XCCELERATE

Image Recognition : Tensorflow 101

Tensorflow Basics

TensorFlow™ is an open source software library for high performance numerical computation.

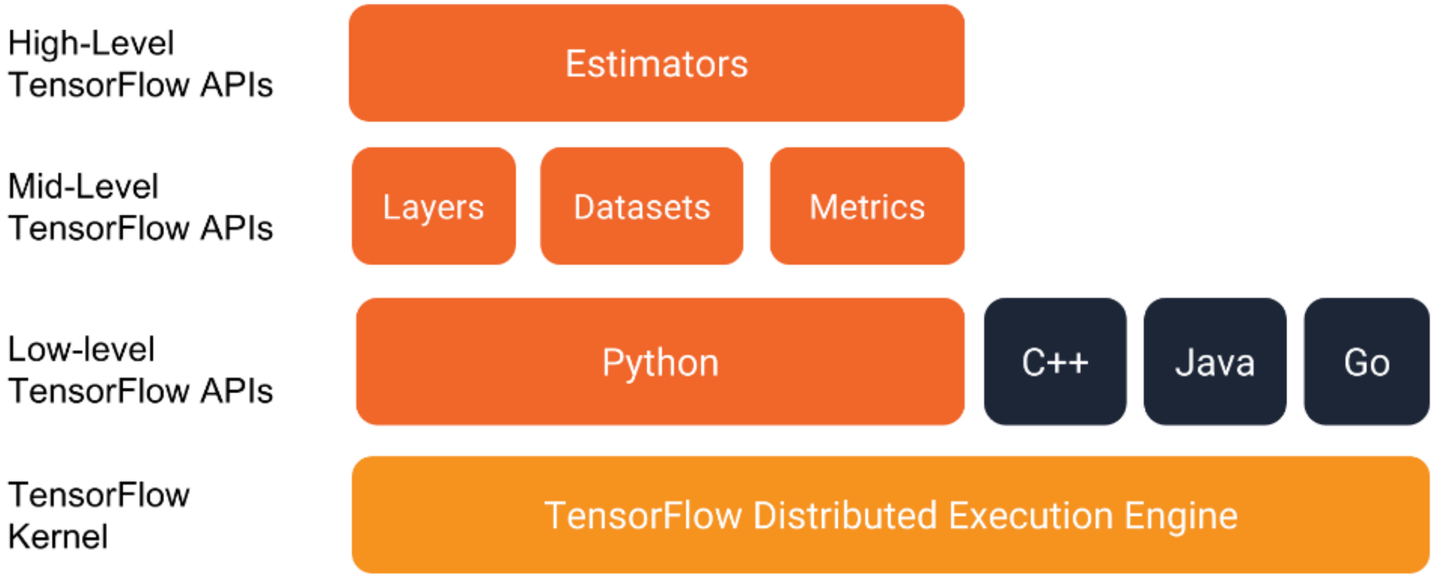
Strong support for machine learning (incl deep learning)

Flexible architecture

Can run on CPU, GPU and TPU

Source: INSIGHT

Tensorflow Programming Model



TensorFlow™ is an open source software library for high performance numerical computation.

Source: INSIGHT

Machine Learning

Tensorflow Basics?

- TensorFlow Basics
  - TF Basic Syntax
  - TF Graphs
  - TF Variables
  - TF Placeholders
  - Simple Neural Network walkthrough
- TensorFlow Regression Neural Code walk through
- Tensorflow sample IRIS dataset walk through.
- Tensorflow practice work

