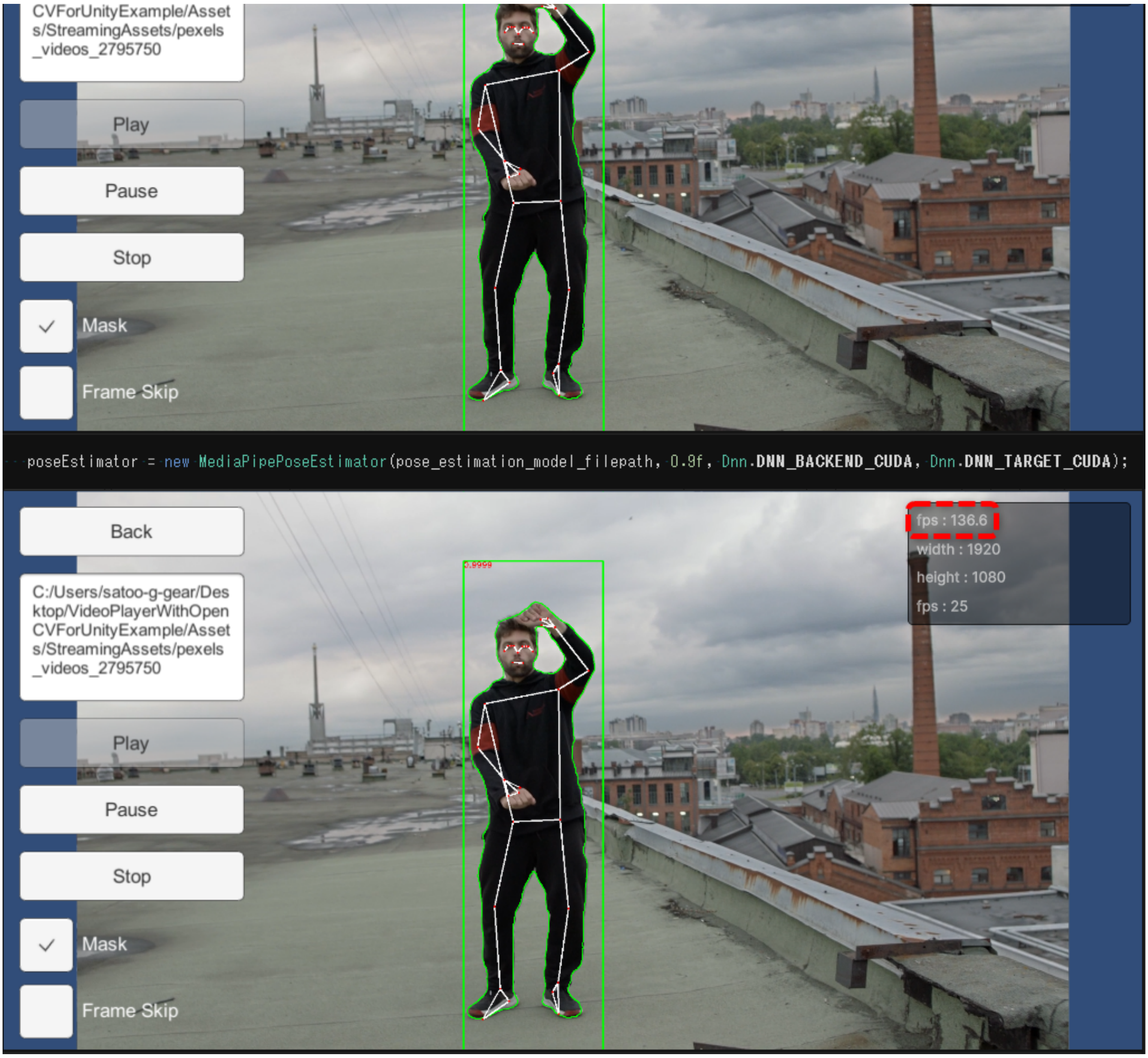
Comparison of inference speed on Windows platform using the dnn module enabled the CUDA backend.

