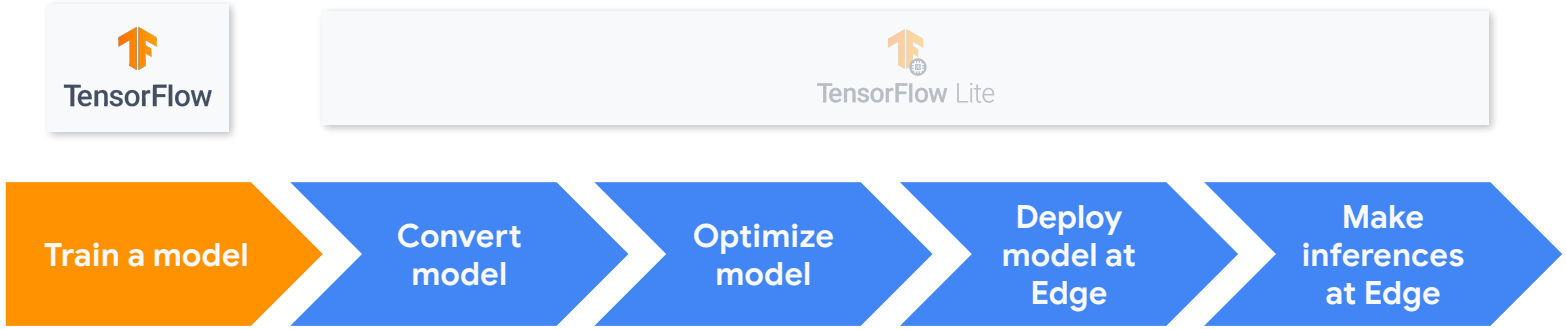
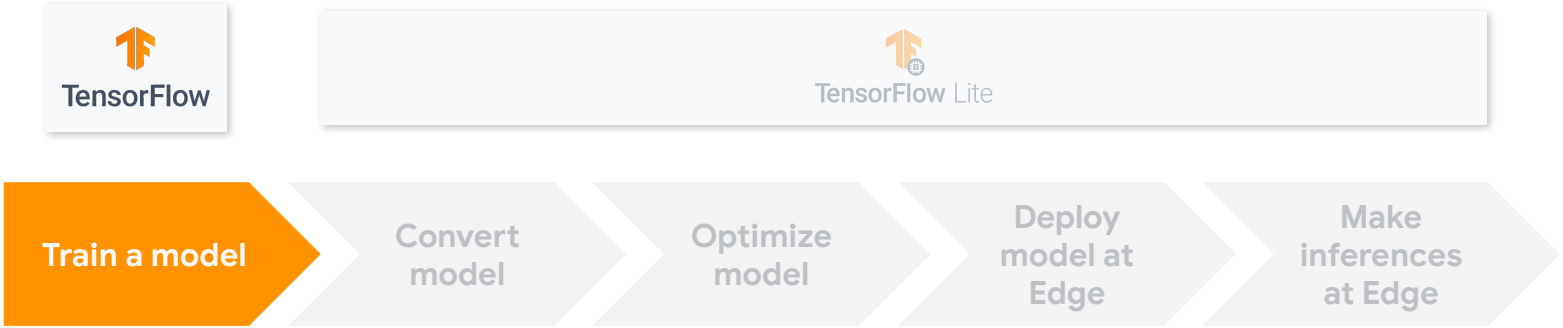
Quantization-aware training

Optimizing for TFLite from the beginning...

Laurence Moroney, Google


TensorFlow
TensorFlow Lite
Train a model
Convert model
Optimize model
Deploy model at Edge
Make inferences at Edge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Using QAT

```
# Load MNIST dataset
mnist = keras.datasets.mnist

(train_images, train_labels), (test_images, test_labels) =
    mnist.load_data()

# Normalize the input image so that each pixel value is between 0 to 1.
train_images = train_images / 255.0
test_images = test_images / 255.0

# Define the model architecture.
model = keras.Sequential([
  keras.layers.InputLayer(input_shape=(28, 28)),
  keras.layers.Reshape(target_shape=(28, 28, 1)),
  keras.layers.Conv2D(filters=12, kernel_size=(3, 3), activation='relu'),
  keras.layers.MaxPooling2D(pool_size=(2, 2)),
  keras.layers.Flatten(),
  keras.layers.Dense(10)
])
```

```
loss: 0.2724 - accuracy: 0.9244 -
val_loss: 0.1085 - val_accuracy: 0.9695
```

```
import tensorflow_model_optimization as tfmot

quantize_model = tfmot.quantization.keras.quantize_model

# q_aware stands for for quantization aware.
q_aware_model = quantize_model(model)

# `quantize_model` requires a recompile.
q_aware_model.compile(optimizer='adam',
              loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
              metrics=['accuracy'])
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loss: 0.1315 - accuracy: 0.9589 -
val_loss: 0.1360 - val_accuracy: 0.9600
```

Your Turn