

# TensorFlow Object Detection API

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**This primer will shortly review some notions and resources that you will need to get started with the TensorFlow Object Detection (TFOD) API.**

# Introduction to TensorFlow

TensorFlow makes it easy for beginners and experts to create machine learning models for desktop, mobile, web, and cloud. See the sections below to get started.



## TensorFlow

Learn the foundation of TensorFlow with tutorials for beginners and experts to help you create your next machine learning project.

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## For JavaScript

Use TensorFlow.js to create new machine learning models and deploy existing models with JavaScript.

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## For Mobile & IoT

Run inference with TensorFlow Lite on mobile and embedded devices like Android, iOS, Edge TPU, and Raspberry Pi.

Learn more



## For Production

Deploy a production-ready ML pipeline for training and inference using TensorFlow Extended (TFX).

Learn more



# TensorFlow Model Garden

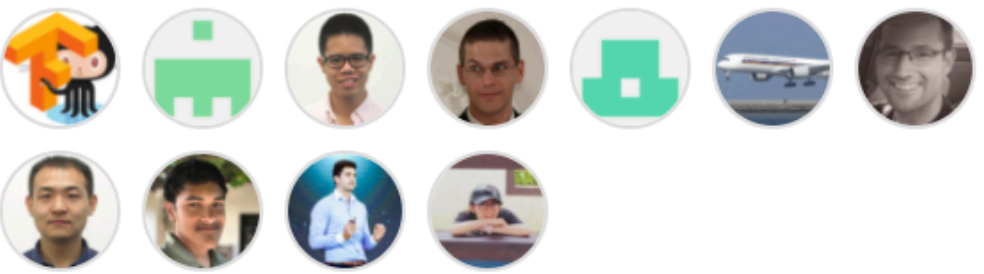
## Welcome to the Model Garden for TensorFlow

The TensorFlow Model Garden is a repository with a number of different implementations of state-of-the-art (SOTA) models and modeling solutions for TensorFlow users. We aim to demonstrate the best practices for modeling so that TensorFlow users can take full advantage of TensorFlow for their research and product development.

To improve the transparency and reproducibility of our models, training logs on [TensorBoard.dev](#) are also provided for models to the extent possible though not all models are suitable.

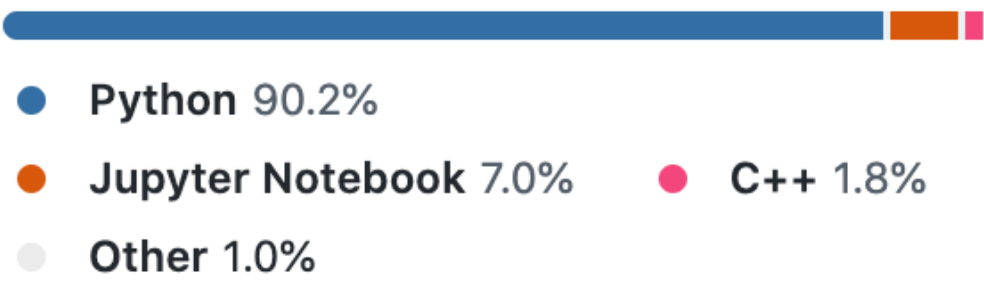
Directory	Description
<a href="#">official</a>	<ul style="list-style-type: none"><li>• A collection of example implementations for SOTA models using the latest TensorFlow 2's high-level APIs</li><li>• Officially maintained, supported, and kept up to date with the latest TensorFlow 2 APIs by TensorFlow</li><li>• Reasonably optimized for fast performance while still being easy to read</li></ul>
<a href="#">research</a>	<ul style="list-style-type: none"><li>• A collection of research model implementations in TensorFlow 1 or 2 by researchers</li><li>• Maintained and supported by researchers</li></ul>
<a href="#">community</a>	<ul style="list-style-type: none"><li>• A curated list of the GitHub repositories with machine learning models and implementations powered by TensorFlow 2</li></ul>
<a href="#">orbit</a>	<ul style="list-style-type: none"><li>• A flexible and lightweight library that users can easily use or fork when writing customized training loop code in TensorFlow 2.x. It seamlessly integrates with <code>tf.distribute</code> and supports running on different device types (CPU, GPU, and TPU).</li></ul>

