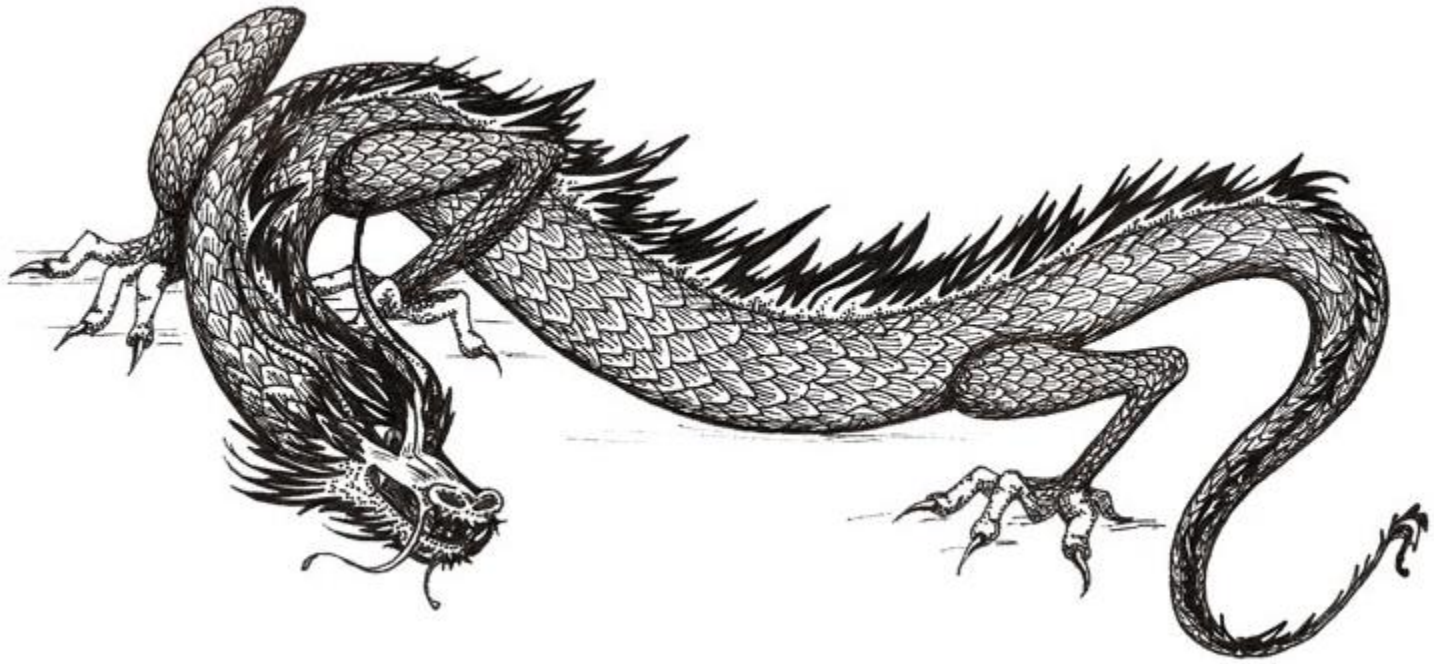


人生若只如初见

主讲人：龙良曲

前世今生

- 2015.9发布0.1版本
- 2017.2发布1.0版本
- 2019春发布2.0版本

2015

- Scikit-learn
  - Machine learning, No GPU
- Caffe
  - 2013, 第一个面向深度学习的框架
  - No auto-grad, C++
- Keras
  - wrapper
- Theano
  - 开发难，调试难
- Torch
  - Lua语言

NUS SINGA

- Prof. OOI & Prof. Wang

https://singa.incubator.apache.org/en/index.html

TensorFlow

- Caffe
  - Facebook， Caffe2 → PyTorch
  - Torch → PyTorch
- Theano
  - Google, → TensorFlow
  - → TensorFlow 2
- Chainer
- MXNet

2017: 1.0

- tf.contrib
  - tf.layers, tf.metrics, tf.losses
- tfdbg
- PyTorch 0.1

TensorFlow vs PyTorch

```tensorflow
import tensorflow as tf

a=tf.constant(7)
b=tf.constant(10)
c = tf.add(a,b)

simple_session = tf.Session()
value_of_c = simple_session.run(c)
print(value_of_c)   # 17
simple_session.close()
```

```pytorch
import torch

a = torch.tensor(1.)
b = torch.tensor(3.)

c = torch.add(a, b)
print(c.item())
```

TF 1.x Sucks.

