Tensorflow

Apoorv Vishnoi

Why use Deep Learning Libraries

Many datasets are complex, requiring us to use multiple hidden layers

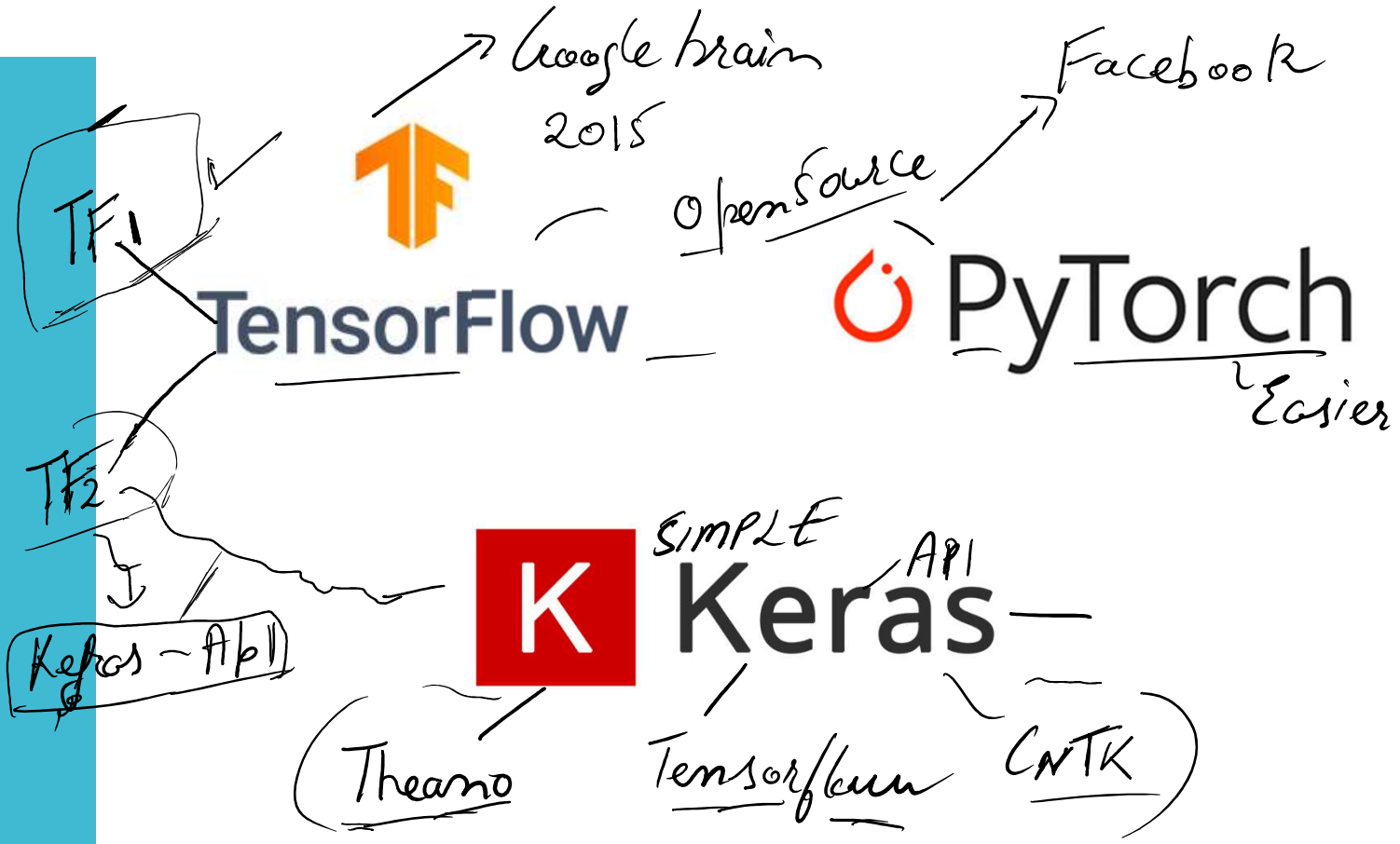
Backpropagating derivatives for different Loss functions can be painful

