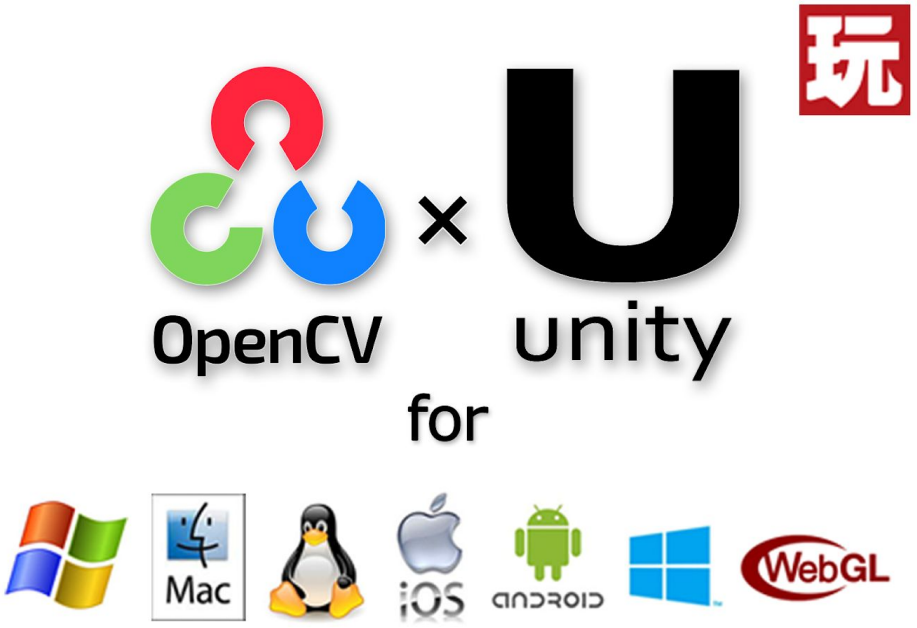
OpenCV for Unity 2.4.2



WebGL support
iOS & **Android** support
Windows10 UWP support
Lumin (MagicLeap) support
Win & **Mac** & **Linux** Standalone support
Support for preview in the **Editor**
Work with Unity Free & Pro

System Requirements
Build Win Standalone & Preview Editor : Windows8 or later
Build Mac Standalone & Preview Editor : OSX 10.11 or later
Build Linux Standalone & Preview Editor : Ubuntu16.04 or later
Build Android : API level 21 or later
Build iOS : iOS Version 9.0 or later

OpenCV for Unity is an Assets Plugin for using **OpenCV** from within **Unity**.

- Since this package is **a clone of OpenCV Java**, you are able to use the same API as OpenCV Java 4.5.0(git: opencv, opencv-contrib).
- You can image processing in **real-time** by using the **WebCamTexture** capabilities of Unity. **(real-time face detection works smoothly on iPhone 5)**
- Provides a method to interconversion of **Unity's Texture2D** and **OpenCV's Mat**.
- **IDisposable** is implemented in many classes.You can manage the resources with the

"**using**" statement.
- **Examples of integration with other publisher assets** are available.（e.g. PlayMaker, NatDevice, NatCorder）

Official Site | ExampleCode | Android Demo | WebGL Demo | Tutorial & Demo Video | Forum | API Reference | Support Modules

Please refer to OpenCV official document for the details of the argument of the method.

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

Example code using OpenCV for Unity is available.
- MarkerBased AR Example
- MarkerLess AR Example
- FaceTracker Example
- FaceSwapper Example
- FaceMask Example
- RealTime FaceRecognition Example
- GoogleVR with OpenCVForUnity Example
- Vuforia with OpenCV for Unity Example
- Kinect with OpenCV for Unity Example
- AVPro with OpenCV for Unity Example
- HoloLens with OpenCV for Unity Example
- PlayMakerActions for OpenCVforUnity
- NatDevice with OpenCVForUnity Example
- NatCorder with OpenCVForUnity Example
- MagicLeap with OpenCVForUnity Example

Version changes

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 WegGL 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.

2.3.3 [Common]Updated to OpenCV4.0.0. [Common]Re-assined namespace as was classified by module names. [Common]Updated to WebCamTextureToMatHelper.cs v1.1.0. [Common]Updated to ImageOptimizationHelper v1.1.0 [Common] Added Utils_GetFilePathExample, FaceMarkExample and QRCodeDetectorExample.

2.3.2 [macOS]Removed 32bit architecture(i386) from opencvforuntiy.bundle.

2.3.1 [Common]Updated to OpenCV3.4.2. [Android,UWP]Fixed Utils.setDebugMode() method on the IL2CPP backend. [Common]Added DnnObjectDetectionExample and DnnObjectDetectionWebCamTextureExample.

2.3.0 [iOS]Added a function to automatically remove the simulator architecture(i386,x86_64) at build time. [Common] Improved OpenCVForUnityMenuItem.setPluginImportSettings() method.

2.2.9 [Linux]Simplified the Linux platform setup procedure. [Common]Added support for Utils. setDebugMode() method on all platforms. [Common]Updated to WebCamTextureToMatHelper.cs v1.0.9. [Common]Added MatToTextureInRenderThreadExample and AlphaBlendingExample.

2.2.8 [Common]Updated to WebCamTextureToMatHelper.cs v1.0.7. [Common]Added MatBasicProcessingExample. [Common]Fixed WebCamTextureToMatExample, WebCamTextureToMatHelperExample, ArUcoExample. [Common]Added flip flag to Utils.fastMatToTexture2D() method and Utils.fastTexture2DToMat() method. [Common]Added throwException flag to Utils.setDebugMode() method.

2.2.7 [Common]Updated to OpenCV3.4.1. [Common]Added OpenPoseExample(The model file is not included in this asset.), KalmanFilterExample, ArUcoCameraCalibrationExample. [Common]Fixed VideoWriterExample, VideoCaptureExample, ImwriteScreenCaptureExample, CamShiftExample, TrackingExample, HandPoseEstimationExample, ArUcoCreateMarkerExample, ArUcoExample, ArUcoWebCamTextureExample. [Common] Updated to WebCamTextureToMatHelper.cs v1.0.6.

2.2.6 [Android]Added arm64-v8a Architecture. [Common]Added ImwriteScreenCaptureExample.

2.2.5 [Common] Updated to WebCamTextureToMatHelper.cs v1.0.4. [Common] Fixed MobileNetSSDExample and MobileNetSSDWebCamTextureExample.

2.2.4 [Common]Updated to OpenCV3.3.1. [Common]Added ResnetSSDFaceDetectionExample, YoloObjectDetectionExample, YoloObjectDetectionWebCamTextureExample.

2.2.3 [Common]Updated to WebCamTextureToMatHelper.cs v1.0.3. [iOS] opencv2.framework is changed from static framework to embededd framework. (Target minimum iOS Version must be set to 8.0 or higher.)

2.2.2 [Common]Added TextRecognitionExample.

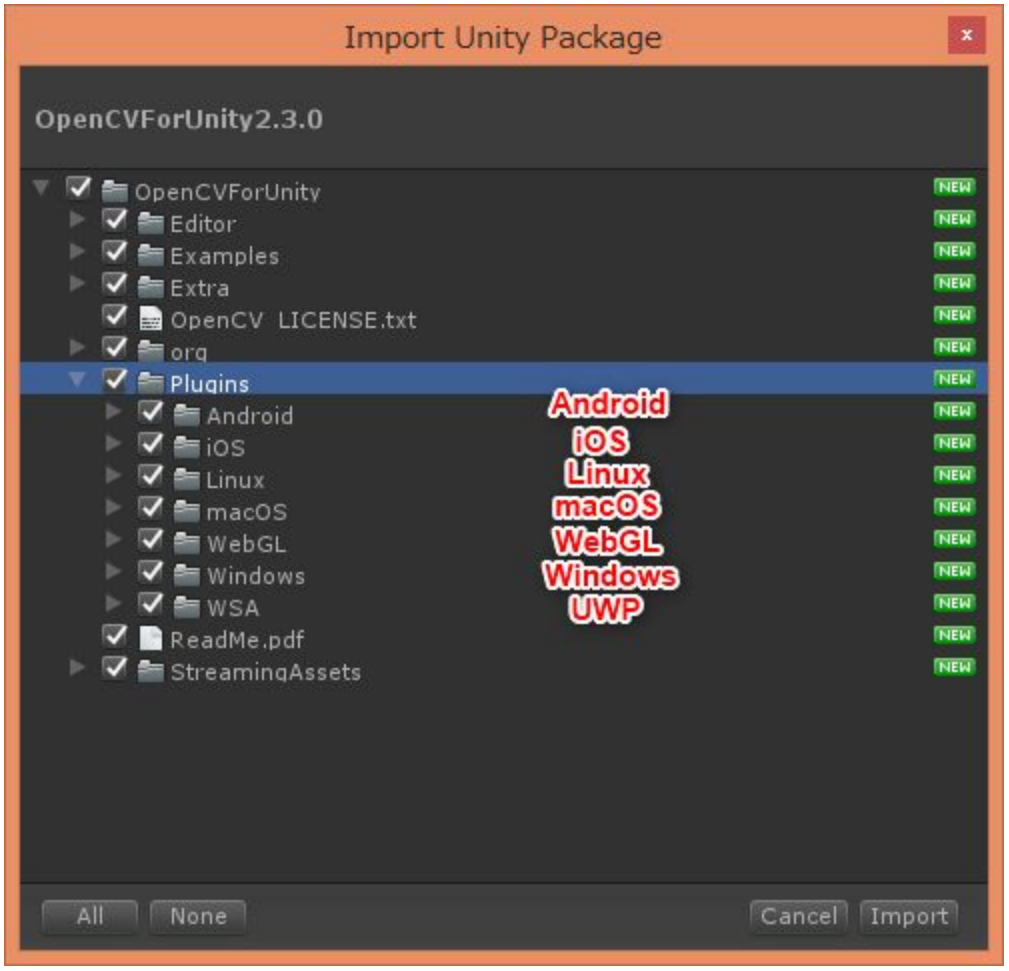
2.2.1 [Common]Updated to OpenCV3.3.0. [Common]Added dnn module.(win,mac,ios,android platform) [Common]Added img_hash, reg, text module.(all platform) [Common]Added MobileNetSSDExample, MobileNetSSDWebCamTextureExample, TensorFlowWebCamTextureExample,

ThinPlateSplineShapeTransformerExample, TextDetectionExample, VideoWriterExample. [Common]WindowsStoreApp8.1 & WindowsPhone8.1 support have been deprecated.
2.2.0 [Common]Updated WebCamTextureToMatHelper.cs v1.0.2 [Common]Improved Utils.getFilePathAsync().
2.1.9 [WebGL]Fixed Utils.getFilePathAsync() method.
2.1.8 [Common]Added PCAExample. [Common]Updated WebCamTextureToMatHelper.cs and OptimizationWebCamTextureToMatHelper.cs(Changed several method names.).
2.1.7 [Common]Improved Utils.getFilePath() and Utils.getFilePathAsync(). [Common]Improved WebCamTextureAsyncDetectFaceExample.cs. [Common] Fixed the const value of Calib3d class.
2.1.6 [Common]Fixed fastMatToTexture2D() method.
2.1.5 [Common]Updated to OpenCV3.2.0. [Common]Added fuzzy, phase_unwrapping, saliency, shape, tracking module. [Common]Added TrackingSample. [iOS]Added ios_exclude_contrib.zip for build size reduction. [Android]Added android_exclude_contrib.zip for build size reduction.
2.1.4 [Common]Changed the scene name.("Sample" to "Example") [Common]Fixed ArUcoTexture2DExample and ArUcoWebCamTextureExample. [Common]Added ConnectedComponentsExample. [Common]Added GreenScreenExample.
2.1.3 [UWP]Added OpenCVForUnityUWP_Beta3.zip.
2.1.2 [Common]Fixed WebCamTextureToMatHelper.cs.(flipVertical and flipHorizontal flag)
2.1.1 [Common]Fixed OpenCVForUnityMenuItem.cs.(No valid name for platform: 11 Error) [Common]Added Utils.textureToTexture2D() method. [Common]Added Mat class operators. [Common]Added PolygonFilterSample.
2.1.0 [Common]Fixed WebCamTextureToMatHelper class. [Common]Added Utils.getVersion(). [Common]Fixed Utils.getFilePathAsync().
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]

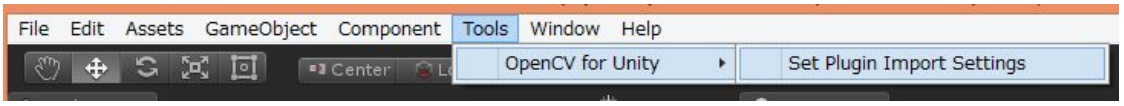
Renewed the samples using WebCamTextureToMatHelper.(Supports all screen orientation.)
Beta12 [iOS]Fixed malloc_error that occurs in Unity5.3.1p2.
Beta11 [iOS]Enabled Jpeg format.(Added mjpeg format support in VideoCapture class)
Beta10 [iOS]Enabled Bitcode.
Beta9 [UWP]Added support for Windows10 UWP.(This 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.