### Contributors 737



+ 726 contributors

### Languages





# TensorFlow 2 Detection Model Zoo

 TensorFlow 2.2

 Python 3.6

We provide a collection of detection models pre-trained on the [COCO 2017 dataset](#). These models can be useful for out-of-the-box inference if you are interested in categories already in those datasets. You can try it in our inference [colab](#)

They are also useful for initializing your models when training on novel datasets. You can try this out on our few-shot training [colab](#).

Please look at [this guide](#) for mobile inference.

Finally, if you would like to train these models from scratch, you can find the model configs in this [directory](#) (also in the linked `tar.gz` s).

Model name	Speed (ms)	COCO mAP	Outputs
<a href="#">CenterNet HourGlass104 512x512</a>	70	41.9	Boxes
<a href="#">CenterNet HourGlass104 Keypoints 512x512</a>	76	40.0/61.4	Boxes/Keypoints
<a href="#">CenterNet HourGlass104 1024x1024</a>	197	44.5	Boxes
<a href="#">CenterNet HourGlass104 Keypoints 1024x1024</a>	211	42.8/64.5	Boxes/Keypoints
<a href="#">CenterNet Resnet50 V1 FPN 512x512</a>	27	31.2	Boxes
<a href="#">CenterNet Resnet50 V1 FPN Keypoints 512x512</a>	30	29.3/50.7	Boxes/Keypoints
<a href="#">CenterNet Resnet101 V1 FPN 512x512</a>	34	34.2	Boxes
<a href="#">CenterNet Resnet50 V2 512x512</a>	27	29.5	Boxes
<a href="#">CenterNet Resnet50 V2 Keypoints 512x512</a>	30	27.6/48.2	Boxes/Keypoints
<a href="#">CenterNet MobileNetV2 FPN 512x512</a>	6	23.4	Boxes
<a href="#">CenterNet MobileNetV2 FPN Keypoints 512x512</a>	6	41.7	Keypoints
<a href="#">EfficientDet D0 512x512</a>	39	33.6	Boxes

# TensorFlow 2 Object Detection API tutorial

📢 Important

This tutorial is intended for TensorFlow 2.5, which (at the time of writing this tutorial) is the latest stable version of TensorFlow 2.x.