TensorFlow Basic Syntax

Tensorflow 101

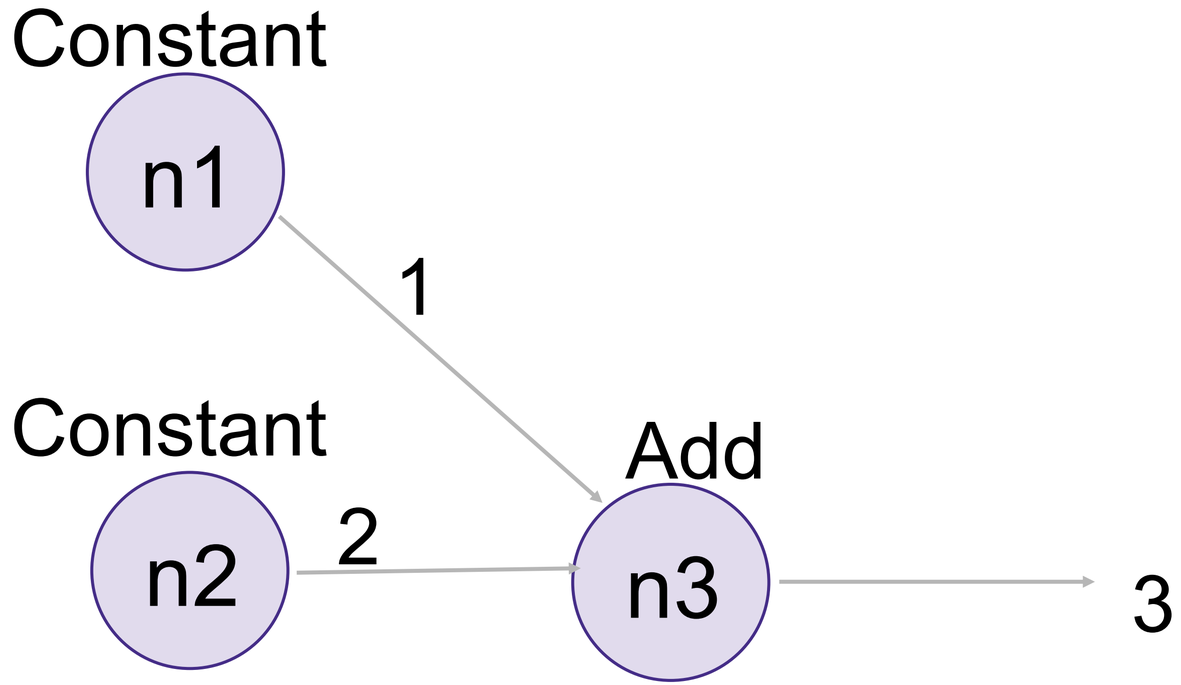
- *Graphs are sets of connected nodes (vertices).*
- *The connections are referred to as edges.*
- *In TensorFlow each node is an operation with possible inputs that can supply some output.*

Tensorflow 101

- *In general, with TensorFlow we will construct a graph and then execute it.*
- *Let's start showing some simple examples in Python!*
- *We'll also discuss how TensorFlow uses a default graph.*

Tensorflow 101

- *We'll start by building out this graph:*



Variables and Placeholders

Tensorflow 101

- *There are two main types of tensor objects in a Graph:*
  - *Variables*
  - *Placeholders*

Tensorflow 101

- *During the optimization process TensorFlow tunes the parameters of the model.*
- *Variables can hold the values of weights and biases throughout the session.*
- *Variables need to be initialized.*

Tensorflow 101

- *Placeholders are initially empty and are used to feed in the actual training examples.*
- *However they do need a declared expected data type (tf.float32) with an optional shape argument.*

Tensorflow 101

- *Let's see some examples of each.*
- *Once we understand how they work we'll be ready to build our first model with TensorFlow!*