Quick setup procedure to run the example scenes (Setup Tutorial Video)

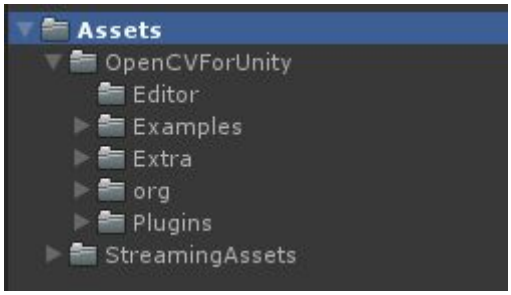
1. Import the OpenCVForUnity.package. You do not need to import plug-in files for platforms not supported by your project. **If there is a previous version of OpenCVForUnity in the project, please delete the OpenCVForUnity folder first and then import the new version.**



2. Select MenuItem[Tools/OpenCV for Unity/Set Plugin Import Settings].



3. Move “OpenCVForUnity/StreamingAssets/” folder to “Assets/” folder.



- Additional Setup for **ColorizationExample** :
  Download

https://github.com/richzhang/colorization/raw/caffe/demo/imgs/ansel_adams3.jpg. Copy ansel_adams3.jpg to “Assets/StreamingAssets/dnn/” folder. Download http://eecs.berkeley.edu/~rich.zhang/projects/2016_colorization/files/demo_v2/colorization_release_v2.caffemodel. Copy colorization_release_v2.caffemodel to “Assets/StreamingAssets/dnn/” folder. Download https://github.com/richzhang/colorization/raw/caffe/models/colorization_deploy_v2.prototxt. Copy colorization_deploy_v2.prototxt to “Assets/StreamingAssets/dnn/” folder.

- Additional Setup for **DaSiamRPNTrackerExample** :
  Download https://www.dropbox.com/s/rr1lk9355vzolqv/dasiamrpn_model.onnx?dl=0. Copy dasiamrpn_model.onnx to “Assets/StreamingAssets/dnn/” folder. Download https://www.dropbox.com/s/999cqx5zrfi7w4p/dasiamrpn_kernel_r1.onnx?dl=0. Copy dasiamrpn_kernel_r1.onnx to “Assets/StreamingAssets/dnn/” folder. Download https://www.dropbox.com/s/qvmtszx5h339a0w/dasiamrpn_kernel_cls1.onnx?dl=0. Copy dasiamrpn_kernel_cls1.onnx to “Assets/StreamingAssets/dnn/” folder.

- Additional Setup for **FastNeuralStyleTransferExample** :
  Download https://cs.stanford.edu/people/jcjohns/fast-neural-style/models/instance_norm/mosaic.t7. Copy mosaic.t7 to “Assets/StreamingAssets/dnn/” folder.

- Additional Setup for **LibFaceDetectionV2Example** :
  Download https://github.com/ShiqiYu/libfacedetection/raw/master/models/caffe/yufacedetectnet-open-v2.caffemodel. Copy yufacedetectnet-open-v2.caffemodel to “Assets/StreamingAssets/dnn/” folder. Download https://github.com/ShiqiYu/libfacedetection/raw/master/models/caffe/yufacedetectnet-open-v2.prototxt. Copy yufacedetectnet-open-v2.prototxt to “Assets/StreamingAssets/dnn/” folder.

- Additional Setup for **LibFaceDetectionV3Example** :
  Download https://github.com/ShiqiYu/libfacedetection.train/raw/master/tasks/task1/onnx/YuFaceDetectNet_320.onnx. Copy YuFaceDetectNet_320.onnx to “Assets/StreamingAssets/dnn/” folder.

- Additional Setup for **MaskRCNNExample** :
  Download https://github.com/chuanqi305/MobileNet-SSD/raw/master/images/004545.jpg. Copy 004545.jpg to “Assets/StreamingAssets/dnn/” folder. Download and unzip http://download.tensorflow.org/models/object_detection/mask_rcnn_inception_v2_coco_2018_01_28.tar.gz. Rename frozen_inference_graph.pb to mask_rcnn_inception_v2_coco_2018_01_28.pb. Copy mask_rcnn_inception_v2_coco_2018_01_28.pb to “Assets/StreamingAssets/dnn/” folder. Download https://github.com/opencv/opencv_extra/raw/master/testdata/dnn/mask_rcnn_inception_v2_coco_2018_01_28.pbtxt. Copy mask_rcnn_inception_v2_coco_2018_01_28.pbtxt to

"Assets/StreamingAssets/dnn/" folder. Download https://github.com/amikelive/coco-labels/raw/master/coco-labels-paper.txt. Copy mscoco_labels.names to "Assets/StreamingAssets/dnn/" folder.

- Additional Setup for **MobileNetSSDExample** or MobileNetSSDWebCamTextureExample :
  Download https://github.com/chuanqi305/MobileNet-SSD/raw/master/images/004545.jpg. Copy 004545.jpg to "Assets/StreamingAssets/dnn/" folder. Download https://drive.google.com/file/d/0B3gersZ2cHIxRm5PMWRoTkdHdHc/view. Copy MobileNetSSD_deploy.caffemodel to "Assets/StreamingAssets/dnn/" folder.
  Download https://github.com/chuanqi305/MobileNet-SSD/raw/f5d072ccc7e3dcddaa830e9805da4bf1000b2836/MobileNetSSD_deploy.prototxt. Copy MobileNetSSD_deploy.prototxt to "Assets/StreamingAssets/dnn/" folder.

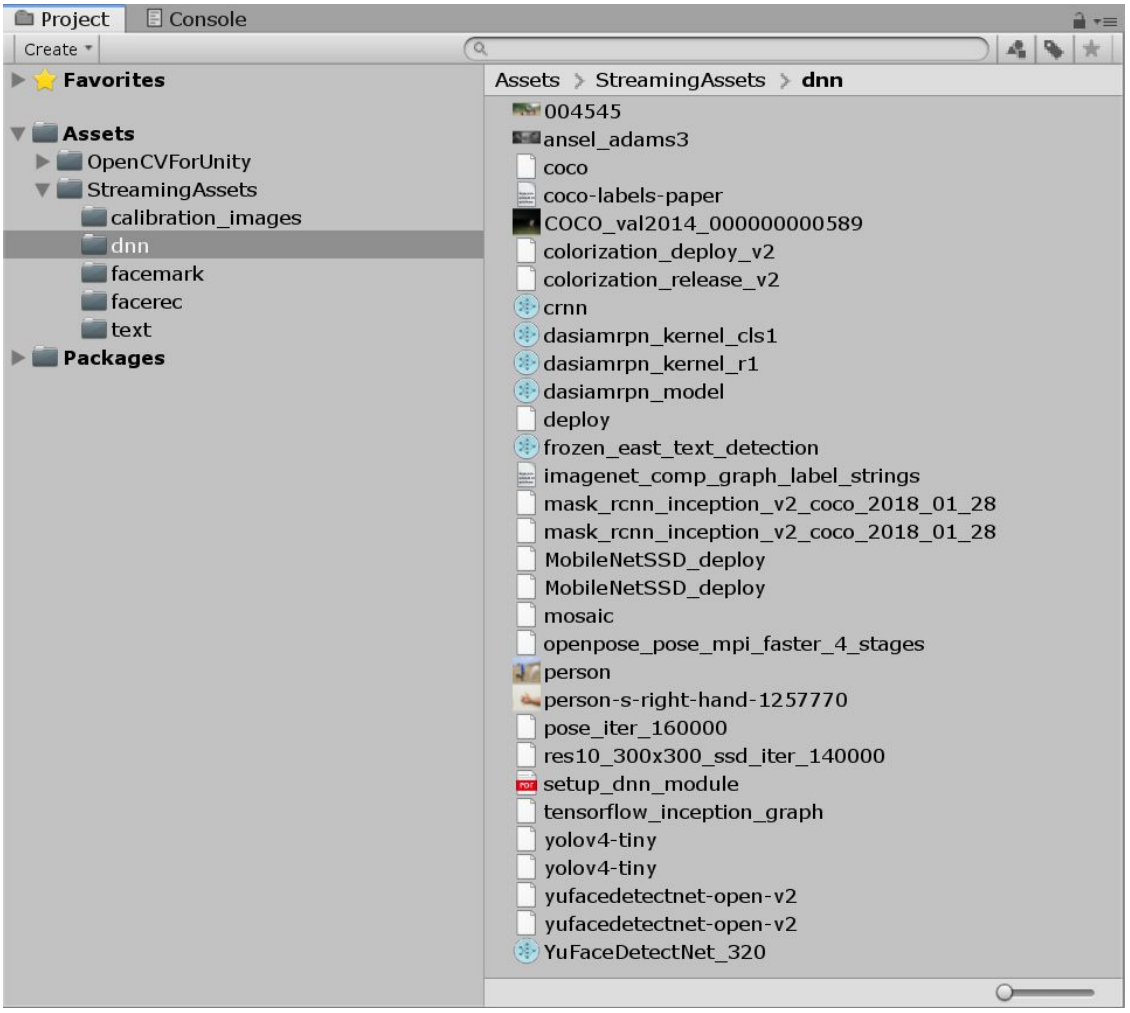
- Additional Setup for **OpenPoseExample** :
  MPI Download https://github.com/CMU-Perceptual-Computing-Lab/openpose/raw/master/examples/media/COCO_val2014_000000000589.jpg. Copy COCO_val2014_000000000589.jpg to "Assets/StreamingAssets/dnn/" folder.
  Download http://posefs1.perception.cs.cmu.edu/OpenPose/models/pose/mpi/pose_iter_160000.caffemodel. Copy pose_iter_160000.caffemodel to "Assets/StreamingAssets/dnn/" folder. Download https://github.com/opencv/opencv_extra/raw/master/testdata/dnn/openpose_pose_mpi_faster_4_stages.prototxt. Copy openpose_pose_mpi_faster_4_stages.prototxt to "Assets/StreamingAssets/dnn/" folder.
  COCO Download https://github.com/CMU-Perceptual-Computing-Lab/openpose/raw/master/examples/media/COCO_val2014_000000000589.jpg. Copy COCO_val2014_000000000589.jpg to "Assets/StreamingAssets/dnn/" folder.
  Download http://posefs1.perception.cs.cmu.edu/OpenPose/models/pose/coco/pose_iter_440000.caffemodel. Copy pose_iter_440000.caffemodel to "Assets/StreamingAssets/dnn/" folder. Download https://github.com/opencv/opencv_extra/raw/master/testdata/dnn/openpose_pose_coco.prototxt. Copy openpose_pose_coco.prototxt to "Assets/StreamingAssets/dnn/" folder.
  HAND Download https://www.pexels.com/photo/person-s-right-hand-1257770/. Copy person-s-right-hand-1257770.jpg to "Assets/StreamingAssets/dnn/" folder.http://posefs1.perception.cs.cmu.edu/OpenPose/models/hand/pose_iter_102000.caffemodel. Copy pose_iter_102000.caffemodel to "Assets/StreamingAssets/dnn/" folder. Download https://github.com/CMU-Perceptual-Computing-Lab/openpose/raw/master/models/hand/pose_deploy.prototxt. Copy pose_deploy.prototxt to "Assets/StreamingAssets/dnn/" folder.

- Additional Setup for **ResnetSSDFaceDetectionExample** :
  Download https://github.com/opencv/opencv_3rdparty/raw/b2bfc75f6aea5b1f834ff0f0b865a7c18ff1459f/res10_300x300_ssd_iter_140000.caffemodel. Copy res10_300x300_ssd_iter_140000.caffemodel to “Assets/StreamingAssets/dnn/” folder. Download https://github.com/opencv/opencv/raw/master/samples/dnn/face_detector/deploy.prototxt. Copy deploy.prototxt to “Assets/StreamingAssets/dnn/” folder.