https://enoxsoftware.com/opencvforunity/how-to-run-dnn-modules-with-cuda-backend-support-on-windows-platform/



```
poseEstimator = new MediaPipePoseEstimator(pose_estimation_model_filepath, 0.9f, Dnn.DNN_BACKEND_OPENCV, Dnn.DNN_TARGET_CPU);
```

fps : 20.9
width : 1920
height : 1080
fps : 25



CVForUnityExample/Asset
s/StreamingAssets/pexels
_videos_2795750

```
poseEstimator = new MediaPipePoseEstimator(pose_estimation_model_filepath, 0.9f, Dnn.DNN_BACKEND_CUDA, Dnn.DNN_TARGET_CUDA);
```

C:/Users/satoo-g-gear/Des
ktop/VideoPlayerWithOpen
CVForUnityExample/Asset
s/StreamingAssets/pexels
_videos_2795750

fps : 136.6
width : 1920
height : 1080
fps : 25

- **macOS**
    i. Build the **OpenCV library**.

    > ***CMAKE_OSX_ARCHITECTURESSTRING=x86_64***
    > ***OPENCV_EXTRA_MODULES_PATHPATH=/Users/xxxxx/opencv_contrib/modules***

    ii. Copy the output files (`libopencv_*.4.12.0.dylib`) to `opencvforunity.bundle\Contents\MacOS` folder.

    iii. Relink `libopencv_*.4.12.0.dylib` using `otool` and `install_name_tool` . http://phenixyu.blogspot.com/2016/09/how-to-load-dynamic-library-with-unity.html

    > //example : aruco module
    > ***otool -L libopencv_aruco.4.12.0.dylib***
    > ***install_name_tool -id @loader_path/libopencv_aruco.4.12.0.dylib libopencv_aruco.4.12.0.dylib***
    > ***install_name_tool -change @rpath/libopencv_calib3d.4.12.dylib @loader_path/libopencv_calib3d.4.12.0.dylib libopencv_aruco.4.12.0.dylib***

```
install_name_tool -change @rpath/libopencv_features2d.4.12.dylib @loader_path/libopencv_features2d.4.12.0.dylib libopencv_aruco.4.12.0.dylib
install_name_tool -change @rpath/libopencv_flann.4.12.dylib @loader_path/libopencv_flann.4.12.0.dylib libopencv_aruco.4.12.0.dylib
install_name_tool -change @rpath/libopencv_highgui.4.12.dylib @loader_path/libopencv_highgui.4.12.0.dylib libopencv_aruco.4.12.0.dylib
install_name_tool -change @rpath/libopencv_videoio.4.12.dylib @loader_path/libopencv_videoio.4.12.0.dylib libopencv_aruco.4.12.0.dylib
install_name_tool -change @rpath/libopencv_imgcodecs.4.12.dylib @loader_path/libopencv_imgcodecs.4.12.0.dylib libopencv_aruco.4.12.0.dylib
install_name_tool -change @rpath/libopencv_imgproc.4.12.dylib @loader_path/libopencv_imgproc.4.12.0.dylib libopencv_aruco.4.12.0.dylib
install_name_tool -change @rpath/libopencv_core.4.12.dylib @loader_path/libopencv_core.4.12.0.dylib libopencv_aruco.4.12.0.dylib
```

- **Linux**
  1. Build the **OpenCV library**.
  2. Rename output files (`libopencv_xxxxx.so.4.12.0`).

     ```
     sudo apt-get install rpl
     sed -i -e 's/.so.412/412.so/g' ./libopencv.so.4.12.0*
     rename "s/.so.4.12.0/412.so/" libopencv.so.4.12.0*
     find . -type f -name '_412.so' -print -exec patchelf --set-rpath '$ORIGIN' {} ;*
     ```

  3. Copy `libopencv_xxxxx_412.so` to `OpenCVForUnity\Plugins\Linux\x86_64` folder.
- **UWP**
  1. Build the **OpenCV library**.

