CHAPTER 30

TensorFlow 2.0 and Keras

TensorFlow (TF) is a specialized numerical computation library for deep learning. It is the preferred tool by numerous deep learning researchers and industry practitioners for developing deep learning models and architectures as well as for serving learned models into production servers and software products. This chapter is focused on TensorFlow 2.0.

Navigating Through the TensorFlow API

Understanding the different levels of the TF API hierarchy is critical to working effectively with TF. The task of building a TF deep learning model may be addressed via different TF API levels. An understanding of the API hierarchy provides clarity on implementing neural network models with TF as well as navigating the TF ecosystem. The TF API hierarchy is primarily composed of three API levels, the high-level API, the mid-level API which provides components for building neural network models, and the low-level API. A diagrammatic representation of this is shown in Figure 30-1.
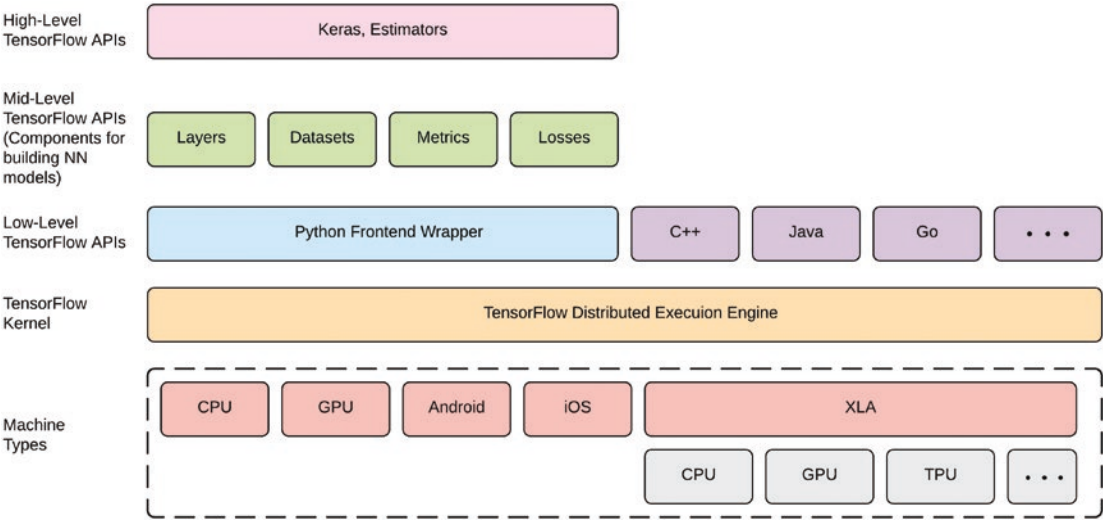
Figure 30-1. *TensorFlow API hierarchy*

The Low-Level TensorFlow APIs

The low-level API gives the tools for building network graphs from the ground up using mathematical operations. This API level affords the greatest level of flexibility to tweak and tune the model as desired. Moreover, the higher-level APIs implement low-level operations under the hood.

The Mid-Level TensorFlow APIs

TensorFlow provides a set of reusable packages for simplifying the process involved in creating neural network models. Some examples of these functions include the layers **(tf.keras.layers)**, Datasets **(tf.data)**, metrics **(tf.keras.metrics)**, loss **(tf.keras.losses)**, and FeatureColumns **(tf.feature_column)** packages.

Layers

The layers package **(tf.keras.layers)** provides a handy set of functions to simplify the construction of layers in a neural network architecture. For example, consider the convolutional network architecture in Figure 30-2 and how the layers API simplifies the creation of the network layers.