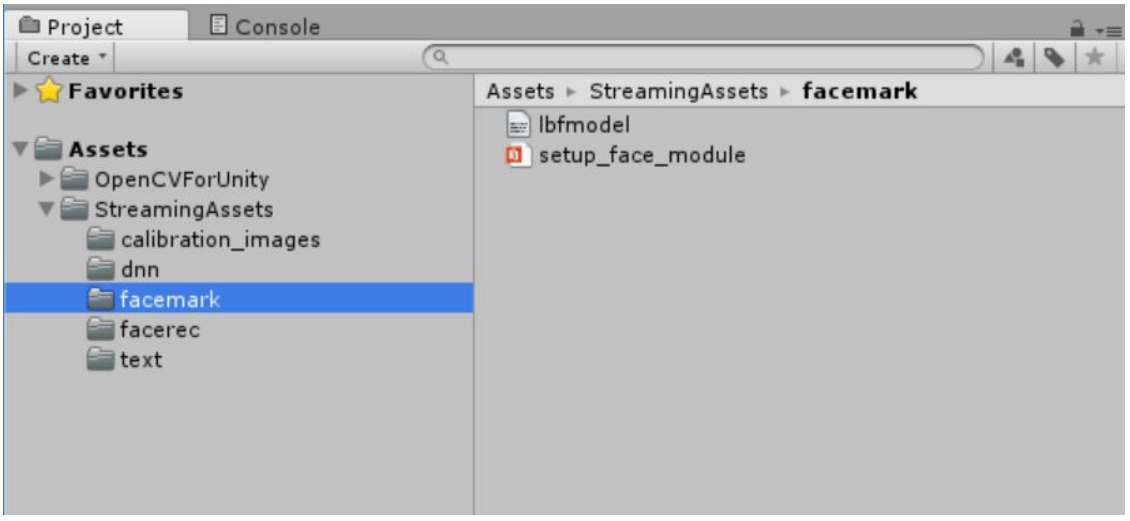
- Additional Setup for **TensorflowInceptionWebCamTextureExample** :
  Download and unzip https://storage.googleapis.com/download.tensorflow.org/models/inception5h.zip. Copy tensorflow_inception_graph.pb and imagenet_comp_graph_label_strings.txt to “Assets/StreamingAssets/dnn/” folder.

- Additional Setup for **TextOCRExample** :
  Download and unzip https://www.dropbox.com/s/r2ingd0l3zt8hxs/frozen_east_text_detection.tar.gz?dl=1. Copy frozen_east_text_detection.pb to “Assets/StreamingAssets/dnn/” folder. Generate crnn.onnx according to the instructions in TextOCRExample\Readme_how_to_export_onnx_model.txt. Copy crnn.onnx to “Assets/StreamingAssets/dnn/” folder.

- Additional Setup for **YoloObjectDetectionExample** or YoloObjectDetectionWebCamTextureExample :
  Download https://github.com/pjreddie/darknet/raw/master/data/person.jpg. Copy person.jpg to “Assets/StreamingAssets/dnn/” folder. Download https://github.com/AlexeyAB/darknet/raw/master/cfg/yolov4-tiny.cfg. Copy yolov4-tiny.cfg to “Assets/StreamingAssets/dnn/” folder. Download https://github.com/AlexeyAB/darknet/releases/download/darknet_yolo_v4_pre/yolov4-tiny.weights. Copy yolov4-tiny.weights to “Assets/StreamingAssets/dnn/” folder. Download https://github.com/pjreddie/darknet/raw/master/data/coco.names. Copy coco.names to “Assets/StreamingAssets/dnn/” folder.

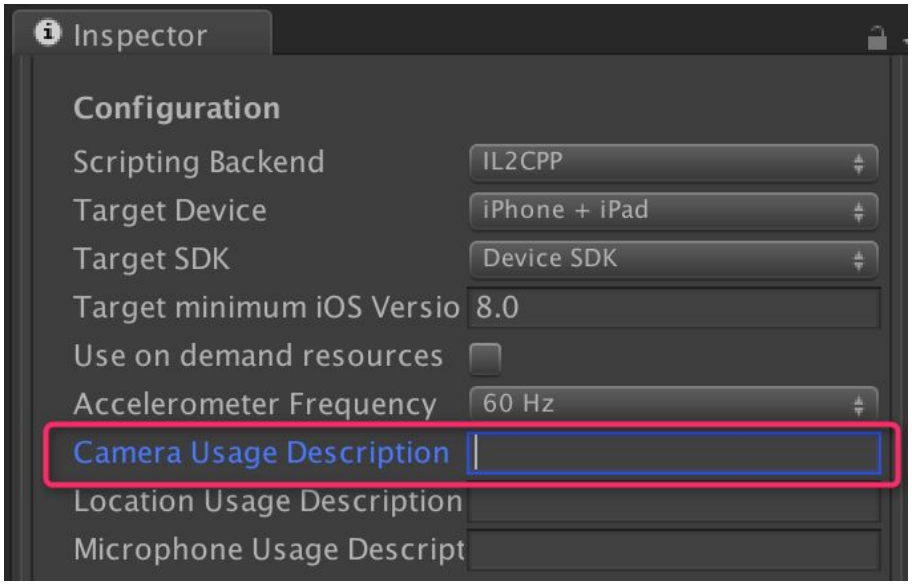


- Additional Setup for **FaceMarkExample** : Downlod https://raw.githubusercontent.com/kurnianggoro/GSOC2017/master/data/lbfmodel.yaml. Copy lbfmodel.yaml to “Assets/StreamingAssets/facemark/” folder.

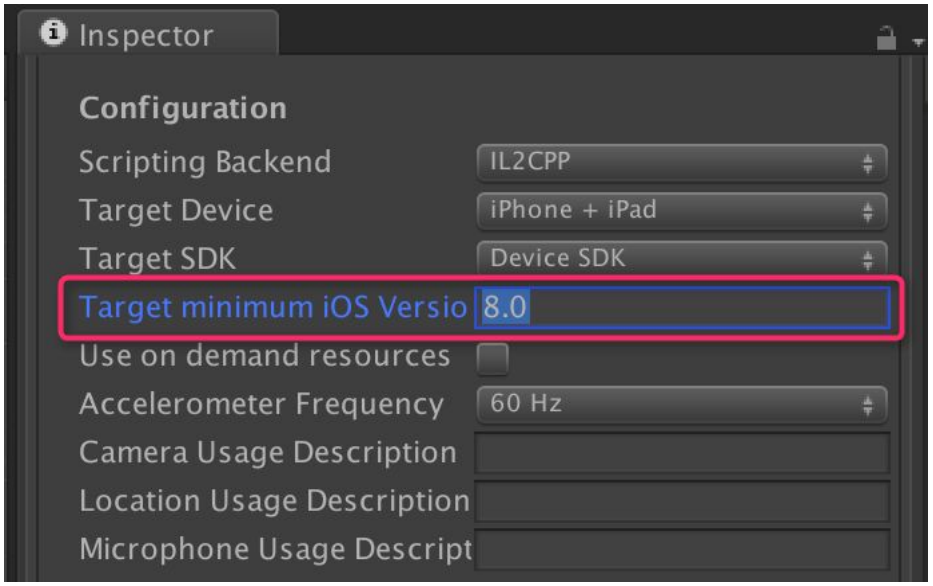


4. **[iOS]** Set [PlayerSettings]-[Other Settings]-[Configuration]-[Camera Usage

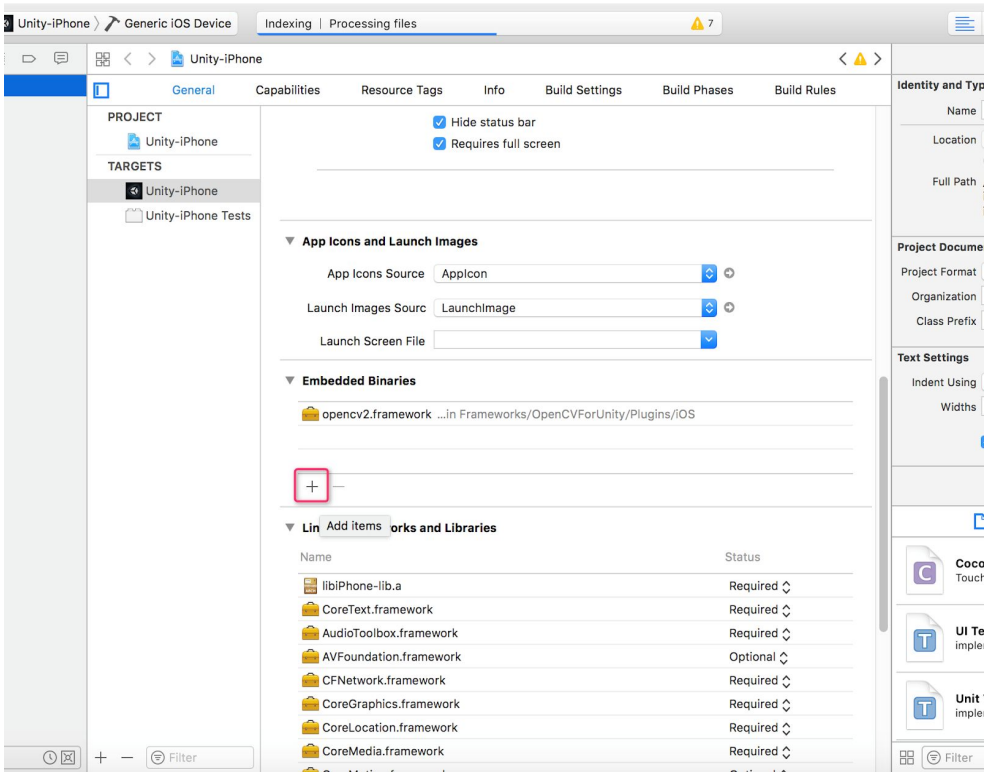
Description].

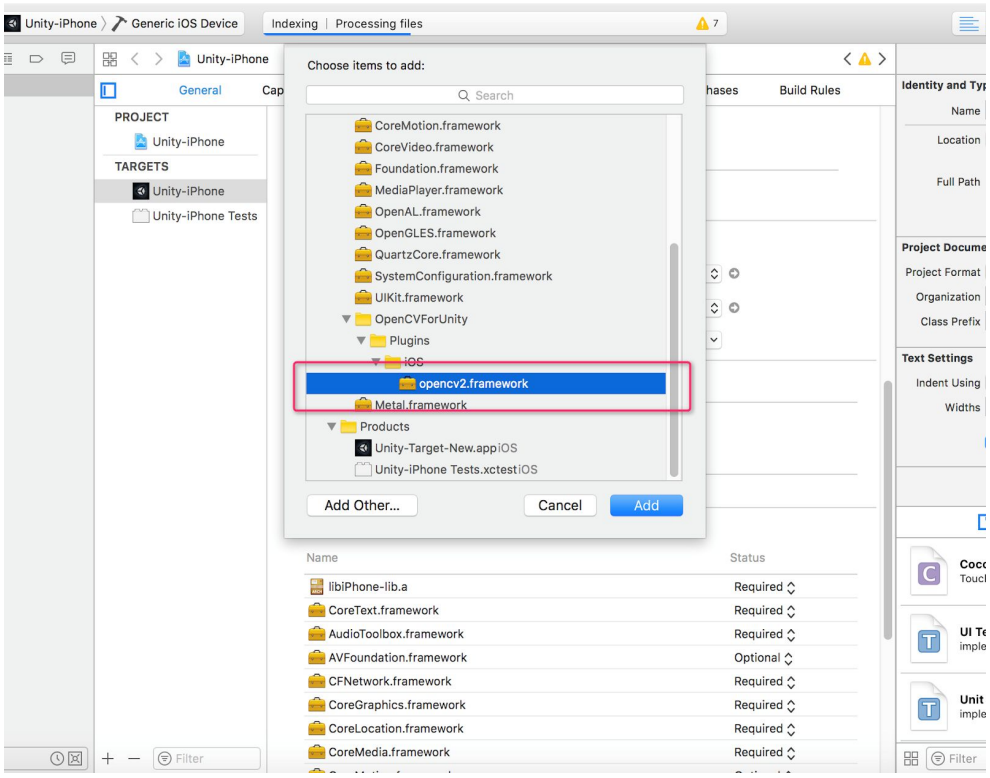


Set Target minimum iOS Version to 8.0 or higher.

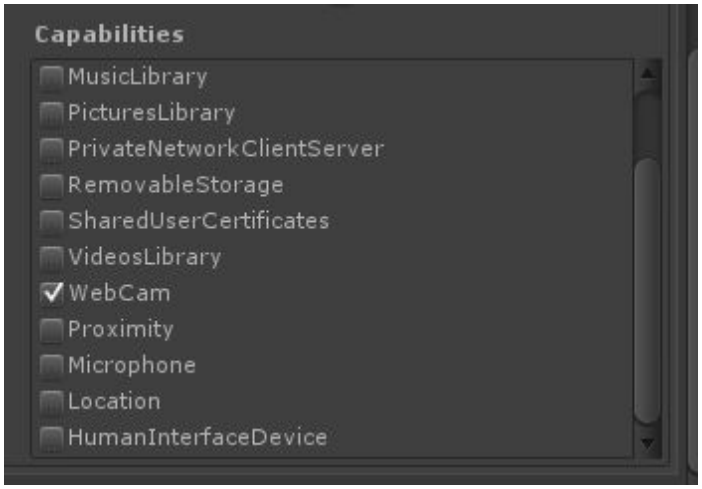


If the version of Unity is less than 2017.2, you have to set opencv2.framework to Embedded Binaries manually.