     ```
     cd C:/Users/satoo/Desktop/opencv/platforms/winrt
     setup_winrt.bat "WS" "10.0" "x64
     ```

  2. Copy `install/WS/10.0/ARM/ARM/vc16/bin` folder to `Assets/OpenCVForUnity/Plugins/WSA/UWP/ARM` folder. Copy `install/WS/10.0/x64/x64/vc16/bin` folder to `Assets/OpenCVForUnity/Plugins/WSA/UWP/x64` folder. Copy `install/WS/10.0/x86/x86/vc16/bin` folder to `Assets/OpenCVForUnity/Plugins/WSA/UWP/x86` folder.

❓ Q & A

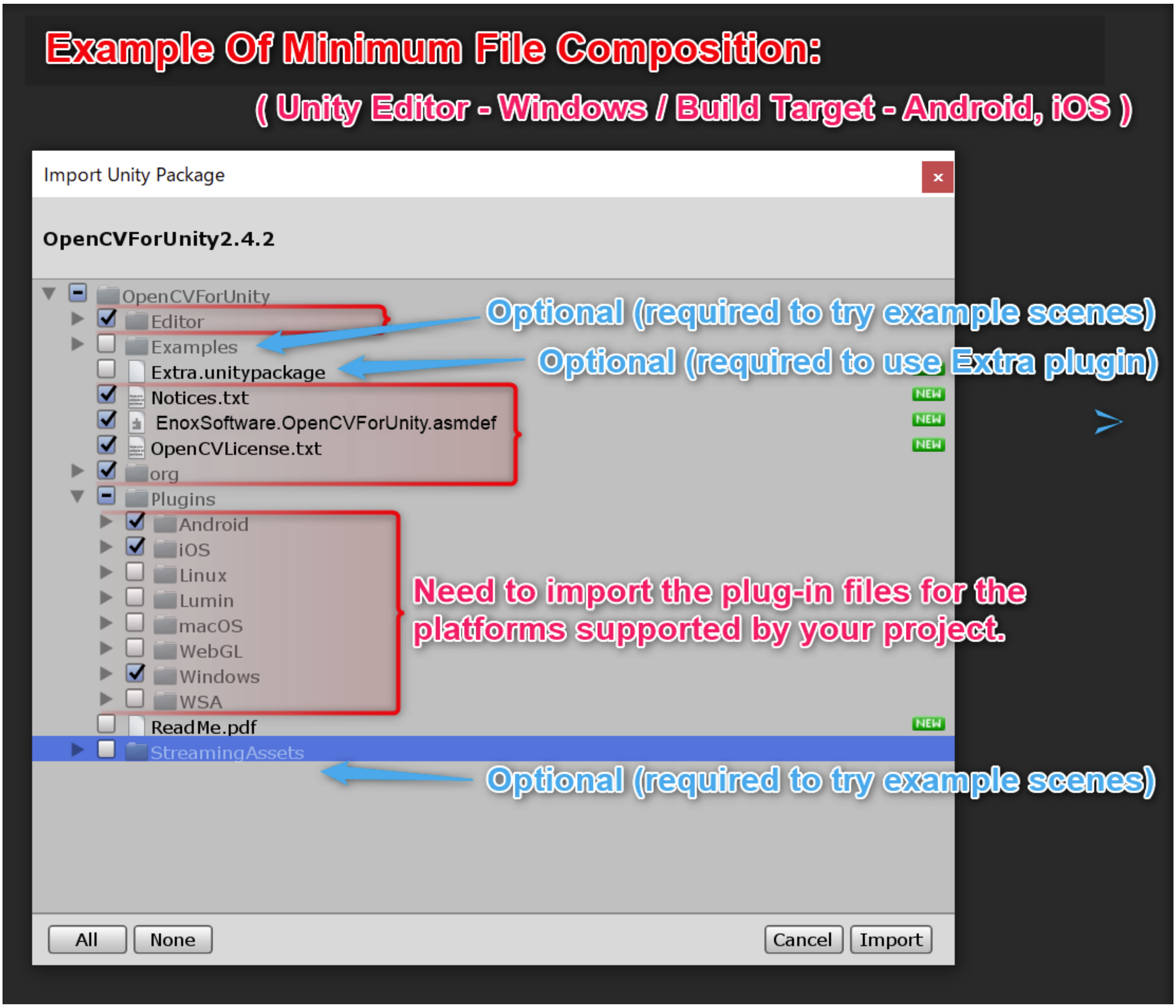
Q1. The asset package size is large. Is there a way to reduce

