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WORLD CHANGING

Object Detection using Deep Learning

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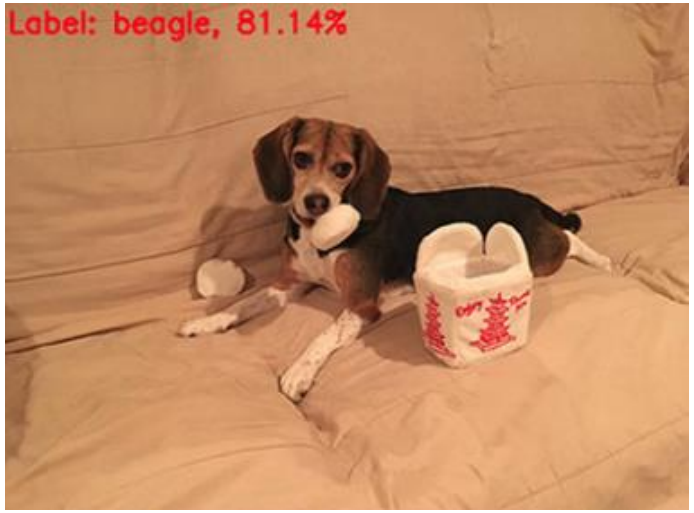
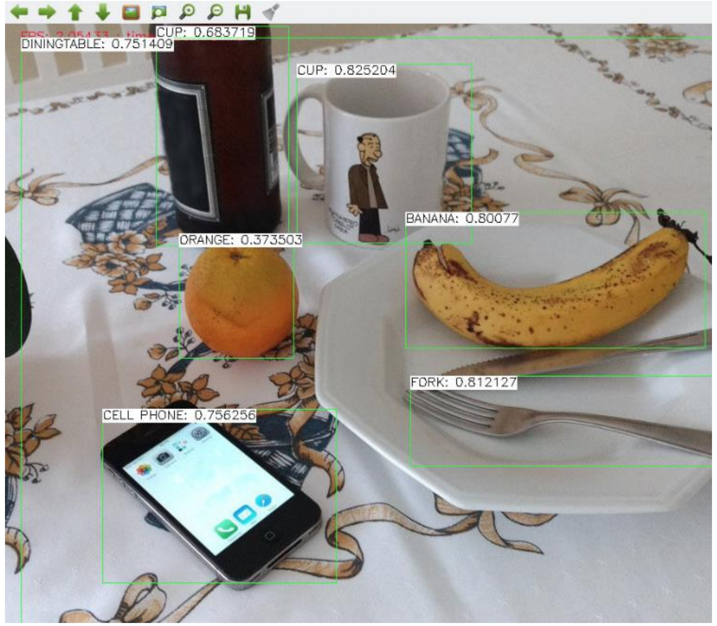
Deep learning in openCV

- From ver. 3.3, you can use deep learning in openCV!
  - openCV support many deep learning framework such as Caffe, TensorFlow, Darknet, and Torch/PyTorch
  - You can use pre-trained deep learning model and use it in C++, Python