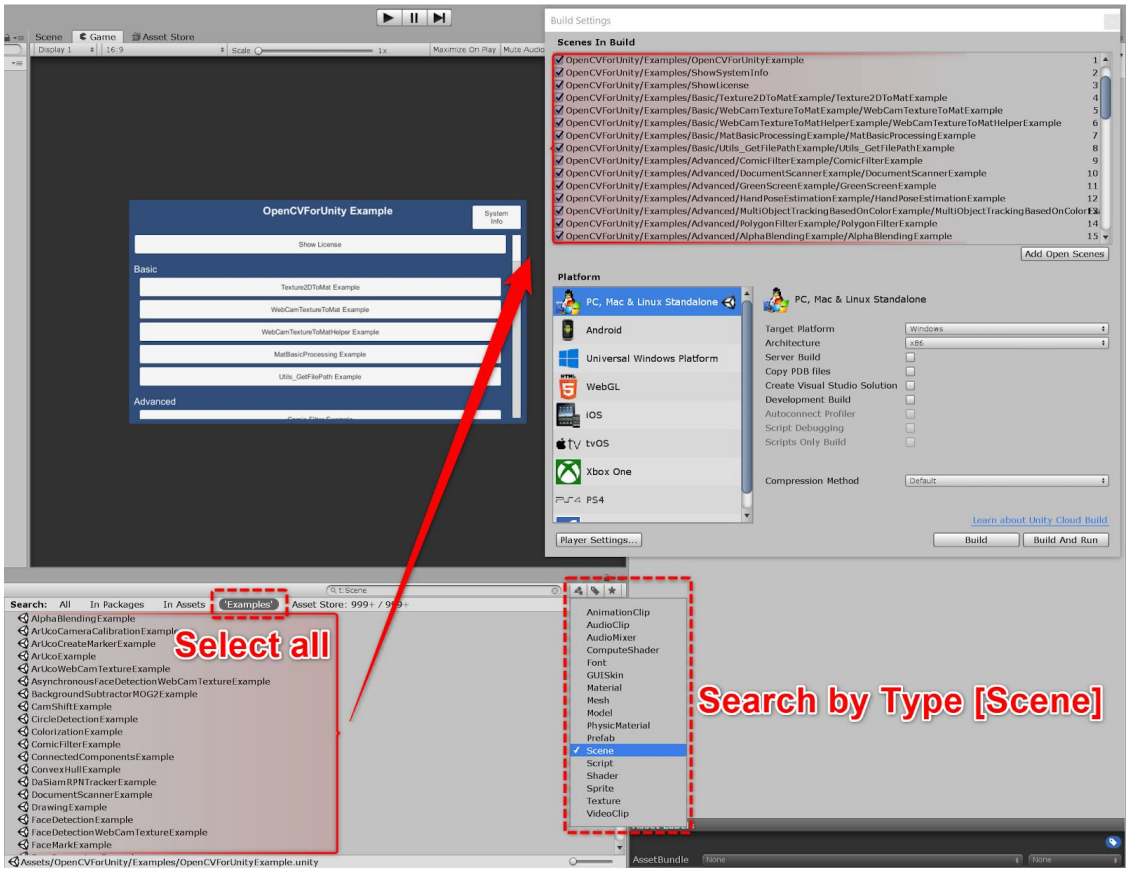




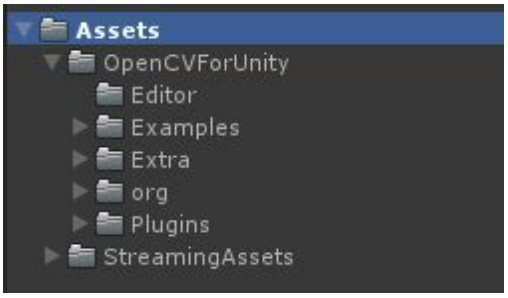
5. **[Windows10 UWP]** If use webCamTextue class, Please choose “WebCam” in [PlayerSettings]-[PublishingSettings]-[Capabilities].



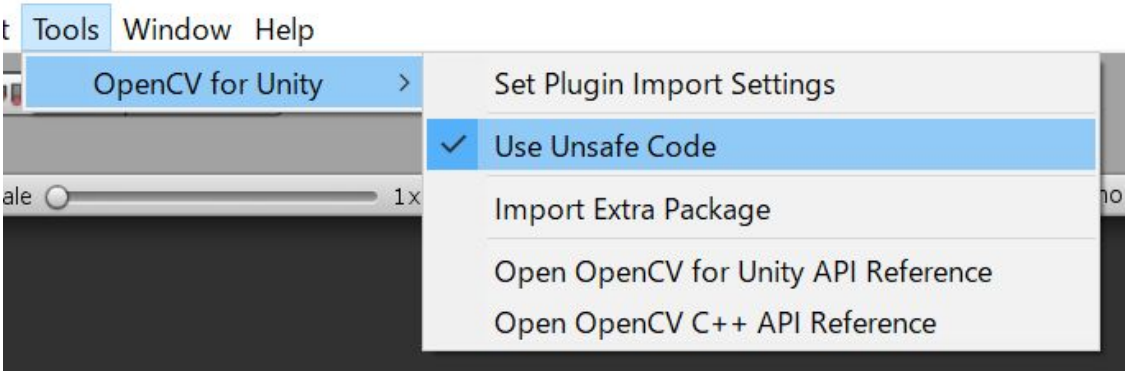
6. Add all of the "***.unity" in the "OpenCVForUnity/Examples" folder to [Build Settings] – [Scene In Build].

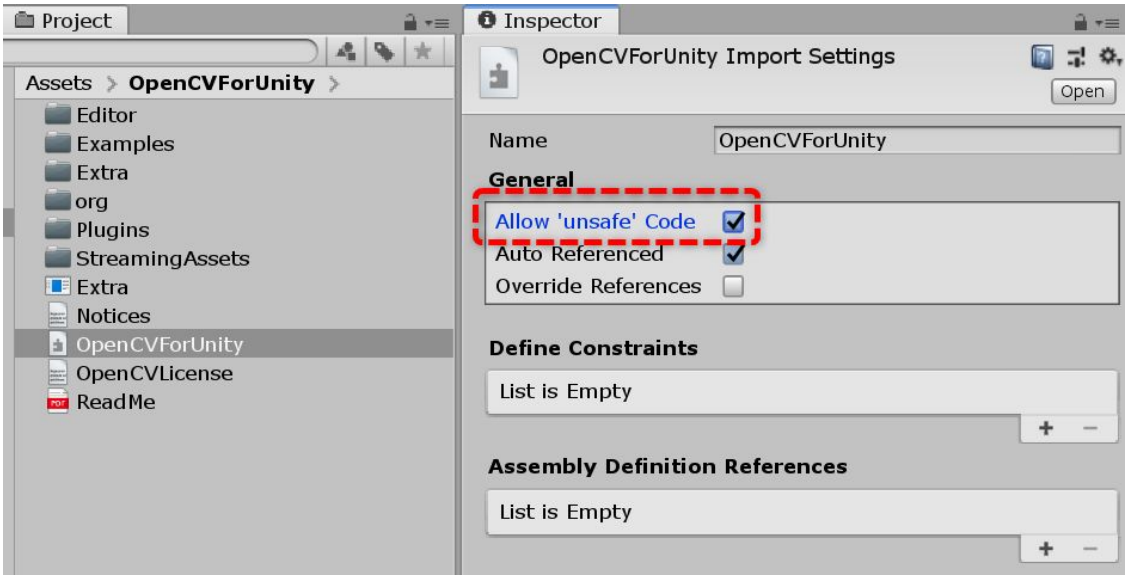


Screenshot after the setup



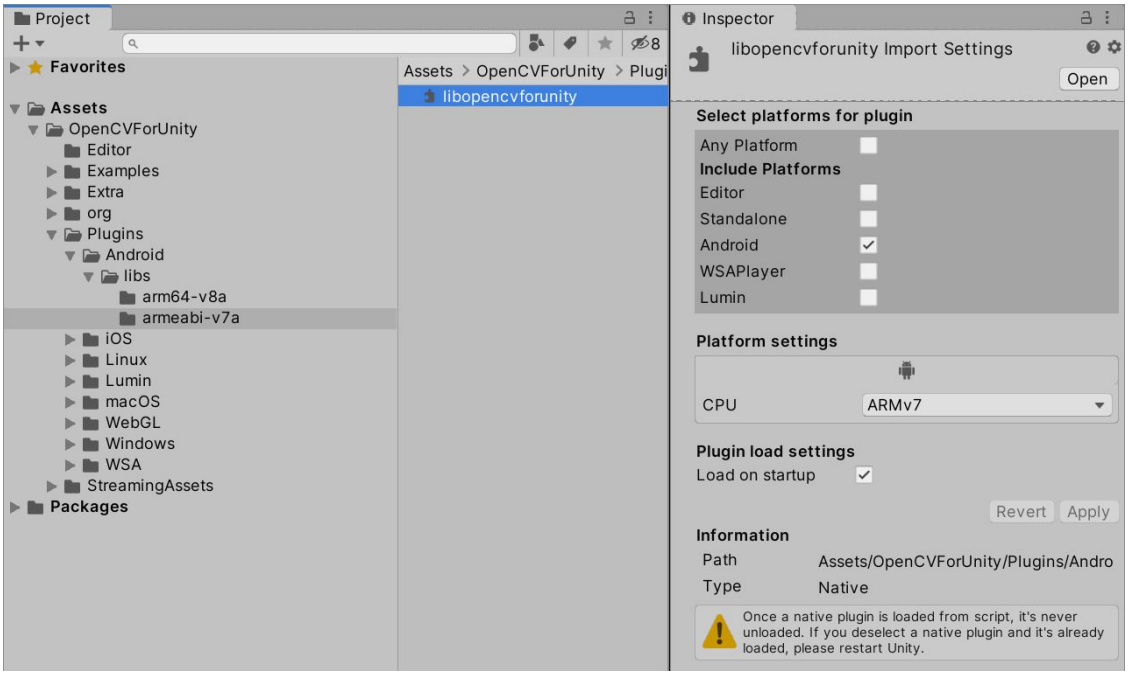
If you want to use optimization code using NativeArray class, select MenuItem[Tools/OpenCV for Unity/Use Unsafe Code]. (require Unity2018.1 or later)



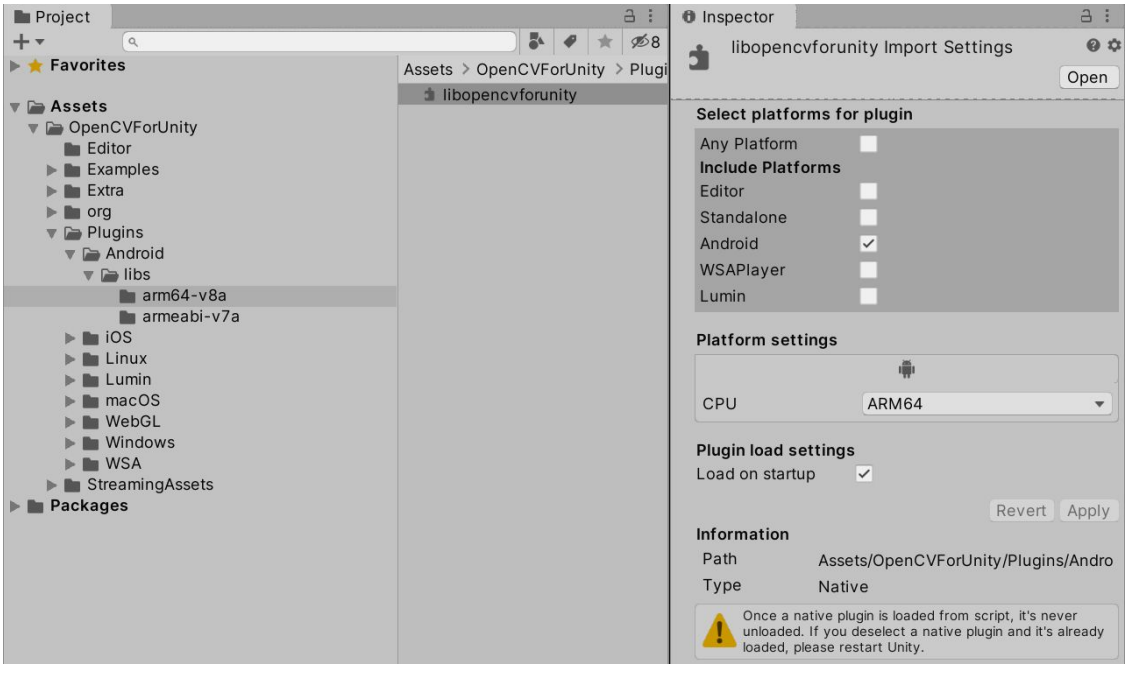


Android Setup Procedure

- “OpenCVForUnity/Plugins/libs/armeabi-v7a/*.so” – Select platform Android and CPU ARMv7 in Inspector.