it?

A1. Using the `Project Size Reducer`, you can easily reduce unnecessary files in the `Assets/OpenCVForUnity` folder. Particularly, by removing plugin files for platforms not planned to be supported in your development project, you can significantly reduce the project size. For details, please see Example Assets Downloader Window Description.

Q2. What is the minimum file configuration required for the asset to work?

A2. You don't need to import all files for the asset to work. If you don't need to try Example Scenes, the minimum file configuration required is as follows.



Example Of Minimum File Composition:

(Unity Editor - Windows / Build Target - Android, iOS)

Import Unity Package

OpenCVForUnity2.4.2

```
▼ ⊟ OpenCVForUnity
  ▶ ☑ Editor
  ▶ ☐ Examples
    ☐ Extra.unitypackage
    ☑ Notices.txt                              NEW
    ☑ EnoxSoftware.OpenCVForUnity.asmdef       NEW
    ☑ OpenCVLicense.txt                        NEW
  ▶ ☑ org
  ▼ ⊟ Plugins
    ▶ ☑ Android
    ▶ ☑ iOS
    ▶ ☐ Linux
    ▶ ☐ Lumin
    ▶ ☐ macOS
    ▶ ☐ WebGL
    ▶ ☑ Windows
    ▶ ☐ WSA
    ☐ ReadMe.pdf                               NEW
  ▶ ☐ StreamingAssets
```

Optional (required to try example scenes)

Optional (required to use Extra plugin)

Need to import the plug-in files for the platforms supported by your project.

Optional (required to try example scenes)

Q3. How can I learn the details of OpenCV methods and arguments?

A3. For details on method arguments, please refer to OpenCV Official Documentation and OpenCV Tutorials.

Q4. How can I convert `Mat` class operators defined in C++?

A4. Regarding the conversion method of `Mat` class operators defined in **C++**. For details, please see this page. (Way to translation of Mat class operators defined in C++)

Q5. When running Example Scenes, `DllNotFoundException: opencvforunity` appears in the console.

A5. It seems the plugin is not loaded correctly. Please check the setup procedure.

Q6. When running Example Scenes, `ArgumentException: The output Mat object has to be of the same` appears in the console.

A6. After plugin setup, restarting the **Unity Editor** may make the plugin work properly.

Q7. When running Example Scenes, `Level 'Texture2DtoMatExample' (-1) could not be loaded because` appears in the console.

A7. Click the `Add Example Scenes in Build` button in the `Setup Tools` window to add all Example Scene files in the `Examples` folder to `Scenes In Build` in `Build Settings`.

Q8. How can I use SIFT and SURF algorithms?

A8. The native libraries included in **OpenCV for Unity** are built with the `OPENCV_ENABLE_NONFREE` flag disabled. To use **SIFT** and **SURF** algorithms, please rebuild the OpenCV library with `OPENCV_ENABLE_NONFREE` enabled. For details, please see How to use OpenCV Dynamic Link Library with customized build settings.