- 调试困难
- API混乱
- 入门困难，入了门依旧困难
- 大批研究人员者转向PyTorch

http://nicodjimenez.github.io/2017/10/08/tensorflow.html

2019

- TensorFlow 2.0 is coming!
- TF+Keras
- Easy to use

Let Go

❌ session.run
❌ tf.control_dependencies
❌ tf.global_variables_initializer
❌ tf.cond, tf.while_loop

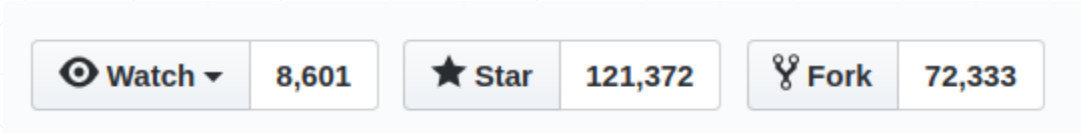
TensorFlow 2

```tensorflow
import tensorflow as tf

a = tf.constant(1.)
b = tf.constant(2.)
c = tf.add(a, b)

print(float(c))
```

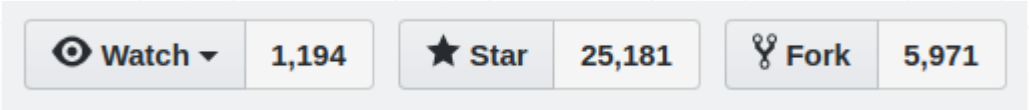
```pytorch
import torch

a = torch.tensor(1.)
b = torch.tensor(3.)

c = torch.add(a, b)
print(c.item())
```