- “OpenCVForUnity/Plugins/libs/arm64/*.so” – Select platform Android and CPU arm64 in Inspector.

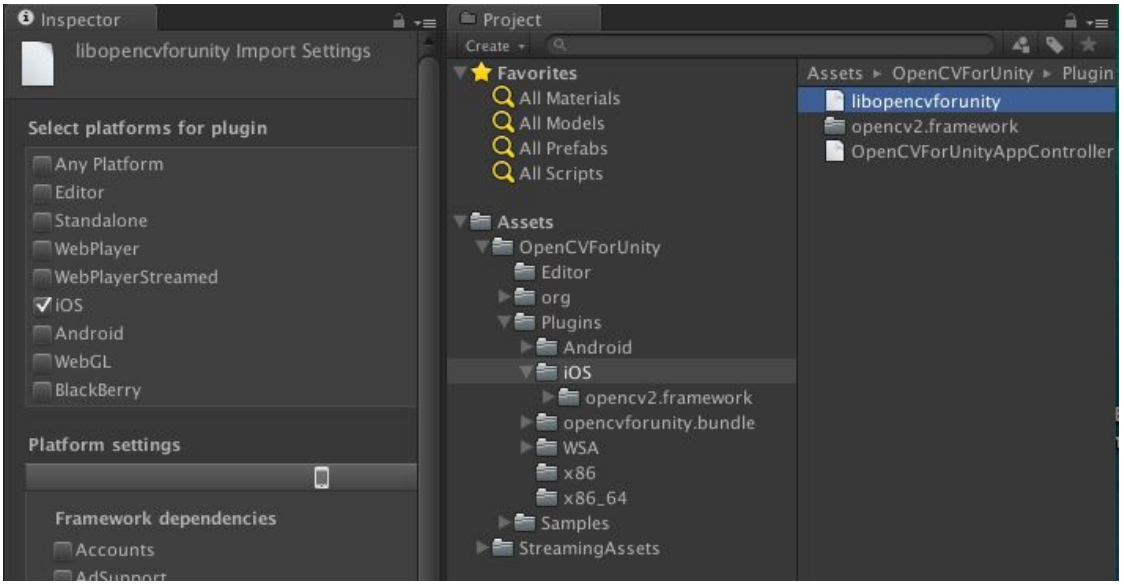


- If you do not use opencv_contrib module, build size will be reduced by using native plugin file excluding opencv_contrib module.
  1. Replace “ OpenCVForUnity/Plugins/Android/libs” folder to “OpenCVForUnity/Extra/exclude_contrib/Android/libs” folder.

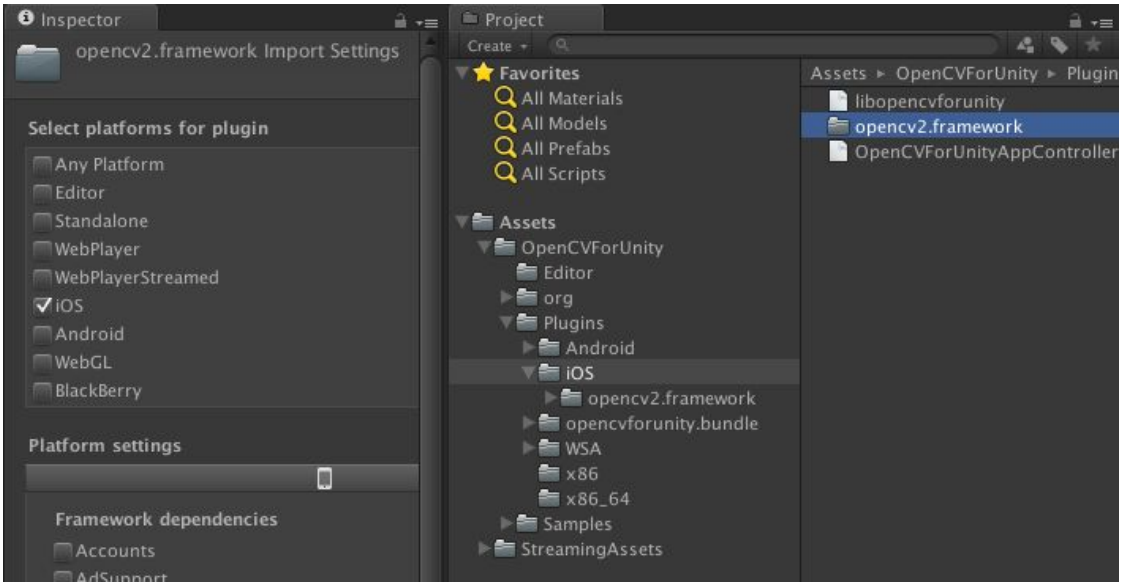
2. Select MenuItem[Tools/OpenCV for Unity/Set Plugin Import Settings].
3. Delete “OpenCVForUnity/Assets/OpenCVForUnity/org/opencv_contrib” folder and “OpenCVForUnity/Examples/ContribModules” folder.

iOS Setup Procedure

- "OpenCVForUnity/Plugins/iOS/libopencvforunity.a" – Select platform iOS in Inspector.

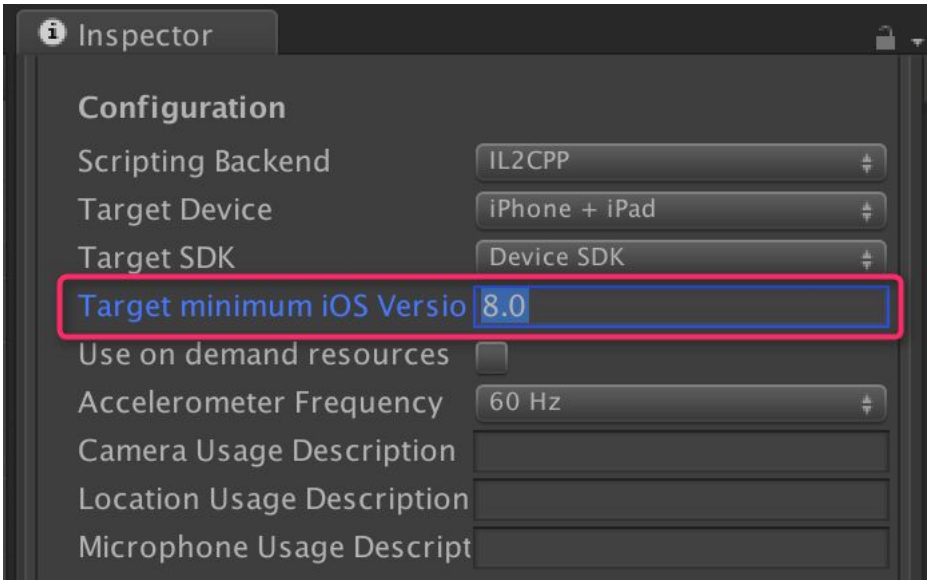


- "OpenCVForUnity/Plugins/iOS/opencv2.framework" – Select platform iOS in Inspector.

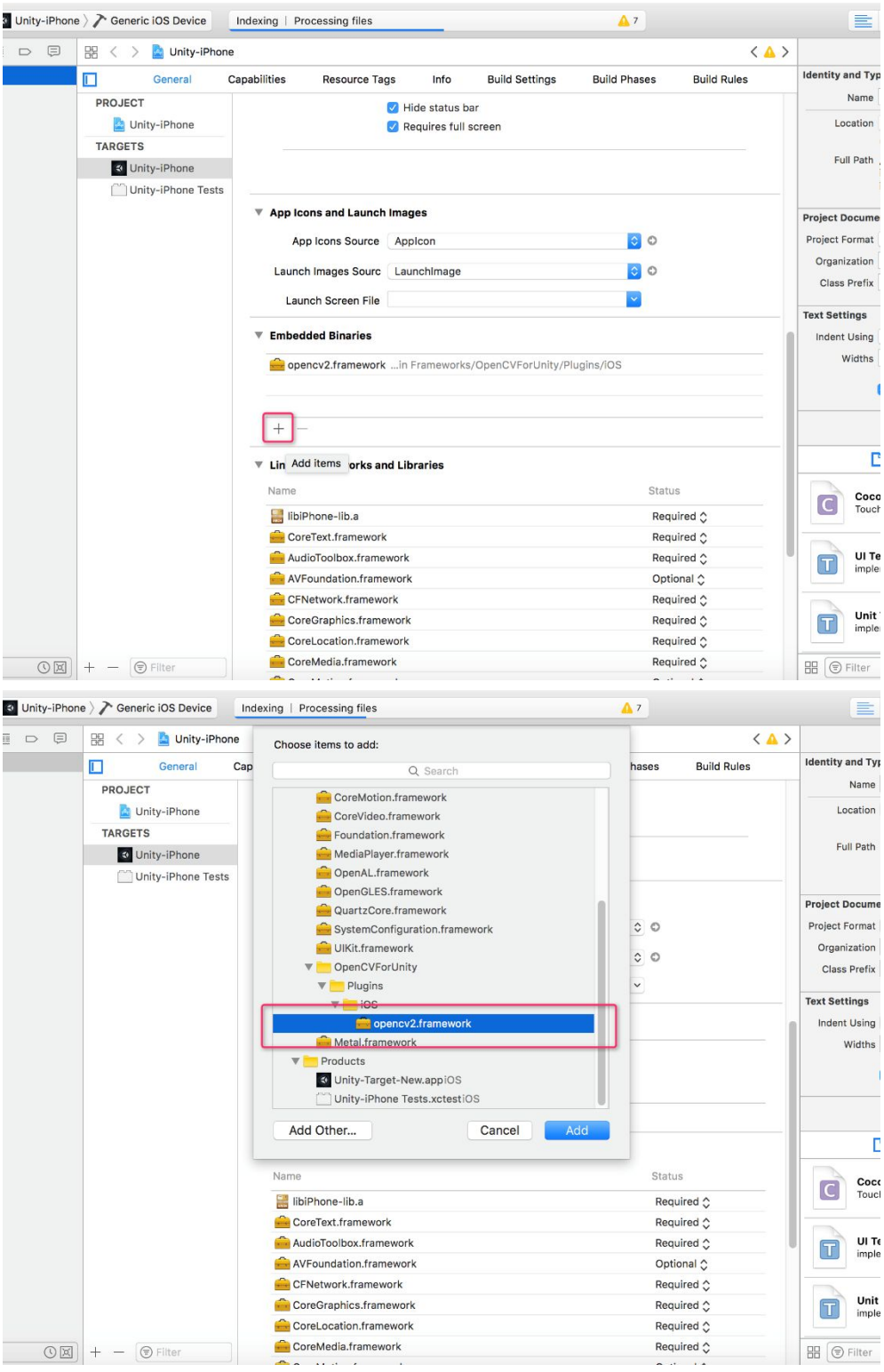


- If iOS platform, Set [PlayerSettings]-[Other Settings]-[Configuration]-[Camera Usage Description].

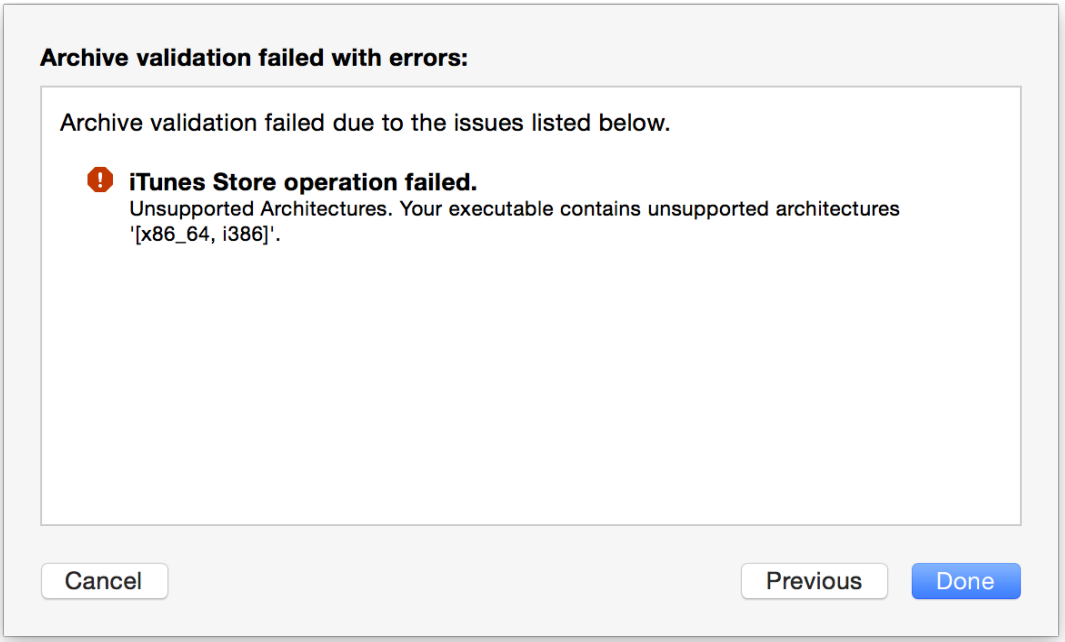
- Set Target minimum iOS Version to 8.0 or higher.