Libraries have vectorized implementations

Accessing multiple CPU cores

Using GPUs for computation

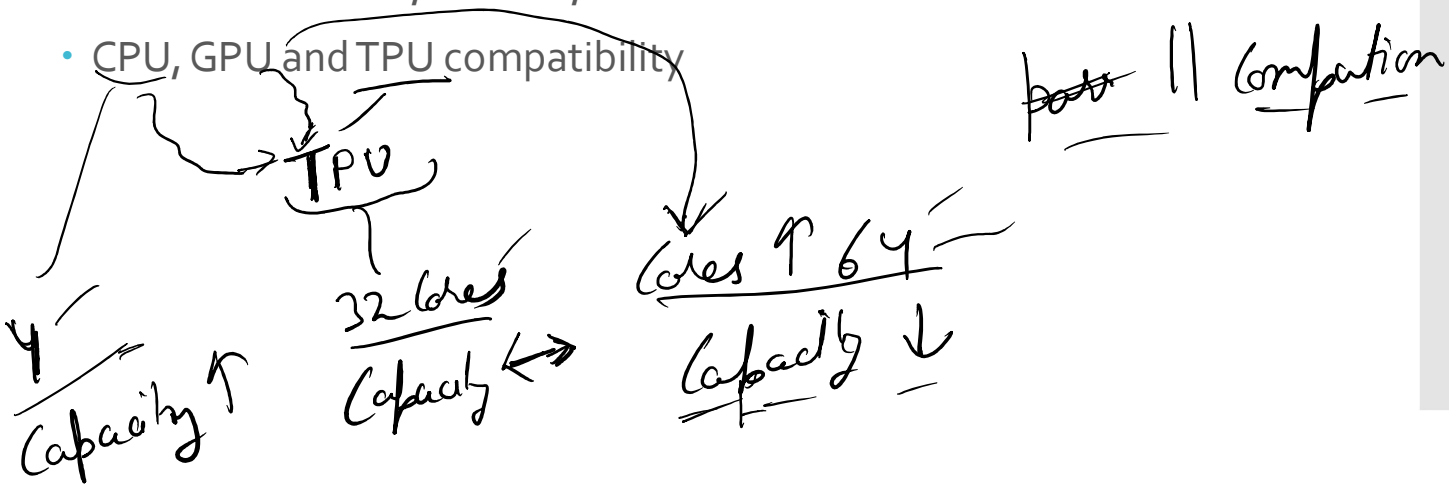
Popular libraries for Neural Networks



https://en.wikipedia.org/wiki/Comparison_of_deep-learning_software

TensorFlow

- Open source library from Google brain for Deep learning
- Arguably the most popular library for Deep learning
- Runs on Windows, Mac OS, Linux & Android
- CPU, GPU and TPU compatibility



TF 1

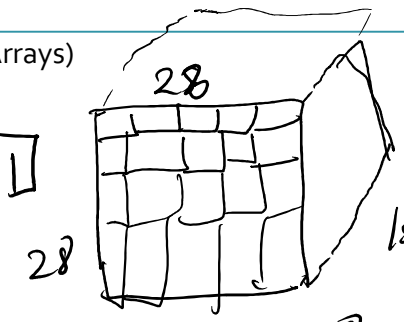
Tensor

a tensor is an algebraic object that describes a (multilinear) relationship between sets of algebraic objects related to a vector space.