Q9. How to catch error codes that occur on the native side of OpenCV (CVException handling)

A9. To display error codes from the native side of OpenCV, wrap your code with `Utils.setDebugMode(true);` and `Utils.setDebugMode(false);`.

> ***Utils.setDebugMode(true);***
> // your OpenCV calls here

```
Utils.setDebugMode(false);
```

For details, please see this page. (How to catch native OpenCV's errors code (CVException handling))

Version Changes

3.0.1 [Common] Changed the minimum supported version to Unity2021.3.45f2. [Common] Added BallTrackingBasedOnColorExample, HumanPoseStreamEstimationMediaPipeExample, FaceIdentificationEstimatorExample.
3.0.0 [Common] Updated OpenCV to version 4.12.0. [Common] Updated FpsMonitor to version 1.0.4. [visionOS] Updated platform support for visionOS on Unity 2022.3.18f1 and later (beta). [Android] Updated native library libopencvforunity.so for Android to be compatible with 16KB page size. [Common] Added SafeDrawFrameAxes method to OpenCVARUtils. [Common] Added GetFilePathCoroutine, GetFilePathAsync, and GetFilePathTaskAsync methods to OpenCVEnv. [Common] Added IsDebugMode and IsThrowException methods to OpenCVDebug. [Common] Added TextureToMatAsync, RenderTextureToMatAsync, and MatToRenderTextureAsync methods to OpenCVMatUtils. [Common] Added OpenCVForUnityProjectSizeReducerWindow in EditorWindow. [Common] Added a feature to skip unnecessary downloads in OpenCVForUnityExampleAssetsDownloaderWindow. [Common] Added ImshowDNNBlob method to DebugMat. [Common] Added WeChatQRCodeDetectorImageExample and WeChatQRCodeDetectorExample. [Common] Added HomographyToFindAKnownObjectExample. [Common] Added ObjectDetectionDAMOYOLOExample. [Common] Removed FaceDetectionResnetSSDExample due to incompatibility with the latest OpenCV. [Common] Changed namespaces under org/unity from UnityUtils to UnityIntegration, split Utils class into function-specific classes, and marked old classes as deprecated. [Common] Changed Operator in Mat class to deprecated.
2.6.6 [Common] Changed The FpsMonitor display system from IMGUI to uGUI. [Common] Added support for the new Input System (UnityEngine.InputSystem).
2.6.5 [Common] Add ARHelper component class. [Common] Updated ArUcoExample, ArUcoImageExample, HandPoseEstimationMediaPipeExample and PostEstimationMediaPipeExample using the ARHelper class. [Common] Refactored AsyncGPUReadback2MatHelper, Image2MatHelper, UnityVideoPlayer2MatHelper, VideoCapture2MatHelper, WebCamTexture2MatAsyncGPUHelper and WebCamTexture2MatHelper. [Common] Added method to convert OpenCV basic classes to Unity basic structs.
2.6.4 [Common] Added various data access methods to the Mat class, including ptr(), at(), AsSpan(), and AsSpanRowRange(). [Common] Updated get() and set() methods in the Mat class