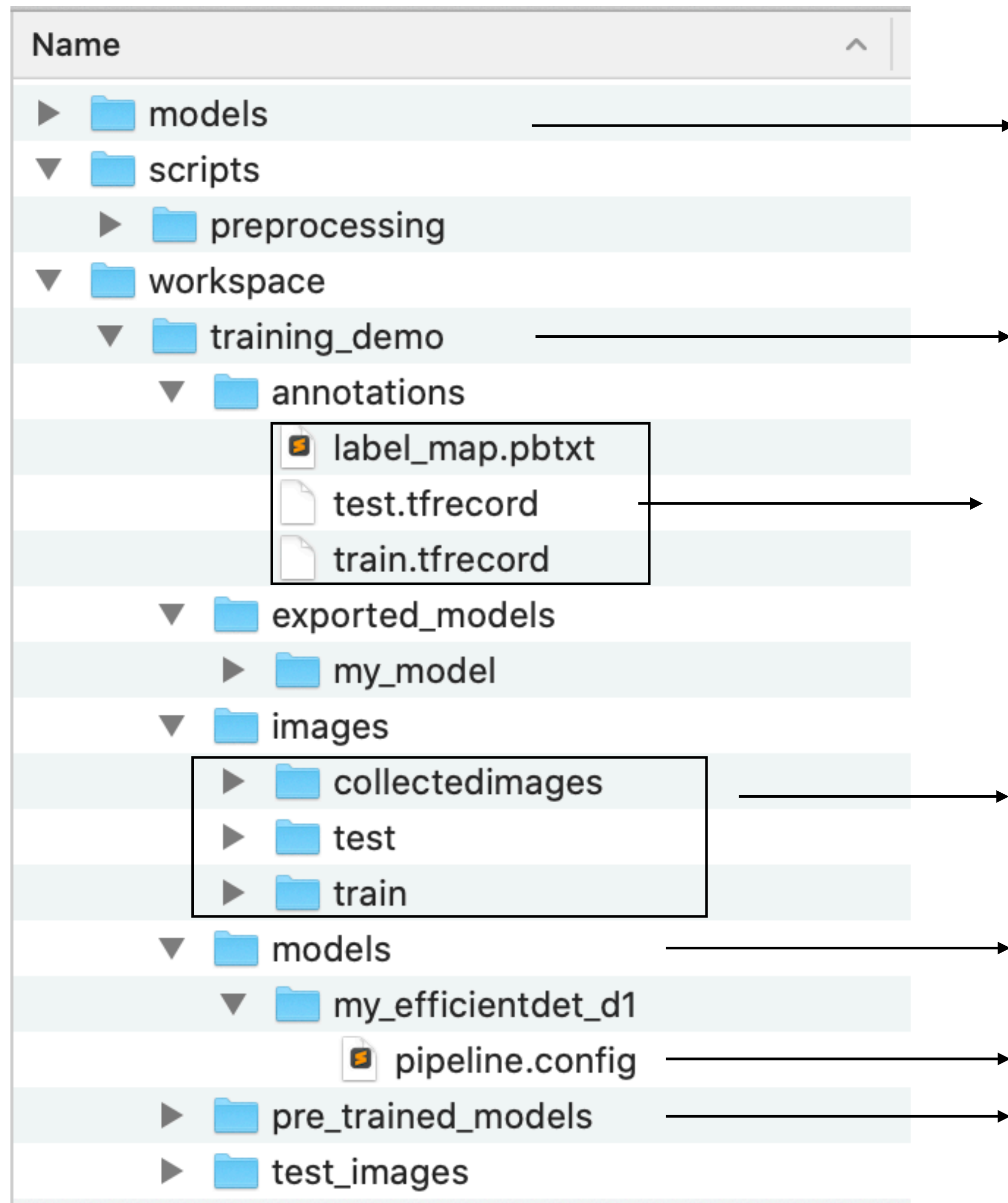
A version for TensorFlow 2.2 can be found [here](#).

A version for TensorFlow 1.14 can be found [here](#).

This is a step-by-step tutorial/guide to setting up and using TensorFlow’s Object Detection API to perform, namely, object detection in images/video.

The software tools which we shall use throughout this tutorial are listed in the table below:

Target Software versions	
OS	Windows, Linux
Python	3.9 <sup>1</sup>
TensorFlow	2.5.0
CUDA Toolkit	11.2
CuDNN	8.1.0
Anaconda	Python 3.8 (Optional)



TFOD API files

For each model you will train, you can start a folder under your workspace.

We will generate these files for each new detection task / dataset.

You can put images you'll collect and label under collected\_images. You will need a script to split them into train and test folders.

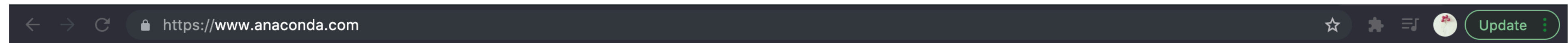
Outputs folder for training.

We will also need to provide a training configuration file.

Public models from which you can start training your own models.