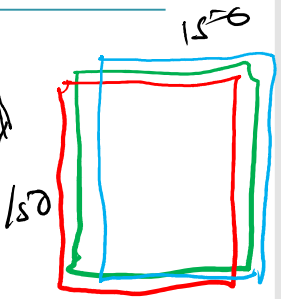
- Arrays of number (Scalars, Vectors, Multidimensional Arrays)

[42] [8, 12, 11, 3, 10, 1]

Scalar Vector



10,000 x 28 x 28



2000 x 150 x 150 x 3

Computational Graph

Computations are represented by a data flow graph, known as computational graph

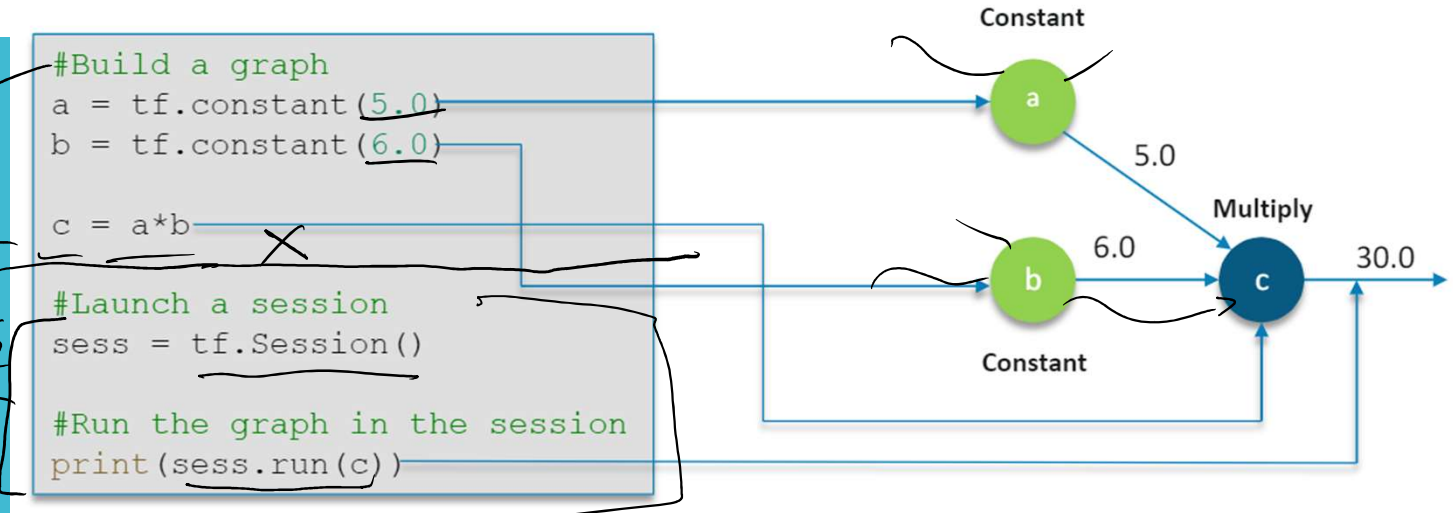
- A node in the graph represents an operation (addition, division etc)

Computational Graph

```
#Build a graph
a = tf.constant(5.0)
b = tf.constant(6.0)

c = a*b

#Launch a session
sess = tf.Session()

#Run the graph in the session
print(sess.run(c))
```