- If the version of Unity is less than 2017.2, you have to set opencv2.framework to Embedded Binaries manually.



- When exporting ipa file, you need to remove the unneeded architectures from opencv2.framework, before submitting it.



Please see Q & A No.9 for details.

- When "-ObjC" is set to "OTHER_LDFLAGS" by other Asset, the following error may occur.

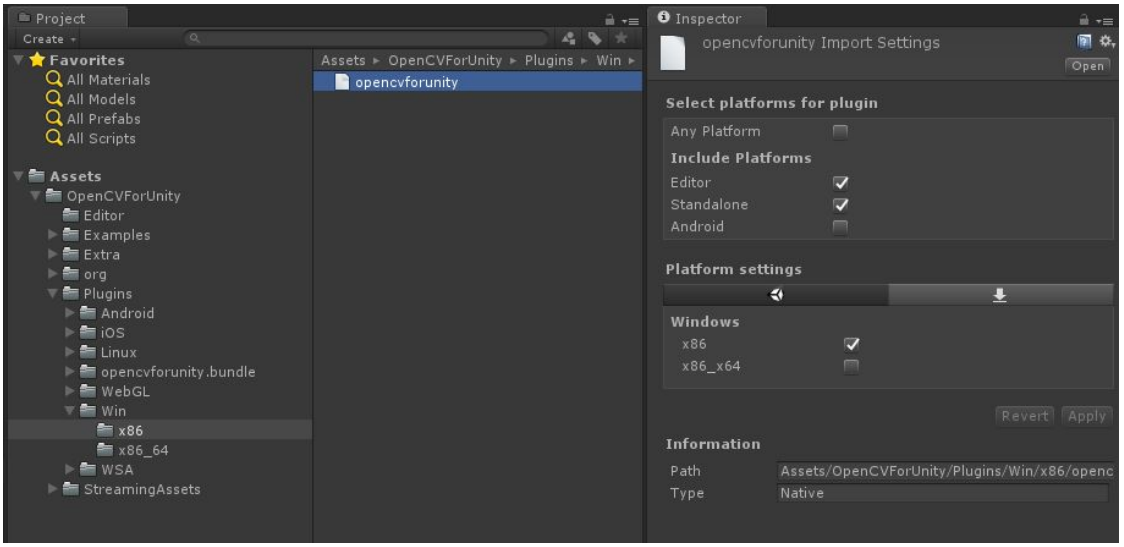
```
Undefined symbols for architecture armv7:

  "_OBJC_CLASS_$_ALAssetsLibrary", referenced from:

      objc-class-ref in opencv2(cap_ios_video_camera.o)

ld: symbol(s) not found for architecture armv7

clang: error: linker command failed with exit code 1 (use -v to see invocation)
```

  In that case, add “proj.AddFrameworkToProject (target, "AssetsLibrary.framework", false);” to “Assets/OpenCVForUnity/Editor/iOS_BuildPostprocessor.cs”.

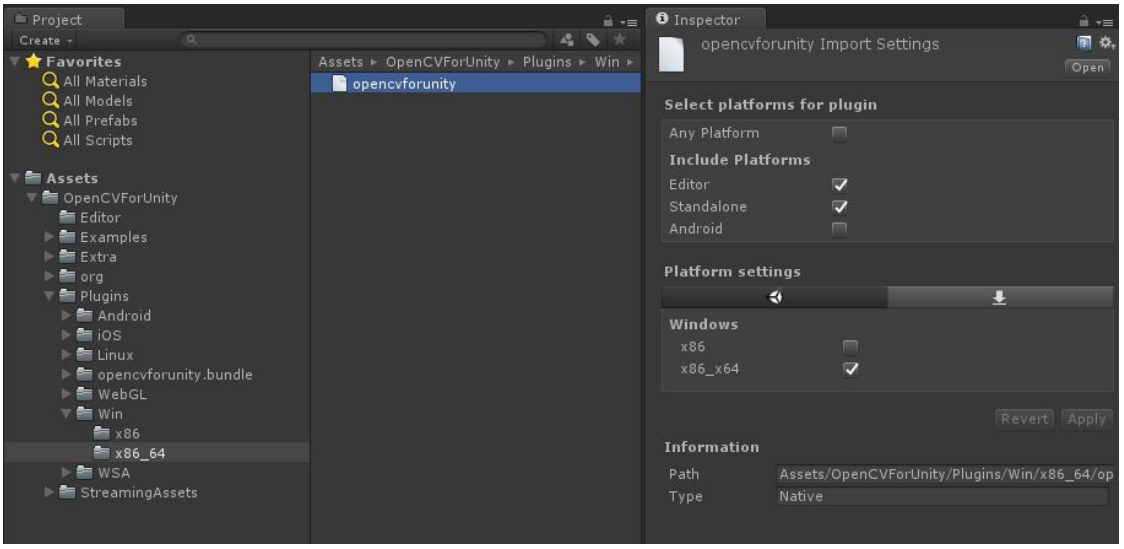
- If you do not use opencv_contrib module, build size will be reduced by using native plugin file excluding opencv_contrib module.
  1. Replace “OpenCVForUnity/Plugins/iOS” folder to “OpenCVForUnity/Extra/exclude_contrib/iOS” folder.
  2. Select MenuItem[Tools/OpenCV for Unity/Set Plugin Import Settings].
  3. Delete “OpenCVForUnity/Assets/OpenCVForUnity/org/opencv_contrib” folder and “OpenCVForUnity/Examples/ContribModules” folder.

Windows Standalone Setup Procedure

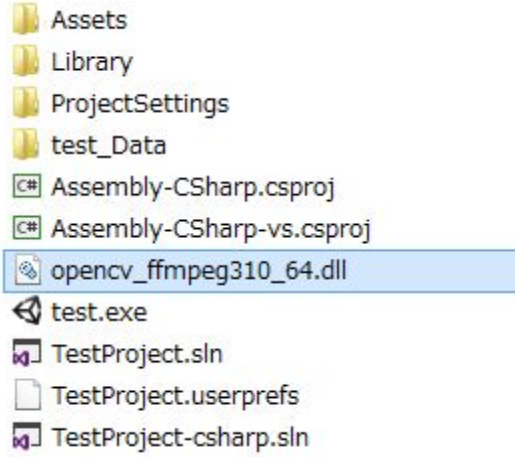
- "OpenCVForUnity/Plugins/Windows/x86/opencvforunity.dll" – Select platform Editor,Standalone and CPU x86 and OS Windows in Inspector.



- "OpenCVForUnity/Plugins/Windows/x86_64/opencvforunity.dll" – Select platform Editor,Standalone and CPU x86_64 and OS Windows in Inspector.

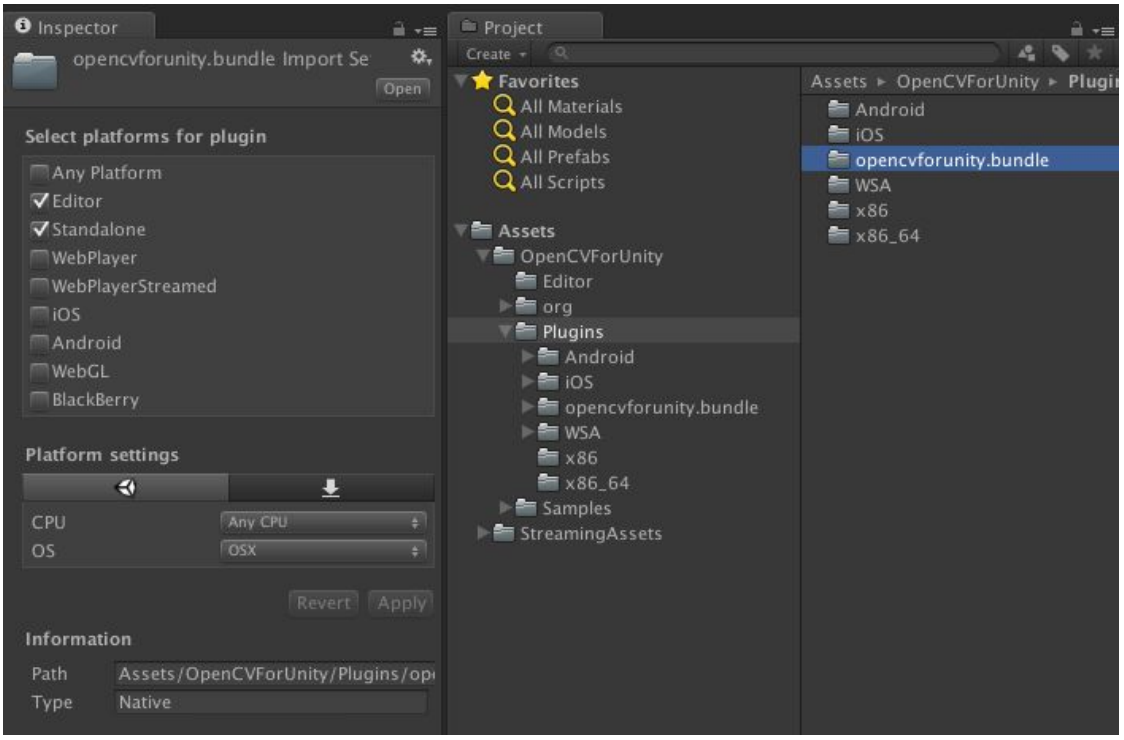


- If you want to use more video formats with the "Video Capture (string filename)" or "VideoWriter" method, setup is required.
  1)Download "OpenCV for Windows Version 4.5.0"(http://opencv.org/downloads.html).
  2)Set PATH variable to "opencv_ffmpeg4.5.0.dll" or "opencv_ffmpeg4.5.0_64.dll".
  if 32bit, "\path\to\opencv\build\x86\vc14\bin\".
  if 64bit, "\path\to\opencv\build\x64\vc14\bin\".
  Or
  2)Copy to Project Folder.


Assets
Library
ProjectSettings
test_Data
Assembly-CSharp.csproj
Assembly-CSharp-vs.csproj
opencv_ffmpeg310_64.dll
test.exe
TestProject.sln
TestProject.userprefs
TestProject-csharp.sln

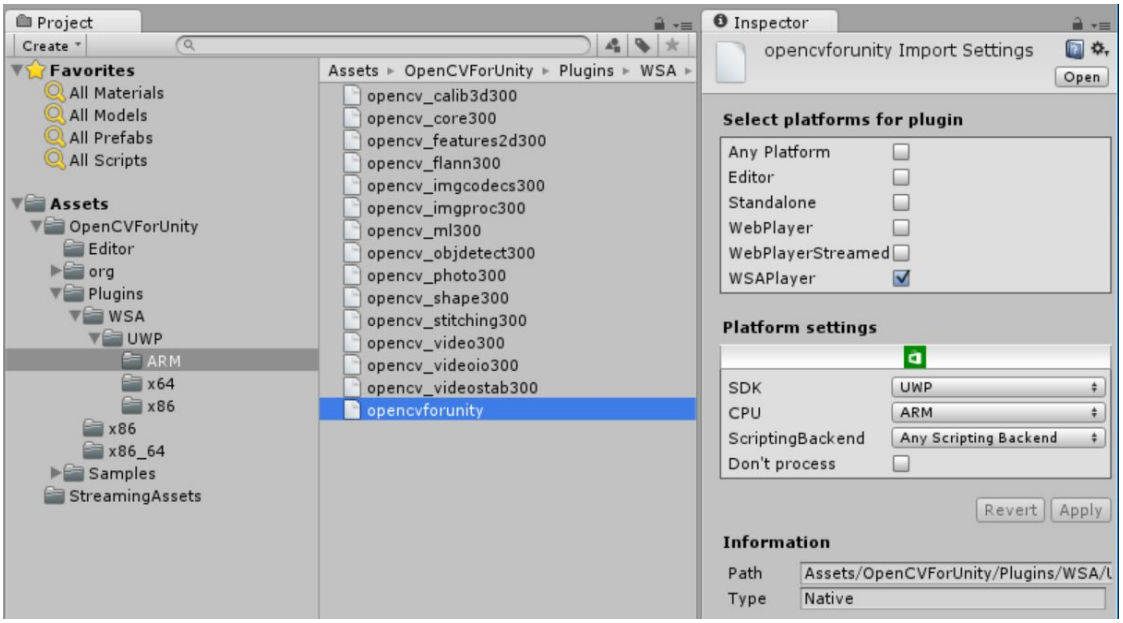
Mac Standalone Setup Procedure

- "OpenCVForUnity/Plugins/macOS/opencvforunity.bundle" – Select platform Editor,Standalone and CPU x86_64 and OS OSX in Inspector.

