GDG Cloud Ahmedabad

Let's Talk TF: TensorFlow from T to F!

As part of TensorFlow All-Around Ahmedabad

By Chami Chokshi

Hey there...

I'm Charmi,

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and a passionate Tech Speaker

Let's Connect!

@CharmiChokshi

Interesting?

https://magenta.tensorflow.org/assets/sketch_rnn_demo/index.html

Interesting?

https://quickdraw.withgoogle.com/data/

History

- When Deep Learning started outperform all the Machine Learning algorithms...
- Google found use case of DL in its services:
  - Gmail, Photo, Search Engine

History

Python is incredibly popular for scientific computing

- Why? NumPy!
- C performance, Python ease of use

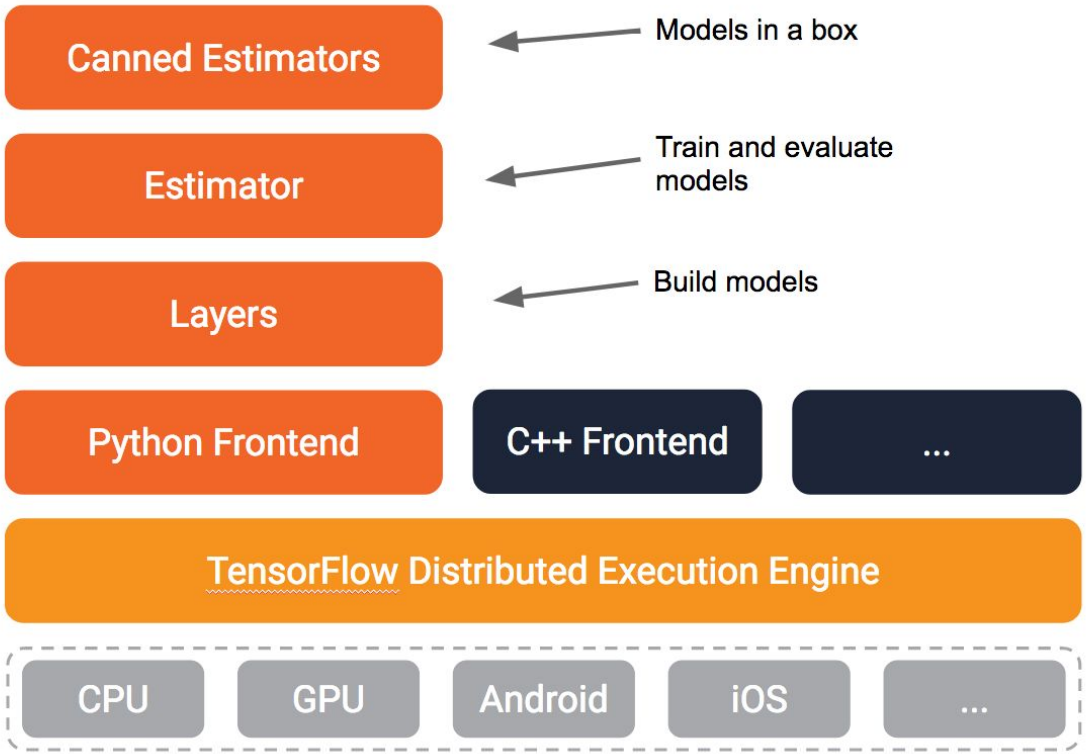
About how much slower is Python than C?