Output

```
30.0
```

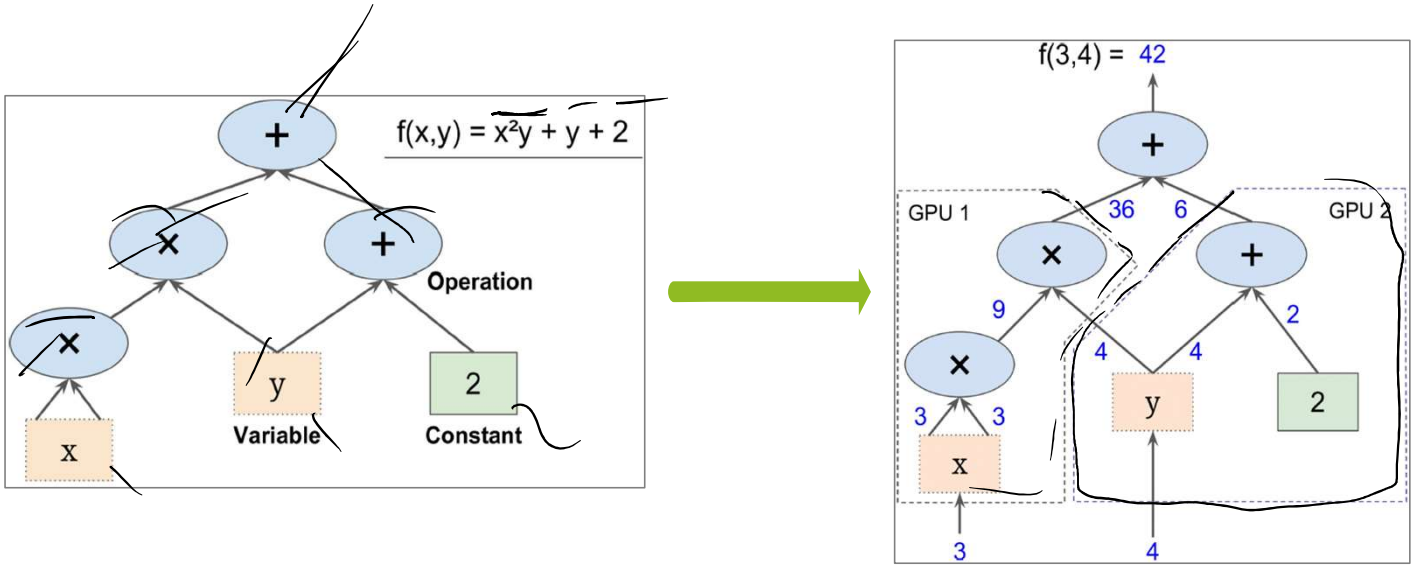


Running the Computational Graph

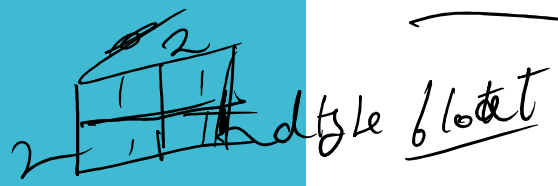
In graph node, a graph needs to be constructed every time to perform operations

Eager mode follows a programming paradigm where any operation can be executed immediately, like in Python.

Computational Graph



TF 1 Program Elements



Constant

- A parameter whose value never changes

Placeholder

- Permits a value to be assigned later
- a = tf.placeholder(tf.float32)