Github

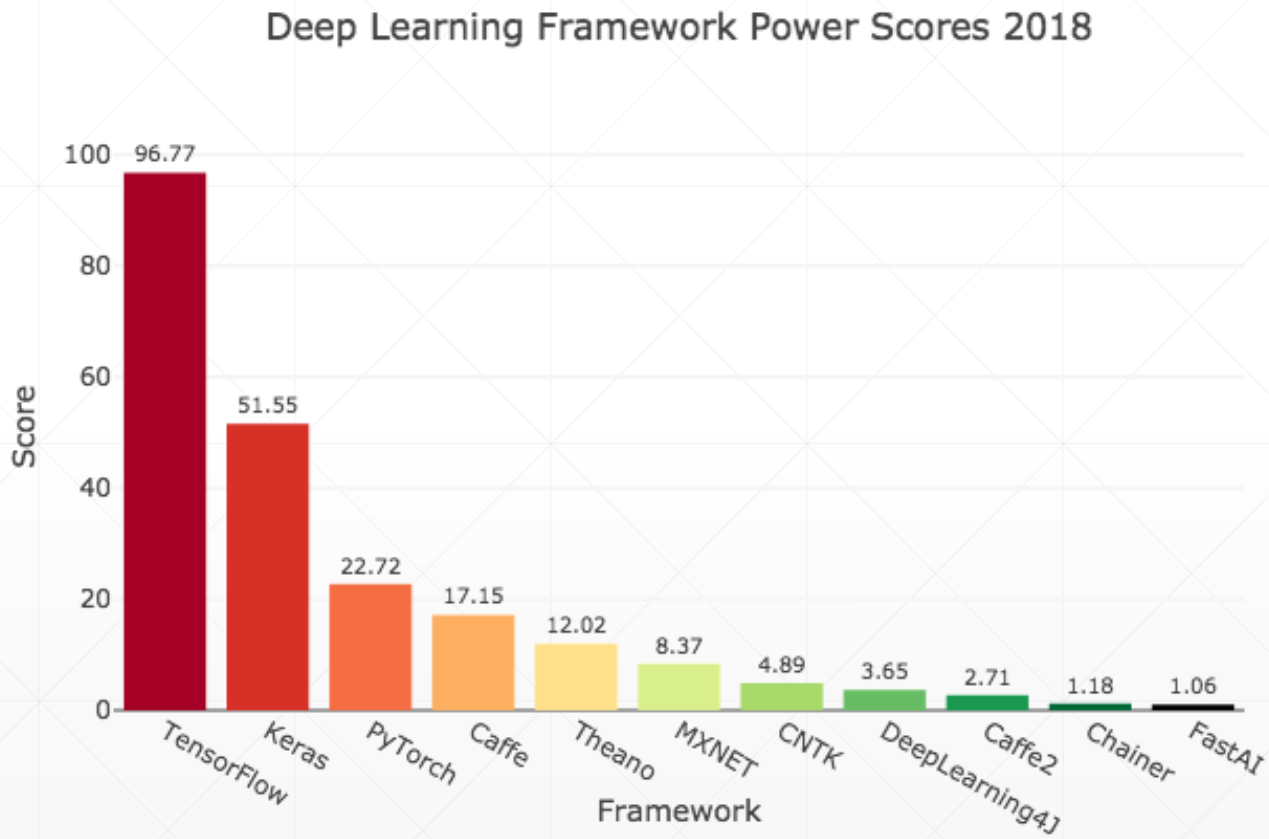
- TensorFlow 1.13



- PyTorch 1.0