to support Span and generics, and updated MatUtils.copyFromMat() and MatUtils.copyToMat() to support Span. [Common] Added structs and ValueTuples corresponding to the data formats of basic OpenCV classes, and created overloads for methods that use these basic classes as arguments, allowing the use of structs and ValueTuples instead. This update simplifies code, enables more efficient memory usage, and improves data access speed. [Common] Added Utils.getFilePathAsyncTask() and Utils.getMultipleFilePathsAsyncTask() methods. It is an asynchronous Task return version of the existing Utils.getFilePathsAsync() method. It can be seamlessly integrated with other asynchronous code. [Common] Added Utils.texture2DToMatRaw() and Utils.matToTexture2DRaw() methods. [Common] Added methods for conversion between Mat and RenderTexture using ComputeShader (Utils.matToRenderTexture(), Utils.renderTextureToMat()). [Common] Added the WebCamTexture2MatAsyncGPUHelper class. [Common] Updated the DebugMatUtils class to support displaying Texture2D and RenderTexture. [Common] Added a face blurring feature to FaceDetectorYNExample. [iOS] Fixed an issue where AddToEmbeddedBinaries was processed redundantly with each incremental build.
2.6.3 [Common]Fixed CountFingersExample. [Windows][UWP]Fixed native library build settings for ARM64 architecture.
2.6.2 [Common]Changed the minimum supported version to Unity2021.3.35f1. [Common]Added AsyncGPUReadback2MatHelper. [Common]Updated MultiSource2MatHelperExample. [Common]Separated the examples using the Built-in Render Pipeline and Scriptable Render Pipeline. [Common]Fixed a memory leak in Converters.cs.
2.6.1 [Common]Updated to OpenCV4.10.0. [Common]Added MultiSource2MatHelperExample.
2.6.0 [iOS] Added separate plugin files for iOS for devices and simulators. [WebGL] Added plugin files with only simd enabled.
2.5.9 [Common]Added PoseSkeletonVisualizer to HandPoseEstimationMediaPipeExample and PoseEstimationMediaPipeExample. [Common]Changed to use unsafe code by default. [Common]Optimized the amount of memory allocation, mainly in the Convertor class.
2.5.8 [Common]Updated to OpenCV4.9.0. [Common]Added DebugMatUtilsExample and MultiObjectTrackingExample. [Common]Updated VideoWriterExample, VideoWriterAsyncExample, TextRecognitionCRNNExample, TextRecognitionCRNNWebCamExample and TrackingExample. [Common]Changed the minimum supported version to Unity2020.3.48f1. [WebGL] Added support for "WebAssembly 2023". [iOS] Changed "Target minimum iOS Version" to 11.0. [Common]Removed TrackerGOTURN from TrackingExample and added TrackerVit.
2.5.7 [Common]Added FeatureMatchingExample. [WebGL] Added a plugin file with threads and simd enabled for the WebGL platform. This update removes support for the WebGL platform in Unity 2021.1 and below. (Select MenuItem[Tools/OpenCV for Unity/Open Setup Tools/WebGL Settings])
2.5.6 [Common]Added PoseEstimationMediaPipeExample. [Common]Updated VideoWriterExample, VideoWriterAsyncExample (support URP and HDRP).
2.5.5 [Common]Updated to OpenCV4.8.0. [Common]Added ImageCorrectionExample,

YuNetFaceDetectionExample and FaceDetectionYuNetV2Example. [Common]Updated HumanSegmentationExample, BarcodeDetectorExample. [Windows] Added Support for ARM64. [WebGL] Added Unity2023.2 or later support.

2.5.4 [Common]Added VideoWriterAsyncExample. [Common]Updated SimpleBlobExample, HumanSegmentationExample and HandPoseEstimationExample.

2.5.3 [Common]Added HandPoseEstimationExample and FacialExpressionRecognitionExample.

2.5.2 [Common]Added YOLOv4ObjectDetectionExample, YOLOv7ObjectDetectionExample, YOLOXObjectDetectionExample and NanoDetPlusObjectDetectionExample. [Common]Updated HandPoseEstimationExample, ArUcoExample, ArUcoWebCamExample and ArUcoCameraCalibrationExample.

2.5.1 [Common]Updated to OpenCV4.7.0. [Common]Added ImageClassificationMobilenetExample and HandPoseEstimationExample. [Common]Added TrackerNano to TrackingExample. [Lumin] Removed Lumin platform support (for MagicLeapOne). [Common]Add a button to SetupTools to automatically add scenes under the "Examples" folder to "Scenes In Build".