- Multiplying matrices: +/- 100X
- 6 seconds vs. 10 minutes

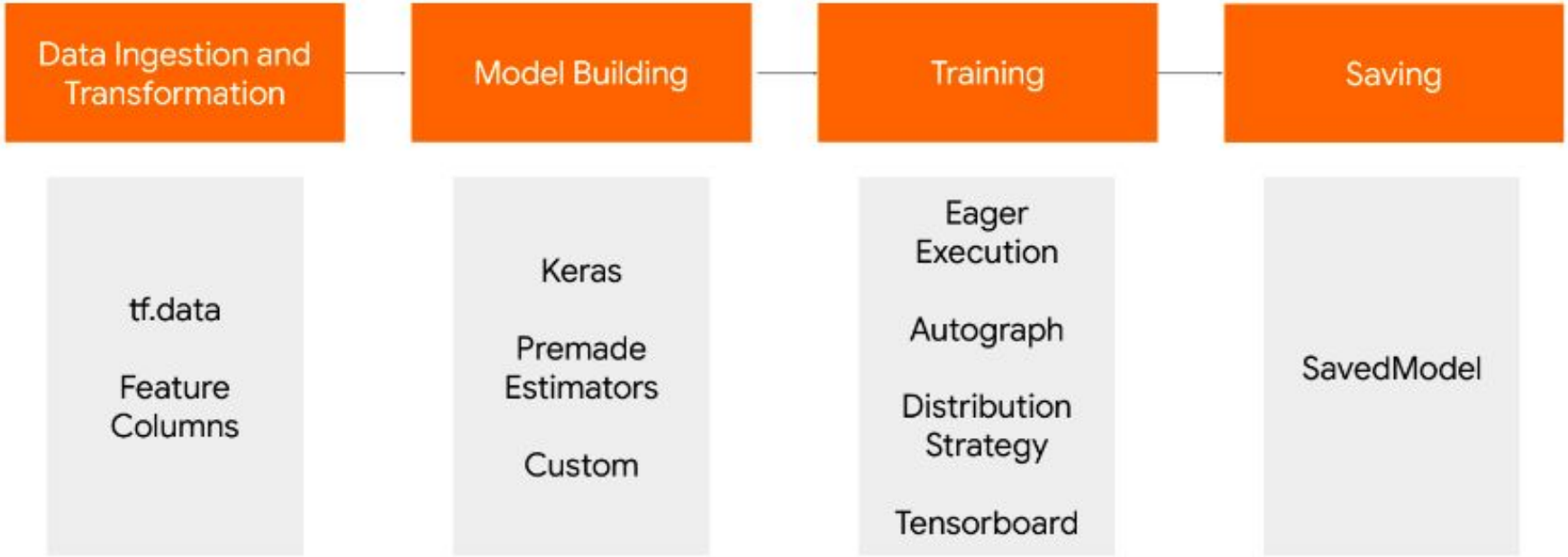
TensorFlow

- TensorFlow is an open-source library for Machine Intelligence
- It was developed by the **Google Brain** and released in 2015
- It provides high-level APIs to help implement many machine learning algorithms and develop complex models in a simpler manner

TF Architecture



Training Workflow



Tensor

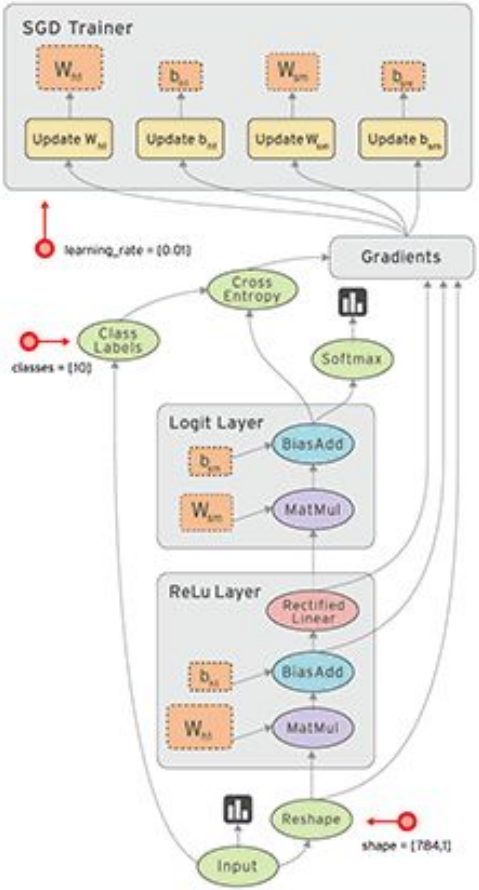
- **An n-dimensional array**
  - 0-d tensor: scalar (number)
  - 1-d tensor: vector
  - 2-d tensor: matrix
  - and so on

Data Flow Graph

- **Computations are represented as Graphs**
  - Nodes <- Operations
  - Edges <- Tensors (Data)

- Typical program consists of 2 phases:
  - **Construction Phase:** assembling a graph
  - **Execution Phase:** pushing data through the graph

- Launch graph in a Session
- Ops execute, in parallel, as soon as their inputs are available



Demo time!