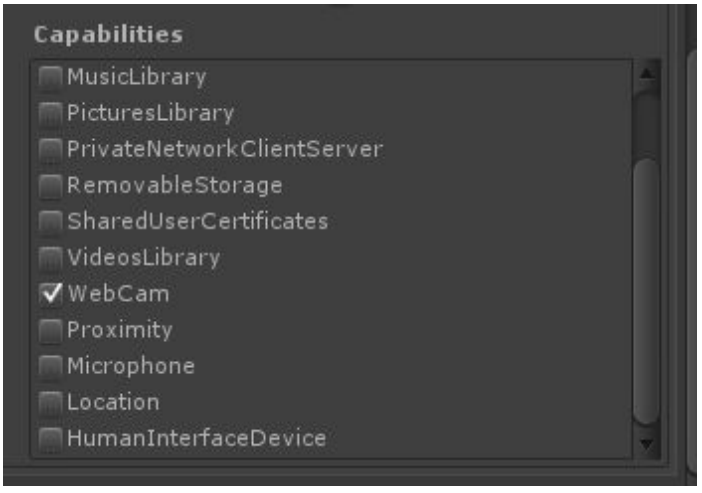


UWP Setup Procedure

- “OpenCVForUnity/Plugins/WSA/UWP/ARM/*.dll” – Select platform WSAPlayer and SDK81 and CPU ARM in Inspector. Set “x86” and ”x64” in the same way as “ARM”.

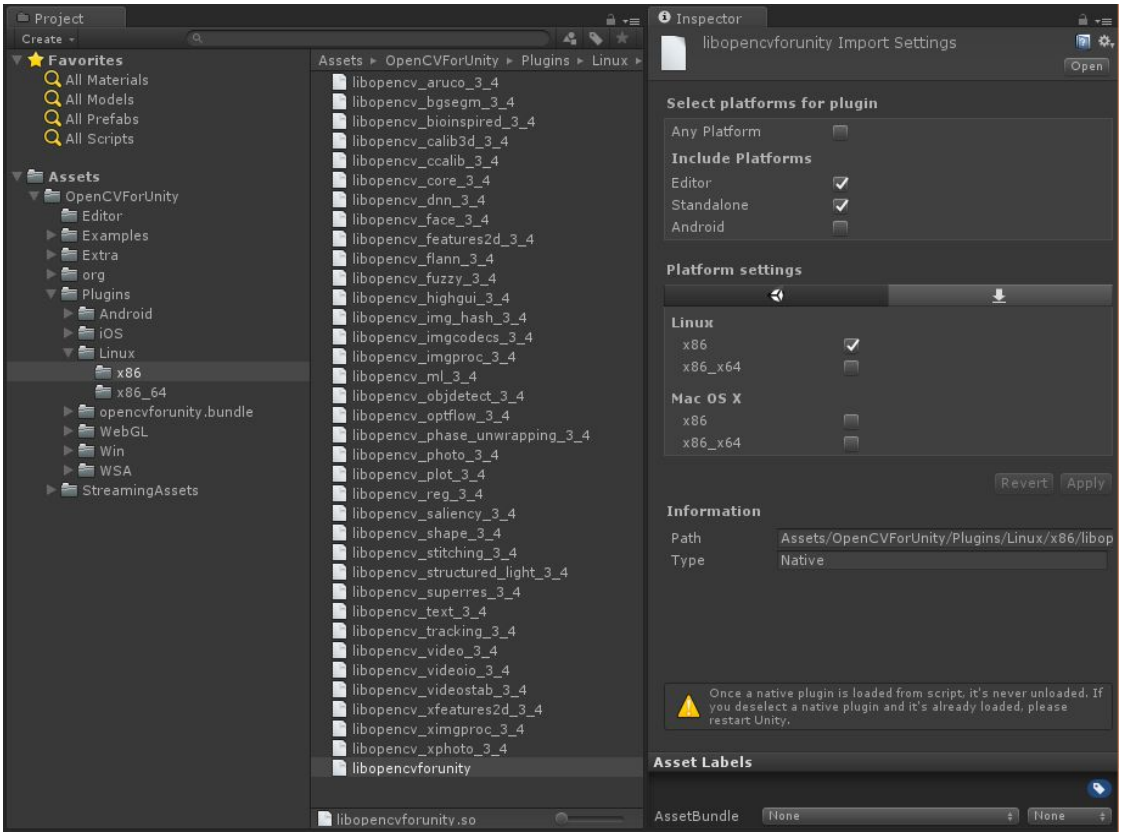


- If use webCamTextue class, Please choose “WebCam” in [PlayerSettings]-[PublishingSettings]-[Capabilities].

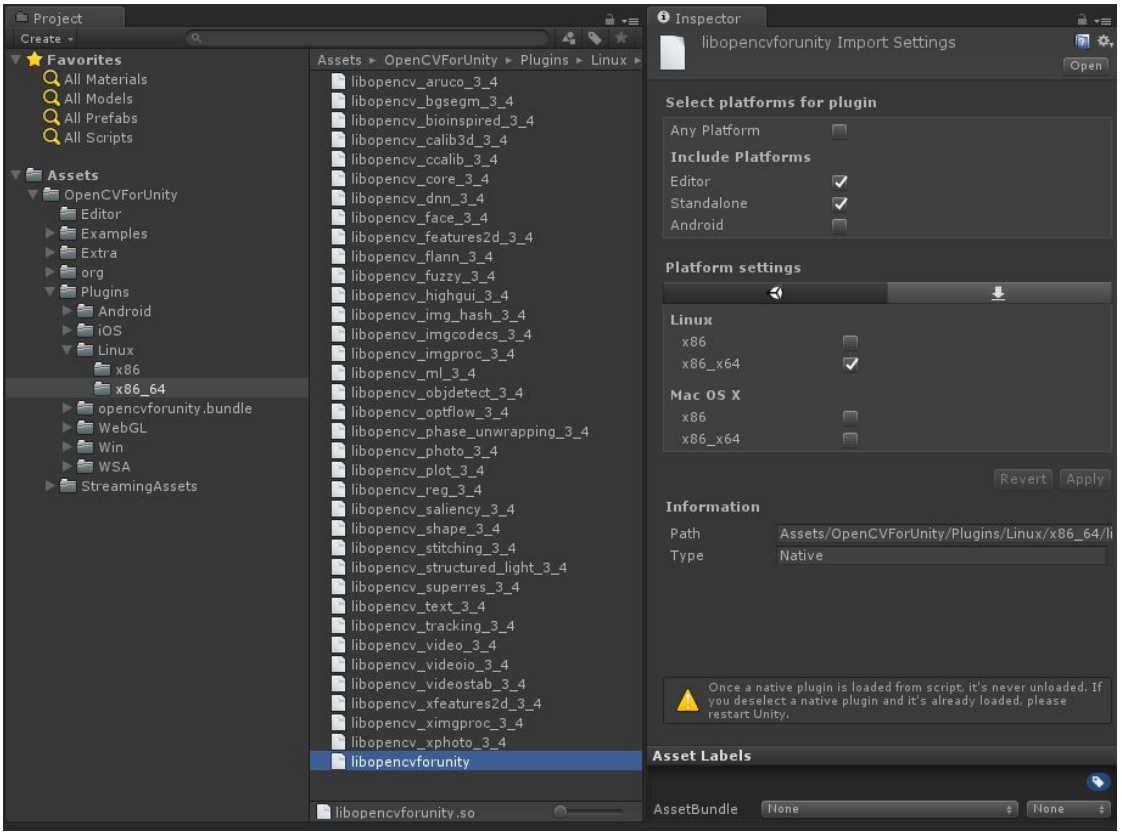


Linux Setup Procedure

- “OpenCVForUnity/Plugins/Linux/x86/libopencvforunity.so” – Select platform Editor,Standalone and CPU x86 and OS Linux in Inspector.



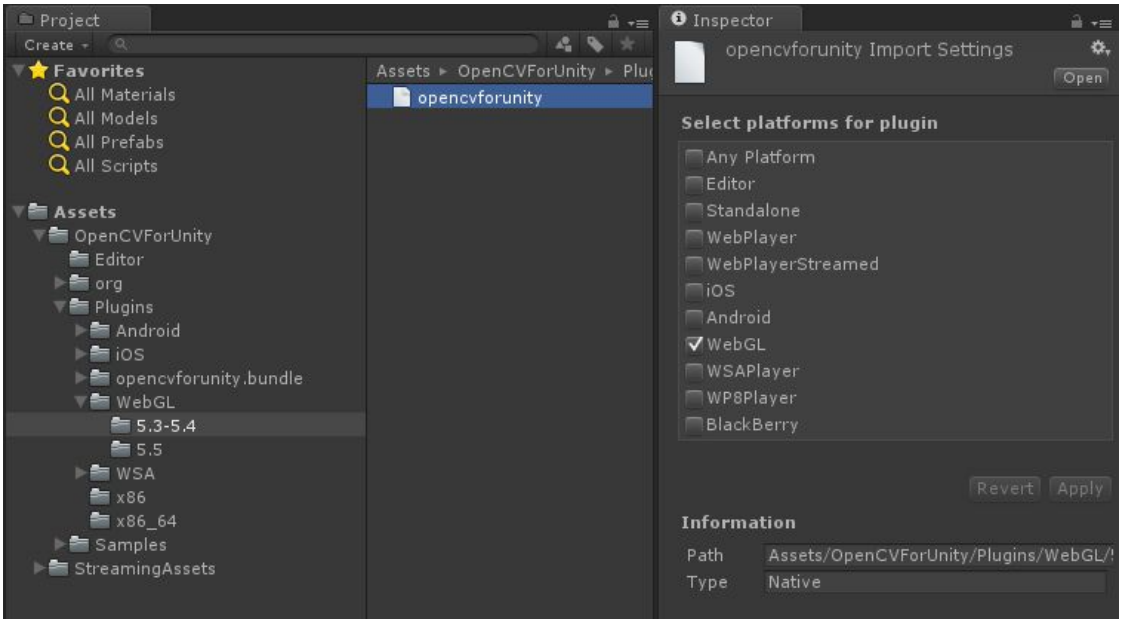
- “OpenCVForUnity/Plugins/Linux/x86_64/libopencvforunity.so” – Select platform Editor,Standalone and CPU x86_64 and OS Linux in Inspector.



- Additional Setting is required to run on the editor.
  http://forum.unity3d.com/threads/native-plugin-in-editor-steam-specifically.384970/

WebGL Setup Procedure

- “OpenCVForUnity/Plugins/WebGL/unity_version/opencvforunity.bc” – Select platform WebGL in Inspector. By Selecting MenuItem [Tools/OpenCV for Unity/Set Plugin Import Settings], You can easily set up.



- Put the file that you want to use for Utils.getFilePathAsync() in the “Aseets/StreamingAssets/”. In Case of WebGL platform, you need to use Utils.getFilePathAsync() instead of Utils.getFilePath(). (haarcascade_frontalface_alt.xml is for OpenCVForUnityExample.scene. Please copy only when necessary.)
- In the WebGL (asm.js) platform, the calculation result of Float type may be significantly different from other platforms. When using the OpenCV’s method that use the Mat class (CvType is CV_32F) as an argument, you need to pay attention to the calculation precision.
- Enable Multithreading support.
    1. Remove “OpenCVForUnity/Plugins/WebGL/2019.1/opencvforunity.bc” and then move “OpenCVForUnity/Extra/webgl_multithread/2019.1/opencvforunity.bc” to “OpenCVForUnity/Plugins/WebGL/2019.1/” folder.
    2. Select MenuItem[Tools/OpenCV for Unity/Set Plugin Import Settings].
    3. PlayerSettings.WebGL.threadsSupport = true;

MagicLeap Setup Procedure

- Please see this page.
  https://github.com/EnoxSoftware/MagicLeapWithOpenCVForUnityExample

How to use OpenCV Dynamic Link Library with customized build settings

- Download OpenCV 4.5.0 repository (git: opencv, opencv-contrib).