2.5.0 [Common]Added TransformECCExample, HumanSegmentationExample and ImageClassificationPPResnetExample. [Common]Update TextOCRWebCamExample. [Common]Changed the setup procedure to use the SetupToolsWindow. [Common]Change the namespace under "OpenCVForUnity/Editor" folder from "OpenCVForUnity" to "OpenCVForUnity.Editor". [Common]Added the ExampleAssetsDownloaderWindow that automatically downloads the necessary files to Examples. [Common]Added "OpenCVForUnity" folder under "StreamingAssets" folder. [Common]Added function to automatically move the StreamingAssets folder. [WebGL] Added Unity2022.2 or later support.

2.4.9 [Common]Added LegacyTrackingExample and LightweightPoseEstimationWebCamExample. [Common]Renamed "WebCamTextureExample" to "WebCamExample". [WebGL] Fixed plugins for the WebGL platform.

2.4.8 [Common]Updated to OpenCV4.6.0. [Common]Added KNNExample, PhysicalGreenScreenExample and LightweightPoseEstimationExample. [Common]Update VideoCaptureToMatHelper, GreenScreenExample and QRCodeDetectorExample.

2.4.7 [Common]Updated to OpenCV4.5.5. [Common]Added FaceDetectorYNWebCamTextureExample, FaceRecognizerSFExample and QRCodeEncoderExample.

2.4.6 [Common]Updated to OpenCV4.5.4. [Android] Added Support for ChromeOS (x86 and x86_64 architectures).

2.4.5 [Common]Updated to OpenCV4.5.3. [Common]Added BarcodeDetectorExample and BarcodeDetectorWebCamTextureExample.

2.4.4 [Common]Updated to OpenCV4.5.2. [Common]Added VideoCaptureCameraInputExample and BackgroundSubtractorComparisonExample. [Common]Updated TrackingExample.

2.4.3 [Common]Added a downloader script to automatically set up the Dnn module example. [WebGL] Added exclude_contrib version for build size reduction.

2.4.2 [Common]Added Assembly Definitions. [Common]Fixed LibFaceDetectionV3Example.

2.4.1 [Common]Updated to OpenCV4.5.0. [Common]Added DaSiamRPNTrackerExample.
2.4.0 [Common]Updated to OpenCV4.4.0. [Common]Added TextOCRExample. [Common]Updated YoloObjectDetectionExample (Yolo v4).
2.3.9 [Common]Updated to OpenCV4.3.0. [Common]Added LibFaceDetectionV2Example, LibFaceDetectionV3Example, ColorizationExample and DocumentScannerExample. [Common]Update ArUcoCameraCalibrationExample and WrapPerspectiveExample.
2.3.8 [Common]Updated to OpenCV4.2.0. [UWP] Added ARM64 Architecture. [WebGL] Added opencvforunity.bc with multi-threading enabled. [Common]Added FastNeuralStyleTransferExample and LibFaceDetectionExample. [Common]Added MatIndexer class and MatUtils class. [Common]Update ComicFilterExample, VideoCaptureExample, OpenPoseExample and MatBasicProcessingExample.
2.3.7 [WebGL] Fixed build errors that occur when DevelopmentBuild is enabled on the WebGL platform. [Common]Added optimization code using NativeArray class. (require PlayerSettings.allowUnsafeCode flag, "OPENCV_USE_UNSAFE_CODE" ScriptingDefineSymbol and Unity2018.2 or later.) [iOS] Fixed build errors that occur on the iOS platform with Unity2019.3 or later. [Common]Updated to WebCamTextureToMatHelper.cs v1.1.1.
2.3.6 [WebGL] Fixed "Plugins/WebGL/2018.2/opencvforunity.bc". [Common]Added multi-dimensional Mat example to MatBasicProcessingExample. [Common]Fixed ARUtils.cs.
2.3.5 [Common]Updated to OpenCV4.1.0. [Windows, Android] Added dynamic link library version.
2.3.4 [Common]Added MaskRCNNExample. [WebGL] Added Unity2019.1 or later support.
2.0.9 [WebGL] Added WebGL(beta) support.(Unity5.3 or later)
2.0.8 [Common]Improved WebCamTextureHelper class. [Common]Fixed ArUcoSample.
2.0.7 [Common]Added aruco, structured_light, xfeatures2d module. [Common]Added ArUcoSample, GrabCutSample, InpaintSample, MatchShapesSample, MSERSample.
2.0.6 [WSA] Fixed an issue where Windows App Certification Kit fails.
2.0.5 [Common]Added HOGDescriptorSample.
2.0.4 [Android] Added Support for Split Application Binary (.OBB) [Android] Removed opencvforunity.jar.
2.0.3 [Common]Added SVMSample. [Common]Fixed VideoCaptureSample and WebCamTextureAsyncDetectFaceSample. [UWP] Added OpenCVForUnityUWP_Beta2.zip.
2.0.2 [Common]Fixed CS0618 warnings: `UnityEngine.Application.LoadLevel(string)' is obsolete: ` Use SceneManager.LoadScene'.
2.0.1 [OSX] Fixed SIGILL Exception. [Common]Added Utils.setDebugMode() method. [Common]Added MatchTemplateSample, StereoBMSample, SeamlessCloneSample and WebCamTextureDetectCirclesSample. [Common]Added flipVertical flag, flapHorizontal flag and GetWebCamDevice() method to WebCamTextureToMatHelper.cs.
2.0.0 [Common]Updated to OpenCV3.1.0. [Common]Included Old Version based on "OpenCV2.4.11". [Common] Included Beta Version of Windows10 UWP Support.(This is beta version based on OpenCV3.0.0. opencv_contrib modules is not supported.)
Beta16 [iOS] Fixed libopencvforunity.a Bitcode Setting.