First TF Neural Network

Tensorflow 101

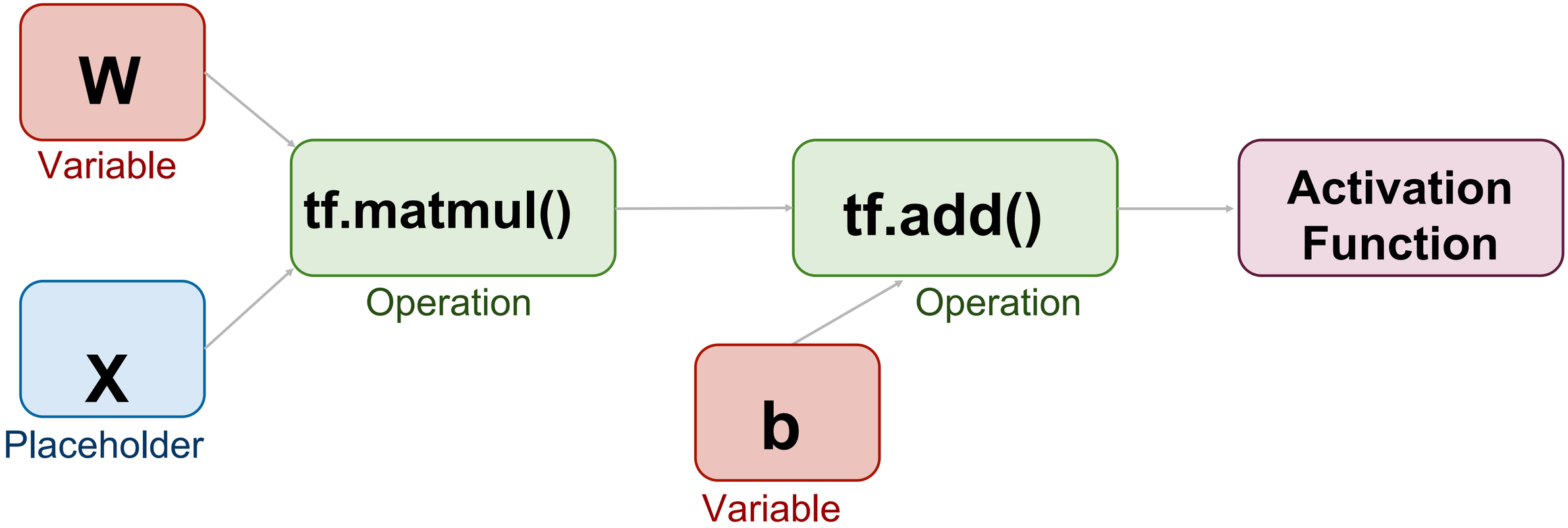
- *We've learned about Sessions, Graphs, Variables, and Placeholders.*
- *With these building blocks we can create our first neuron!*
- *We'll create a neuron that performs a very simple linear fit to some 2-D data.*

Tensorflow 101

- *Our steps are:*
  - *Build a Graph*
  - *Initiate the Session*
  - *Feed Data In and get Output*
- *We'll use the basics we've learned so far to accomplish this task!*

Tensorflow 101

What does the graph of wx+b=z look like?



Tensorflow 101

- *Afterwards you can add in the cost function in order to train your network to optimize the parameters!*
- *Let's build this neural network!*

TensorFlow Regression

Using Neural Network Code walk through

Tensorflow - Estimators

- *Let’s now explore the Estimator API from TensorFlow!*
- *There are also higher level APIs (Keras etc)*
- *An Estimator is TensorFlow's high-level representation of a complete model.*
- *The tf.estimator API has several model types to choose from*
- *Here are the Estimator Types*
    - *tf.estimator.LinearClassifier: Constructs a linear classification model.*
    - *tf.estimator.LinearRegressor: Constructs a linear regression model.*
    - *tf.estimator.DNNClassifier: Construct a neural network classification model.*
    - *tf.estimator.DNNRegressor: Construct a neural network regression model*

Tensorflow -Estimators

- *In general, to use the Estimator API we do the following:*
    1. Create one or more input functions.(supply data)
    2. Define the model's feature columns.
    3. Instantiate an Estimator, specifying the feature columns and various hyperparameters.
    4. Call one or more methods on the Estimator object, passing the appropriate input function as the source of the data.