Deep learning in openCV

- How to use deep learning in OpenCV

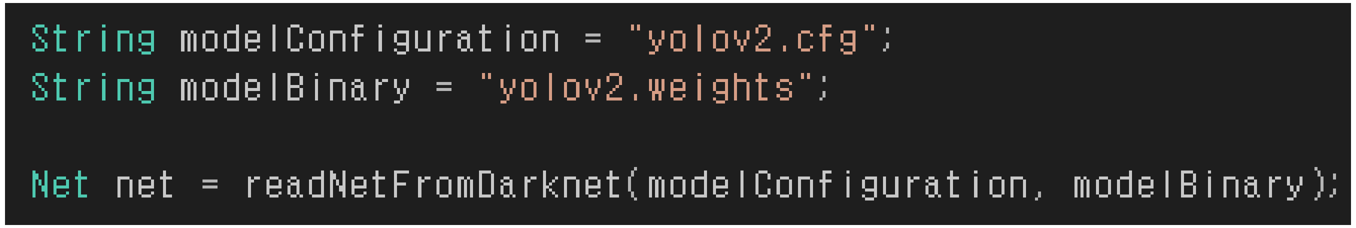
1. load deep learning model

2. process an input image to a blob suitable for deep learning model

3. obtain classification result by propagating the input blob

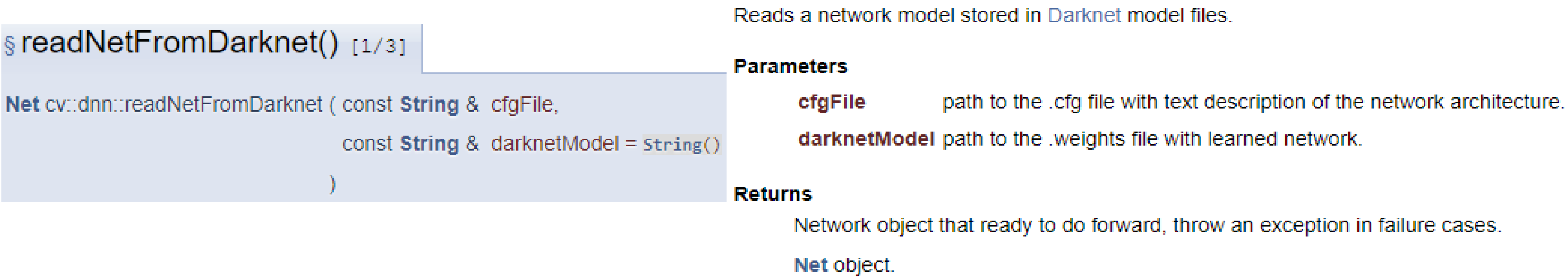
YOLO

- Load deep learning model



```
String modelConfiguration = "yolov2.cfg";
String modelBinary = "yolov2.weights";

Net net = readNetFromDarknet(modelConfiguration, modelBinary);
```



§ readNetFromDarknet() [1/3]

```
Net cv::dnn::readNetFromDarknet ( const String &  cfgFile,
                                  const String &  darknetModel = String()
                                )
```

Reads a network model stored in Darknet model files.

Parameters

cfgFile	path to the .cfg file with text description of the network architecture.
darknetModel	path to the .weights file with learned network.

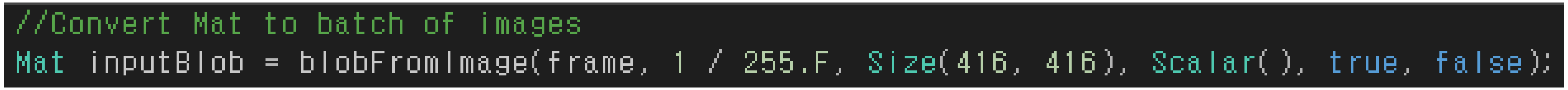
Returns

Network object that ready to do forward, throw an exception in failure cases.

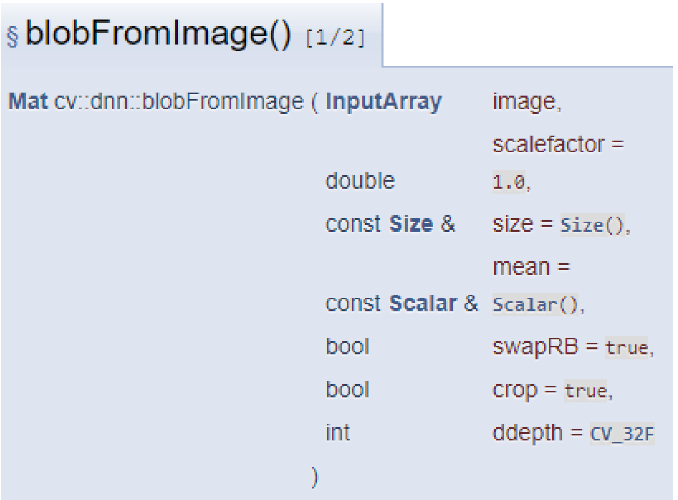
Net object.