Android

1. Build the Android SDK with "opencv/platforms/android/build_sdk.py". (APP_STL := gnustl_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 --use_android_buildtools
```

2. Copy the output file (native\libs\arm64-v8a\libopencv_java4.so) to "OpenCVForUnity\Plugins\Android\libs\arm64-v8a\". Copy the output files (native\libs\arm64-v8a\libopencv_java4.so) to "OpenCVForUnity\Plugins\Android\libs\armeabi-v7a\". Copy the output files (native\libs\x86\libopencv_java4.so) to "OpenCVForUnity\Plugins\Android\libs\x86\".
3. Copy "OpenCVForUnity\Extra\dll_version\Android\libs\" to "OpenCVForUnity\Plugins\Android\libs\".

iOS

1. Build the iOS framework with "opencv/platforms/ios/build_framework.py".

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

2. Copy the output file (opencv2.framework) to "OpenCVForUnity\Plugins\iOS\".

Windows

1. Build the OpenCV dynamic library.

```
OPENCV_EXTRA_MODULES_PATH:PATH=C:/Users/xxxxx/opencv_contrib/mo
dules
BUILD_SHARED_LIBS:BOOL=ON
```

2. Set PATH variable to “C:\path\to\opencv\x64\vc15\bin”.
3. Copy “OpenCVForUnity\Extra\dll_version\Windows\” to “OpenCVForUnity\Plugins\Windows\”.

macOS

1. Build the OpenCV library.

```
CMAKE_OSX_ARCHITECTURESSTRING=x86_64
OPENCV_EXTRA_MODULES_PATHPATH=/Users/xxxxx/opencv_contrib/modul
es
```

2. Copy the output files (libopencv_*.4.5.0.dylib) to opencvforunity.bundle□\Contents\□MacOS\.□
3. Relink libopencv_*.4.5.0.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.4.5.0.dylib


install_name_tool -id @loader_path/libopencv_aruco.4.5.0.dylib
libopencv_aruco.4.5.0.dylib



install_name_tool -change @rpath/libopencv_calib3d.4.5.dylib
@loader_path/libopencv_calib3d.4.5.0.dylib libopencv_aruco.4.5.0.dylib


install_name_tool -change @rpath/libopencv_features2d.4.5.dylib
@loader_path/libopencv_features2d.4.5.0.dylib libopencv_aruco.4.5.0.dylib


install_name_tool -change @rpath/libopencv_flann.4.5.dylib
@loader_path/libopencv_flann.4.5.0.dylib libopencv_aruco.4.5.0.dylib


install_name_tool -change @rpath/libopencv_highgui.4.5.dylib
@loader_path/libopencv_highgui.4.5.0.dylib libopencv_aruco.4.5.0.dylib


install_name_tool -change @rpath/libopencv_videoio.4.5.dylib
@loader_path/libopencv_videoio.4.5.0.dylib libopencv_aruco.4.5.0.dylib
```

```
install_name_tool -change @rpath/libopencv_imgcodecs.4.5.dylib
@loader_path/libopencv_imgcodecs.4.5.0.dylib libopencv_aruco.4.5.0.dylib


install_name_tool -change @rpath/libopencv_imgproc.4.5.dylib
@loader_path/libopencv_imgproc.4.5.0.dylib libopencv_aruco.4.5.0.dylib


install_name_tool -change @rpath/libopencv_core.4.5.dylib
@loader_path/libopencv_core.4.5.0.dylib libopencv_aruco.4.5.0.dylib
```

Linux

1. Build the OpenCV library.
2. Rename output files (libopencv_*.so.4.5.0).

```
sudo apt-get install rpl
rpl -R -e .so.4.5 "_4_5.so" libopencv_*.so.4.5.0
rename "s/".so.4.5.0"/"_4_5.so"/;" libopencv_*.so.4.5.0
```

3. Copy libopencv_*_4_5.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\vc15\bin” to “OpenCVForUnity\Plugins\WSA\UWP\ARM”. Copy “install\WS\10.0\x64\x64\vc15\bin” to “OpenCVForUnity\Plugins\WSA\UWP\x64”. Copy “install\WS\10.0\x86\x86\vc15\bin” to “OpenCVForUnity\Plugins\WSA\UWP\x86”.

Q & A

Q1.
Asset package size is large. Is there a way to reduce?
A1.
Please remove plugin folders of non-output target platforms that are included in OpenCVforUnity package. You do not need to import plug-in files for platforms not supported by your project.

Q2.
Support Web platform?
A2.
Since the Unity Web Player does not support the native plugin, “OpenCV for Unity" does not support "WebPlayer Platform”.
A WebGL platform was added as an alternative. (Unity 5.3 or higher).

Q3.
How do learn the details of OpenCV's method and argument?
A3.
Please refer to OpenCV official document (http://docs.opencv.org/4.5.0/index.html) and OpenCV Tutorials (http://docs.opencv.org/4.5.0/d9/df8/tutorial_root.html) for the details of the argument of the method..

Q4.
How can I convert Mat class operators defined in C++?
A4.
Way to translation of Mat class operators defined in C++.
https://enoxsoftware.com/opencvforunity/way-to-translation-of-mat-class-operators-defined-in-cpp/

Q5.
“DllNotFoundException: opencvforunity” is displayed on the console when run the example scene.
A5.
The plugin does not seem to be loaded correctly. Please check the setup procedure.

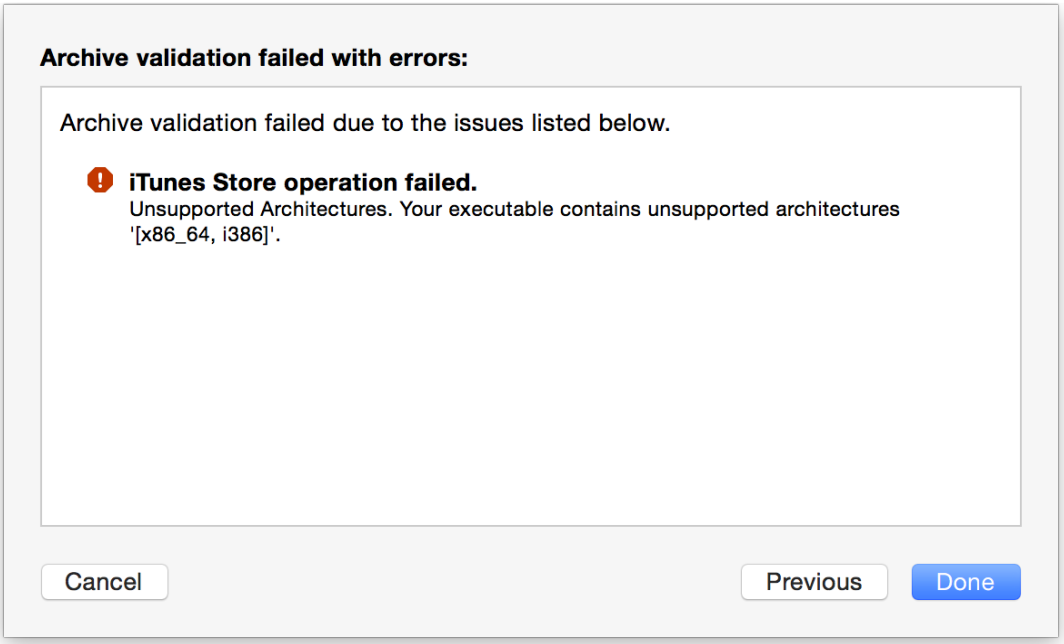
Q6.
“ArgumentException: The output Mat object has to be of the same size” is displayed on the console when run the example scene.
A6.
After having setup Plugin, Plugin may work well when you reboot Unity.

Q7.
“Level 'Texture2DtoMatExample' (-1) could not be loaded because it has not been added to the build settings.” is displayed on the console when run the example scene.
A7.
Please add all of “***.unity” scenes into the “Assets/OpenCVForUnity/Examples” folder to

[Build Settings] – [Scene In Build].

Q8.
In DetectFaceExample or WebCamTextureDetectFaceExample, red rectangle is not displayed around a face.
A8.
You might have failed to read the “haarcascade_frontalface_alt.xml”. Please confirm whether there is the “StreamingAssets” folder at the right position.

Q9.
[iOS]Submit to App Store issues: Unsupported Architecture x86, i386“Unsupported Architecture. Your executable contains unsupported architecture ‘[x86_64, i386]’.”

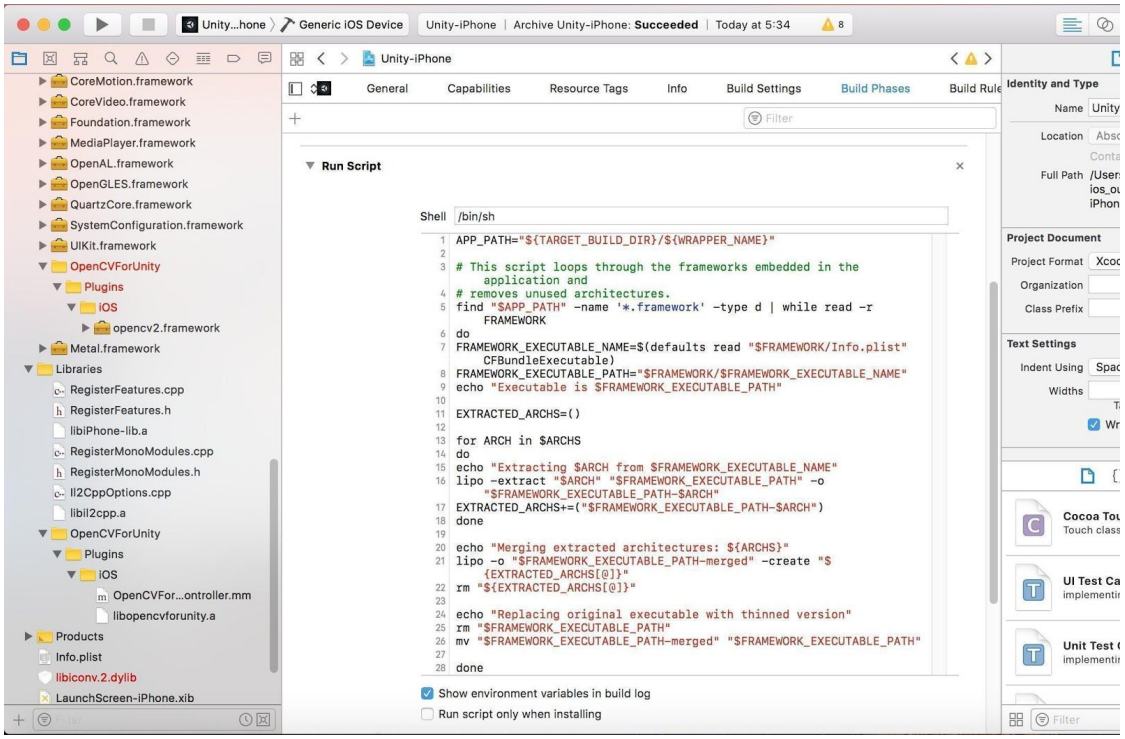


A9.
http://ioscake.com/submit-to-app-store-issues-unsupported-architecture-x86.html
“The problem is that the Buy framework contains a build for both the simulator (x86_64) and the actual devices (ARM).

Of course, you aren’t allowed to submit to the App Store a binary for an unsupported architecture, so the solution is to “manually” remove the unneeded architectures from the final binary, before submitting it.”

There are **two ways** to solve this error.

1. Please add the script of this page to BuildPhases->RunScript.
   http://ikennd.ac/blog/2015/02/stripping-unwanted-architectures-from-dynamic-libraries-in-xcode/



2. Please execute the following command on terminal.
https://stackoverflow.com/questions/42641806/check-and-remove-unsupported-architecture-x86-64-i386-in-ipa-archive

```
//remove i386 architectures.
lipo -remove i386 opencv2.framework/opencv2 -o opencv2.framework/opencv2

//remove x86_64 architectures.
lipo -remove x86_64 opencv2.framework/opencv2 -o opencv2.framework/opencv2

//check the architectures.
lipo -info opencv2.framework/opencv2
```

Q10
How can I use SIFT or SURF algorithms?
A10.
The native library included in OpenCVForUnity is built with the OPENCV_ENABLE_NONFREE flag disabled. To use the SIFT and SURF algorithms, rebuild OPENCV library with OPENCV_ENABLE_NONFREE enabled. For more details, see the section on “How to use OpenCV Dynamic Link Library with customized build settings” in this document.

Q11.
How to catch native OpenCV’s errors code (CVException handling)
A11.
In order to display the native opencv’s error code, please enclose the code in Utils.setDebugMode(true) and Utils.setDebugMode(false).

Utils.setDebugMode(true); ---------- Utils.setDebugMode(false);

See this page for details. ([Tips] How to catch native OpenCV's errors code (CVException handling))