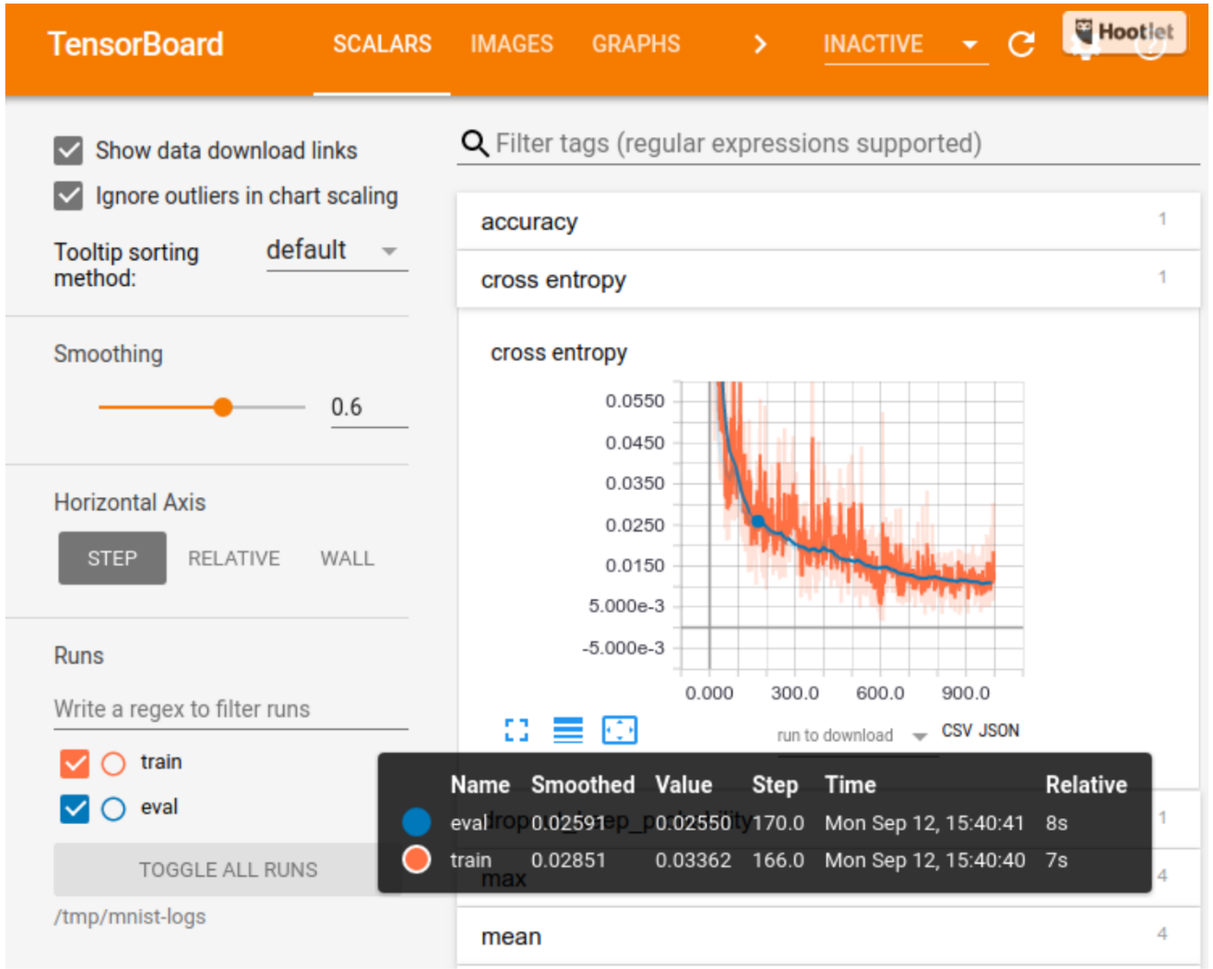
    https://www.tensorflow.org/guide/premade_estimators

Tensorboard

Suite of Visualisation tools.

Understand , Debug and optimise tensorflow programs

https://www.tensorflow.org/guide/summaries_and_tensorboard



Tensorflow 101

Review Tensorboard and its usage

Practice – Linear regression estimator.

https://www.tensorflow.org/guide/summaries_and_tensorboard

Tensorflow – New features

- *Eager execution – easier to learn and apply.*
- *Support for more platform and languages*
- *Cleanup of duplicate APIs*
- *Conversion tool for existing code*