# What to install



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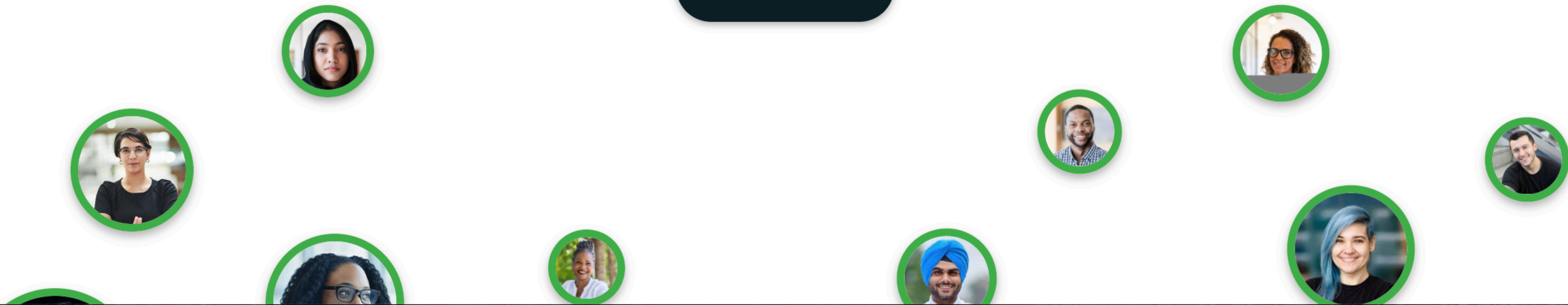
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# What to install

TensorFlow

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Install TensorFlow

Packages

- pip
- Docker

Additional setup

- GPU support
- GPU device plugins
- Problems

Build from source

- Linux / macOS
- Windows
- SIG Build

Language bindings

- Java
- Java (legacy)
- C
- Go

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## Install TensorFlow 2

TensorFlow is tested and supported on the following 64-bit systems:

- Python 3.6–3.9
- macOS 10.12.6 (Sierra) or later (no GPU support)
- Ubuntu 16.04 or later
- Windows 7 or later (with [C++ redistributable](#))

## Download a package

Install TensorFlow with Python's *pip* package manager.

★ TensorFlow 2 packages require a **pip** version >19.0 (or >20.3 for macOS).

Official packages available for Ubuntu, Windows, and macOS.

```
# Requires the latest pip
$ pip install --upgrade pip

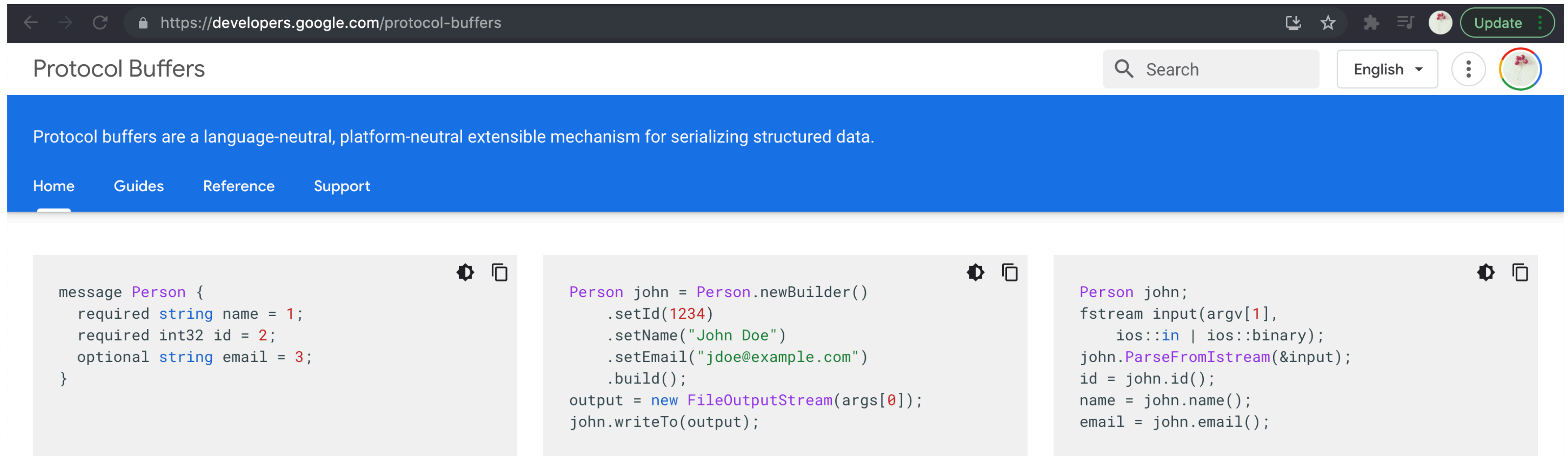
# Current stable release for CPU and GPU
$ pip install tensorflow

# Or try the preview build (unstable)
$ pip install tf-nightly
```