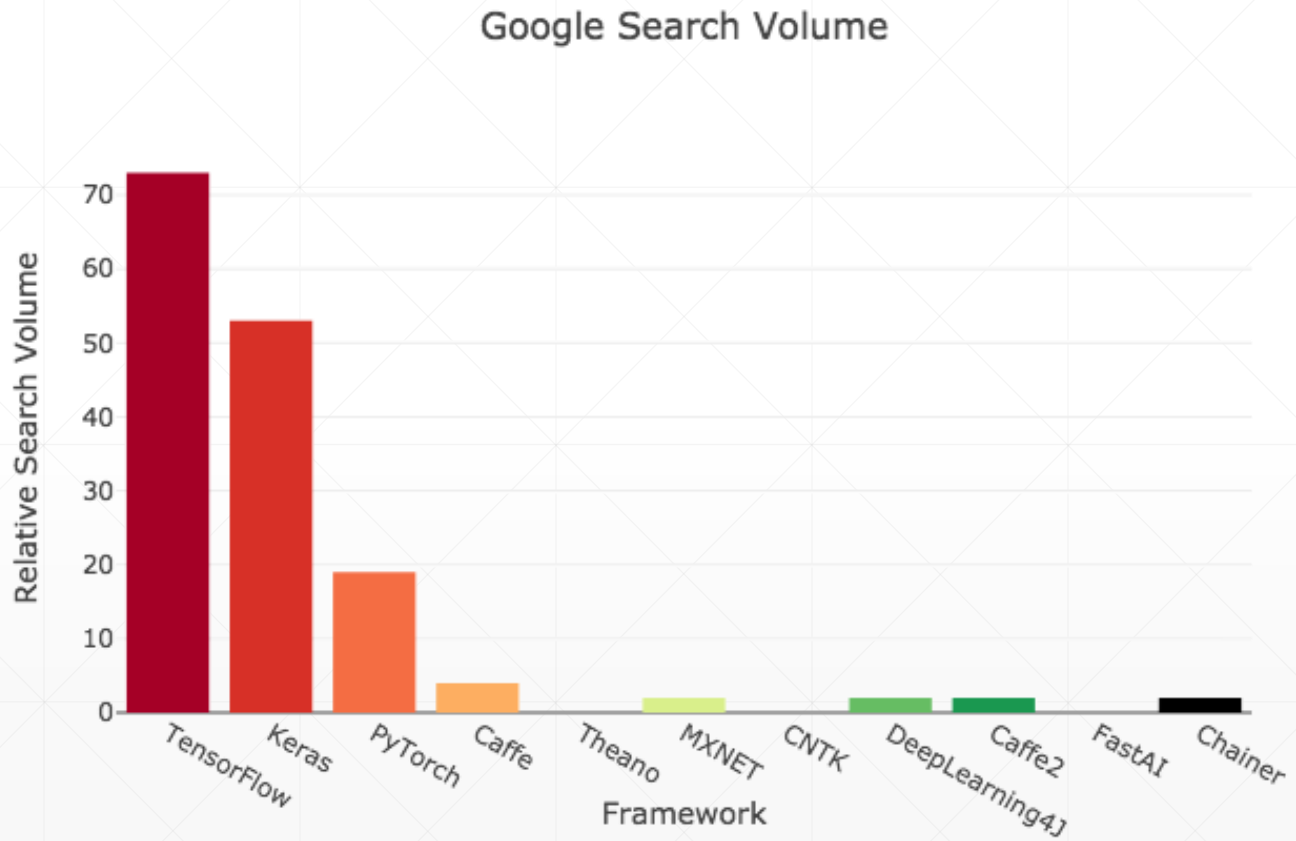


Power Scores

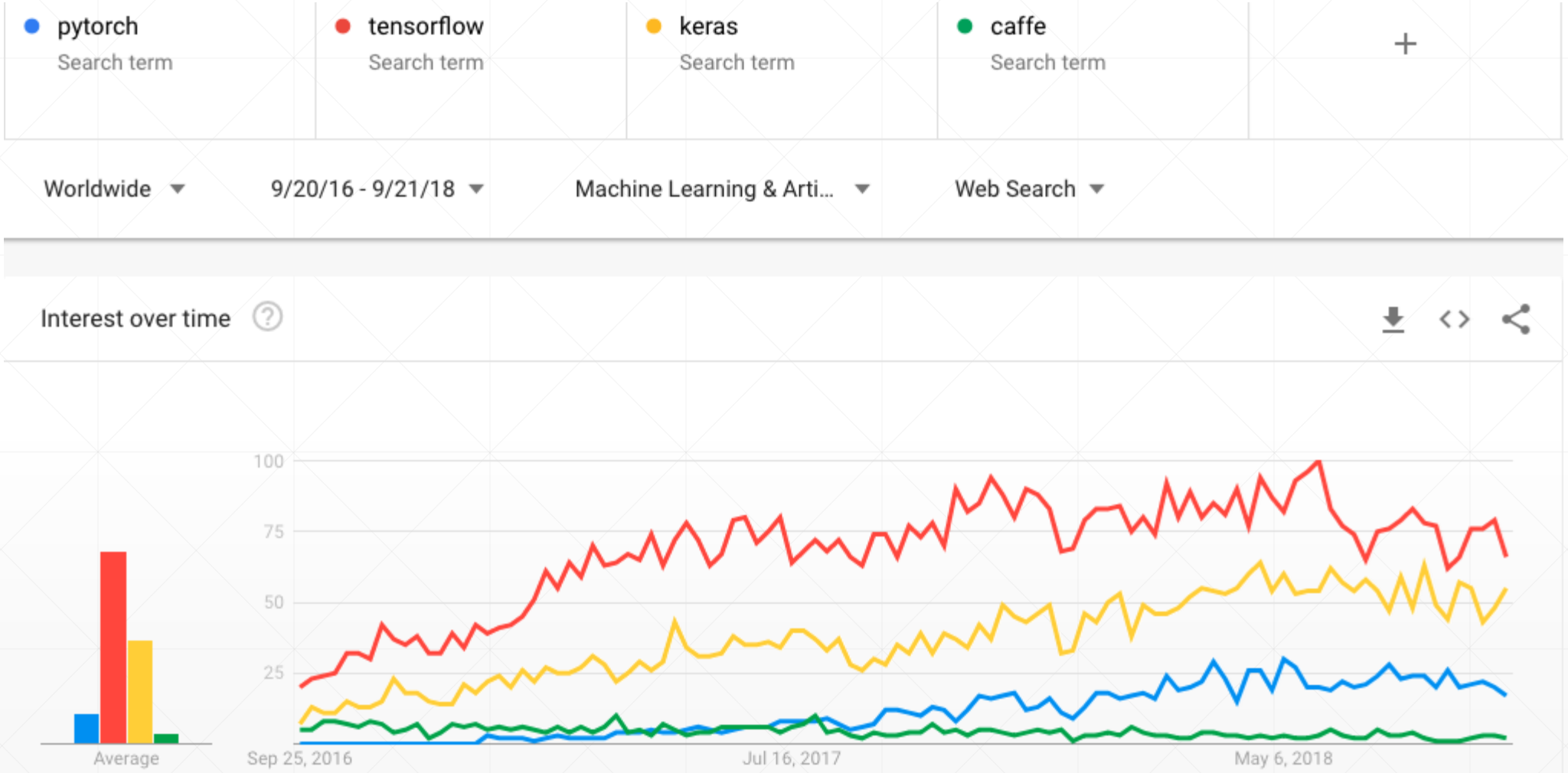


https://towardsdatascience.com/deep-learning-framework-power-scores-2018-23607ddf297a