YOLO

- Process an input image to a blob suitable for deep learning model



```
//Convert Mat to batch of images
Mat inputBlob = blobFromImage(frame, 1 / 255.F, Size(416, 416), Scalar(), true, false);
```

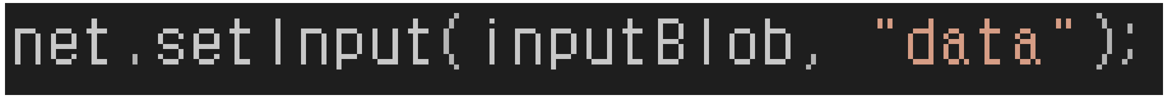


§ blobFromImage() [1/2]

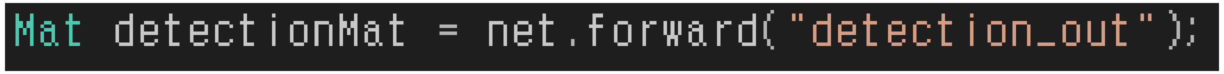
```
Mat cv::dnn::blobFromImage ( InputArray       image,
                                                scalefactor =
                             double             1.0,
                             const Size &       size = Size(),
                                                mean =
                             const Scalar &     Scalar(),
                             bool               swapRB = true,
                             bool               crop = true,
                             int                ddepth = CV_32F
                           )
```

YOLO

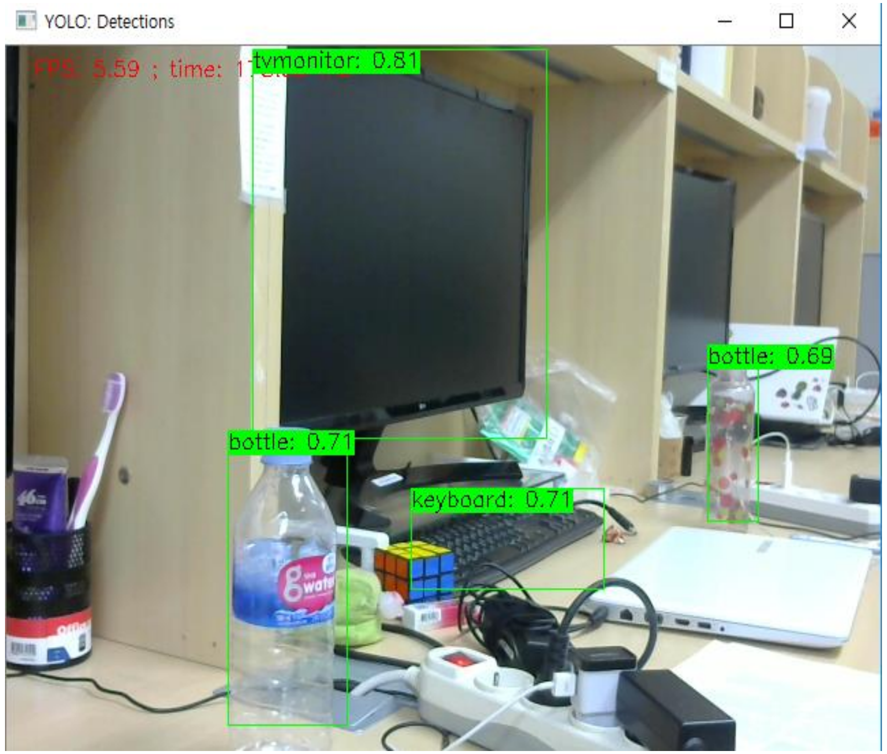
- Obtain classification result by propagating the input blob



```
net.setInput(inputBlob, "data");
```



```
Mat detectionMat = net.forward("detection_out");
```


YOLO: Detections
FPS: 5.59 ; time: 1
tvmonitor: 0.81
bottle: 0.69
bottle: 0.71
keyboard: 0.71