Beta15 [Common]Fixed WebCamTextureToMatHelper.cs.(Add didUpdateThisFrame () method)
Beta14 [Common]Fixed WebCamTextureToMatHelper.cs.(Bug of rotation convertion from WebCamTexture to Mat in Win,Mac StandAlone Build)
Beta13 [Common]Added fastTexture2DToMat() and fastMatToTexture2D(). [Common] Renewed the samples using WebCamTextureToMatHelper.(Supports all screen orientation.)
Beta12 [iOS] Fixed malloc_error that occurs in Unity5.3.1p2.
Beta11 [iOS] Enabled Jpeg format.(Added mjpeg format support in VideoCapture class)
Beta10 [iOS] Enabled Bitcode.
Beta9 [UWP] Added support for Windows10 UWP.(This is a test version. opencv_contrib modules is not supported.)
Beta8 [Common] Fix FaceRecognizerSample. [Common] Delete the method using Default parameter specifiers. [Android] Compile the library using "armabi-v7a with NEON" option.
Beta7 [Common] Add WrapPerspectiveSample, HandPoseEstimationSample.
Beta6 [iOS] Fix WebCamTexture bug of SampleScene in Unity5.2.
Beta5 [Linux] Add Linux Support. [WindowsStoreApp8.1] Support for methods using Low-level Native Plugin Interface. [Common] Rewrite SampleScene.
Beta4 [Common] Add Utils. getGraphicsDeviceType(). [Common] Add SampleScene Setup Tutorial Video for Unity5.
Beta3 [Common] Add CamShiftSample.(Object Tracking) [Common] Add OpenCVForUnityMenuItem.cs.(This script set plugin import settings automatically from MenuItem.)
Beta2 [iOS] Fix problem when working with Metaio(UnityAppController problem). [Common]Add [System.Serializable] to basic class. [Common] change folder name from "OpenCVForUnity/OpenCVForUnity_Editor/" to "OpenCVForUnity/Editor/". [iOS] Move "OpenCVForUnity/OpenCVForUnity_Editor/opencv2.framework" to "OpenCVForUnity/Plugins/iOS" folder.