feed_dict parameter

- Specifies Tensors that provide concrete values to the placeholders

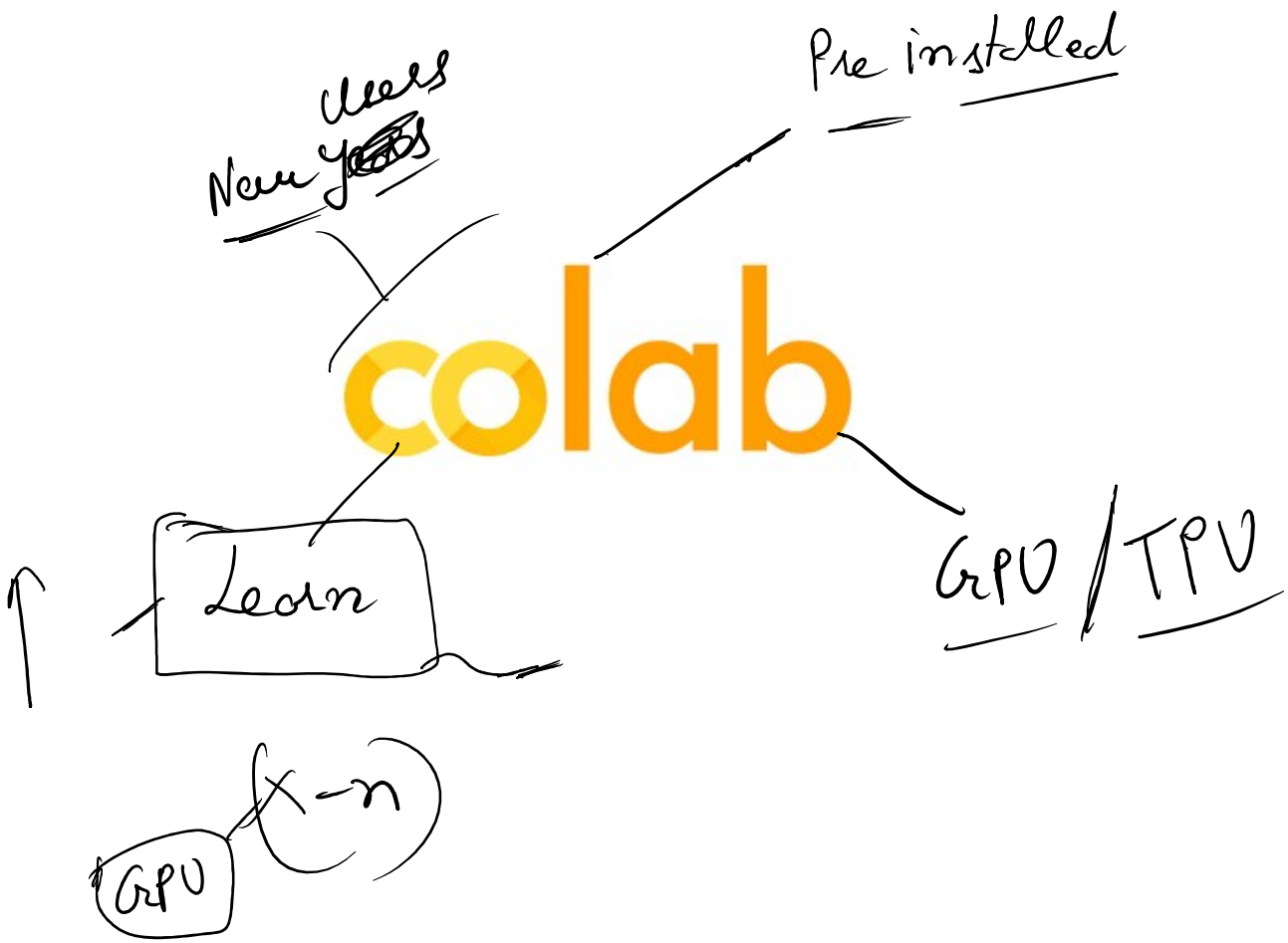
Variable

- Allows addition of new trainable parameters to a graph
- W = tf.Variable([.3], dtype=tf.float32)
- b = tf.Variable([-.3], dtype=tf.float32)
- x = tf.placeholder(tf.float32)
- linear_model = W * x + b

Session

- A session is run to evaluate the nodes
- This is called as the TensorFlow runtime

Lets create MLP on MNIST dataset using TF1



TF1 APIs

Pandas
|
Python
C++

TensorFlow Core API

- Low level Machine Learning Development
- Offers more customisation
- Coding is Verbose

Higher level APIs

- APIs are built on top of Core
- Easier to learn and use
- Helps managing layers, data, training and inference
- Has compact APIs such as tf.contrib.learn, tf.layers

Thanks


webs
IMPORT OS
CUR_PATH = OS.GETCWD()
IGNORE_SET = SET(["__INIT__.PY",
"COUNT_SOURCELINES.PY"])
I DIDN'T KNOW HARRY SPOKE PYTHON.
YEAH, HE'S A PARSER-TONGUE.