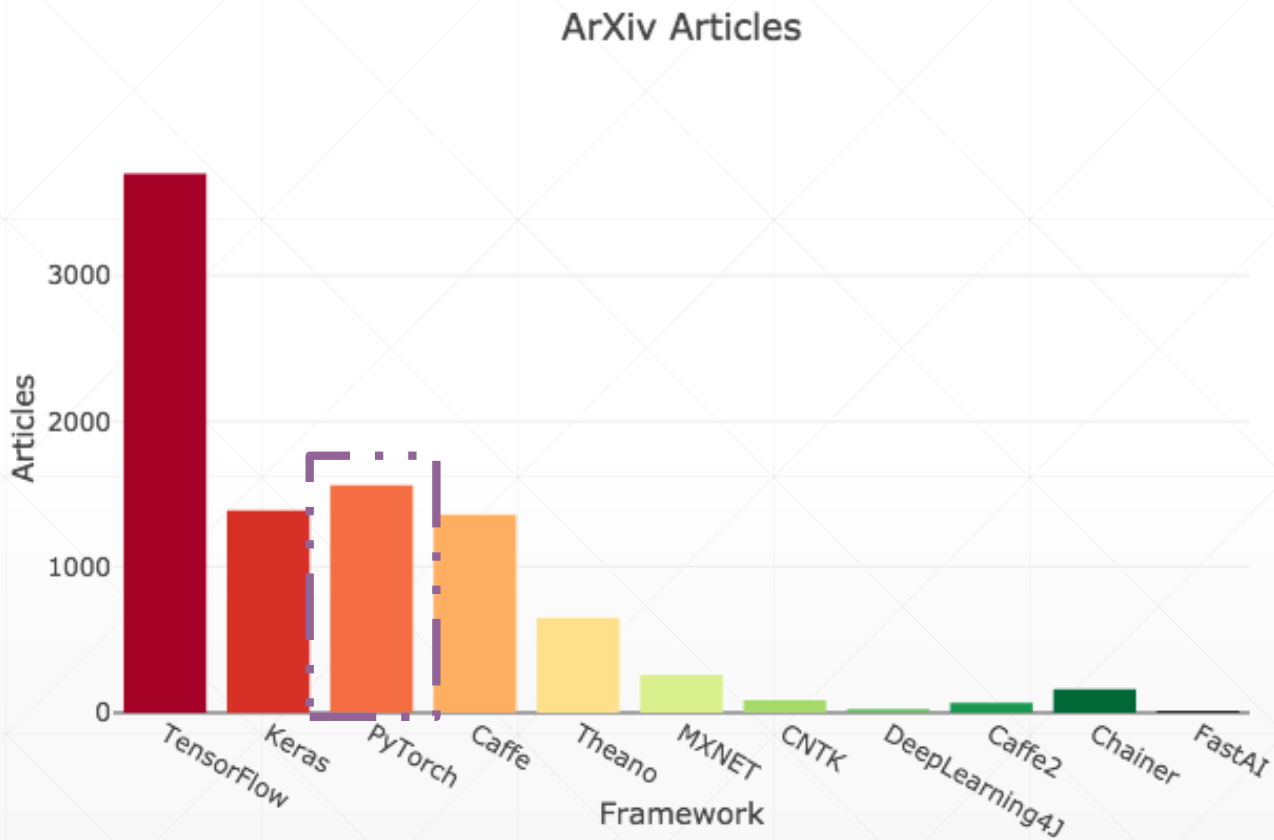
Google Search



Trends


pytorch
Search term
tensorflow
Search term
keras
Search term
caffe
Search term
Worldwide
9/20/16 - 9/21/18
Machine Learning & Arti...
Web Search
Interest over time
100
75
50
25
Average
Sep 25, 2016
Jul 16, 2017
May 6, 2018