On this page

Build your first ML app

# What to install

A screenshot of the Protocol Buffers website. The browser address bar shows 'https://developers.google.com/protocol-buffers'. The page title is 'Protocol Buffers'. Below the title is a search bar and a language selector set to 'English'. A blue banner contains the text: 'Protocol buffers are a language-neutral, platform-neutral extensible mechanism for serializing structured data.' Below the banner is a navigation menu with links: 'Home', 'Guides', 'Reference', and 'Support'. The main content area features three code snippets, each with a settings icon and a copy icon. The first snippet is Protobuf IDL for a 'Person' message. The second is Java code using the 'Person' class. The third is C++ code using the 'Person' class.

```
message Person {
  required string name = 1;
  required int32 id = 2;
  optional string email = 3;
}
```

```
Person john = Person.newBuilder()
    .setId(1234)
    .setName("John Doe")
    .setEmail("jdoe@example.com")
    .build();
output = new FileOutputStream(args[0]);
john.writeTo(output);
```

```
Person john;
fstream input(argv[1],
              ios::in | ios::binary);
john.ParseFromIstream(&input);
id = john.id();
name = john.name();
email = john.email();
```

## What are protocol buffers?

Protocol buffers are Google's language-neutral, platform-neutral, extensible mechanism for serializing structured data – think XML, but smaller, faster, and simpler. You define how you want your data to be structured once, then you can use special generated source code to easily write and read your structured data to and from a variety of data streams and using a variety of languages.

[Learn more](#)

## Pick your favorite language

Protocol buffers currently support generated code in Java, Python, Objective-C, and C++. With our new proto3 language version, you can also work with Dart, Go, Ruby, and C#, with more languages to come.

[C++](#) [C#](#) [Dart](#) [Go](#) [Java](#) [Kotlin](#) [Python](#)

## How do I start?

1. [Download](#) and install the protocol buffer compiler.
2. Read the [overview](#).
3. Try the [tutorial](#) for your chosen language.

# What to install

←

→

↺

https://github.com/cocodataset/cocoapi


☆

⚙️

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🏷 0 tags

Go to file

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Code ▾

 tylin Merge pull request #183 from wenting-zhao/master ...

8c9bcc3 on 20 Feb 2020 ⌚ 201 commits

📁 LuaAPI	MaskApi: adding simple box/rle NMS code (matlab/lua)	5 years ago
📁 MatlabAPI	deleted precompiled Matlab binaries (no longer maintaining these)	3 years ago
📁 PythonAPI	Merge pull request #183 from wenting-zhao/master	2 years ago
📁 common	BUG FIX in bb = MaskApi.toBbox(R) !!!	3 years ago
📁 results	MatlabAPI/CocoEval.m: adding keypoint evaluation code!!! (needs mo...	5 years ago
📄 .gitignore	deleted precompiled Matlab binaries (no longer maintaining these)	3 years ago
📄 .travis.yml	pip install pycocotools is broken in Travis CI	4 years ago
📄 README.txt	Update README.txt	4 years ago
📄 license.txt	moved license to root directory	7 years ago

README.txt

COCO API - <http://cocodataset.org/>

About

COCO API - Dataset @ <http://cocodataset.org/>

📖 Readme

📜 View license


Releases

No releases published

Packages

No packages published

Used by 8.8k

 + 8,801

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# Things you will need to do

1. Organise your workspace (folder structure)
2. (Create a label map and annotate images)
3. Generate (Tensorflow record files) tfrecords
4. Provide a configuration file for the training pipeline
5. Train your model and check its progress
6. Export the resulting model and use it to detect objects