Paper mentions

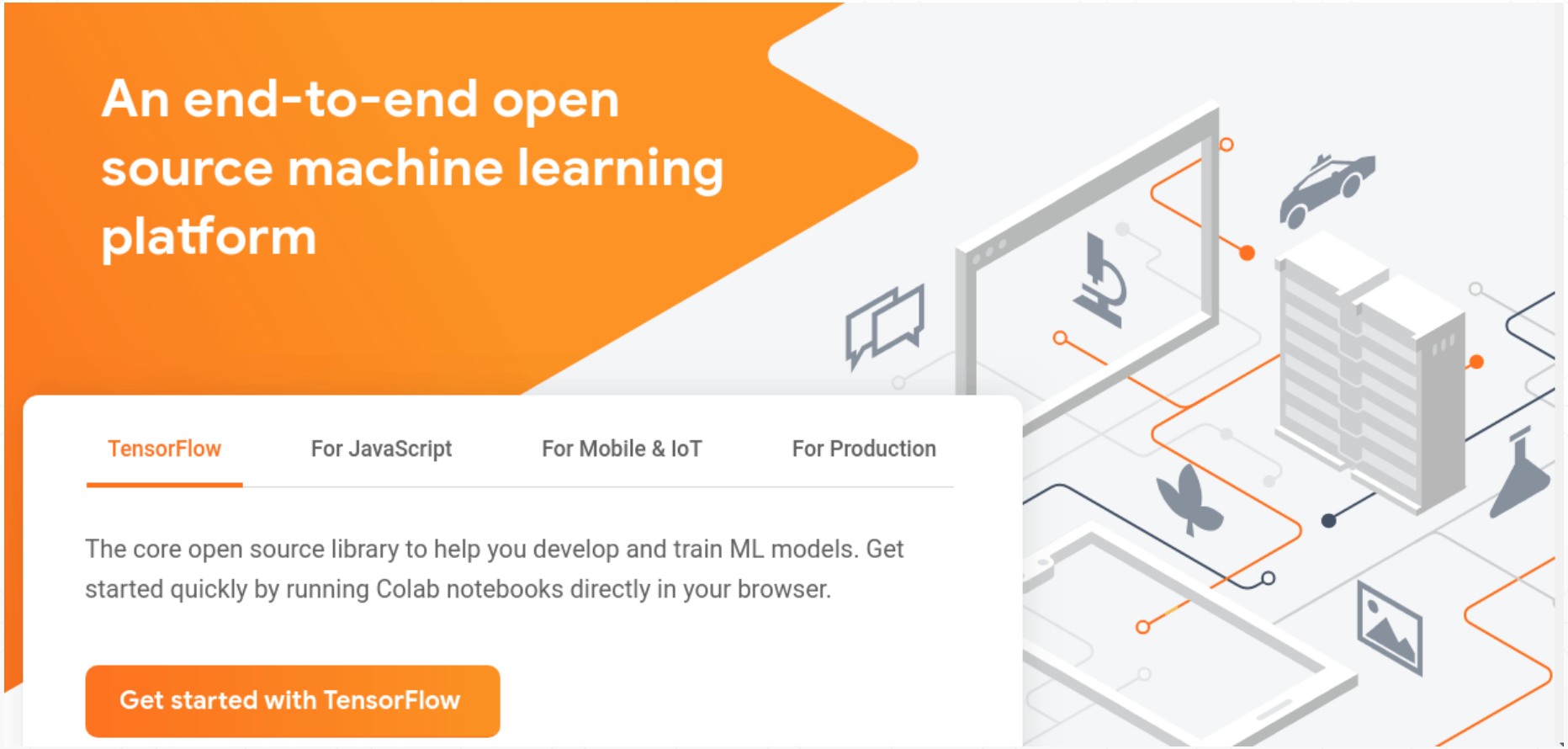


忘掉1.0吧

- 计算图Graph
- 会话Session
- 变量管理Variable Scope与共享reuse
- define-and-run
- 等等一系列烦人的概念将一去不复返

- 我们假设你对TensorFlow一无所知

TensorFlow eco-system



TensorFlow eco-system

- TensorFlow 2.0
  - @tf.function
- TensorFlow Lite
- TensorFlow.JS
- TensorFlow Extended
- TensorFlow Prob
- TPU Cloud

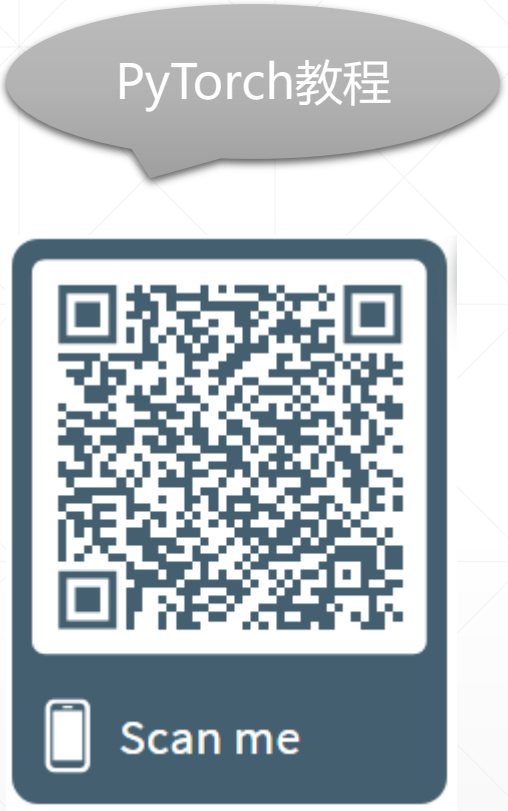
CPU

GPU

TPU

学习建议

- 忘掉TensorFlow 1.x
- PyTorch和TensorFlow选一主修
  - 二者都要掌握
- Keras逐渐淡出
  - TF+Keras
  - PyTorch+Caffe2



为什么要使用TensorFlow

- GPU加速
- 自动求导
- 神经网络Layers

GPU加速

```
gpu_a = tf.random.normal([10000, 1000])
gpu_b = tf.random.normal([1000, 2000])
c = tf.matmul(gpu_a, gpu_b)

#warmup:    3.4389721539992024 0.1348619329983194
#run time: 3.3803352279974206 0.0006796920024498831
```

自动求导

- $y = a^2 * x + b * x + c$

- x=1
- a=2
- b=3
- c=4

神经网络API

- tf.matmul
- tf.nn.conv2d
- tf.nn.relu
- tf.nn.max_pool2d
- tf.nn.sigmoid
- tf.nn.softmax

- layers.Dense
- layers.Conv2D
- layers.SimpleRNN
- layers.LSTM
- layers.ReLU
- layers.MaxPool2D

下一课时

开发环境准备

Thank You.