But, why should you use it?

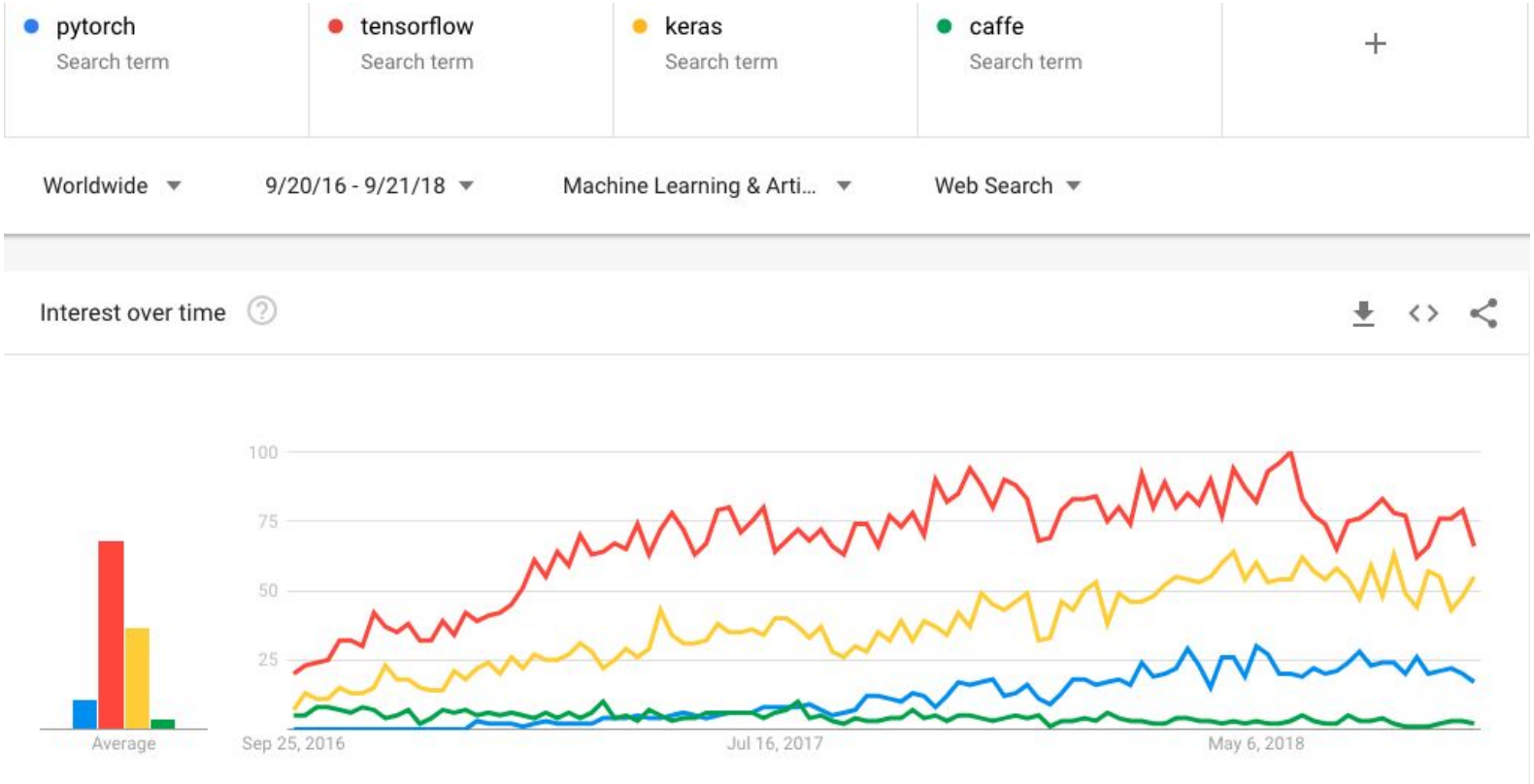
Why TensorFlow?

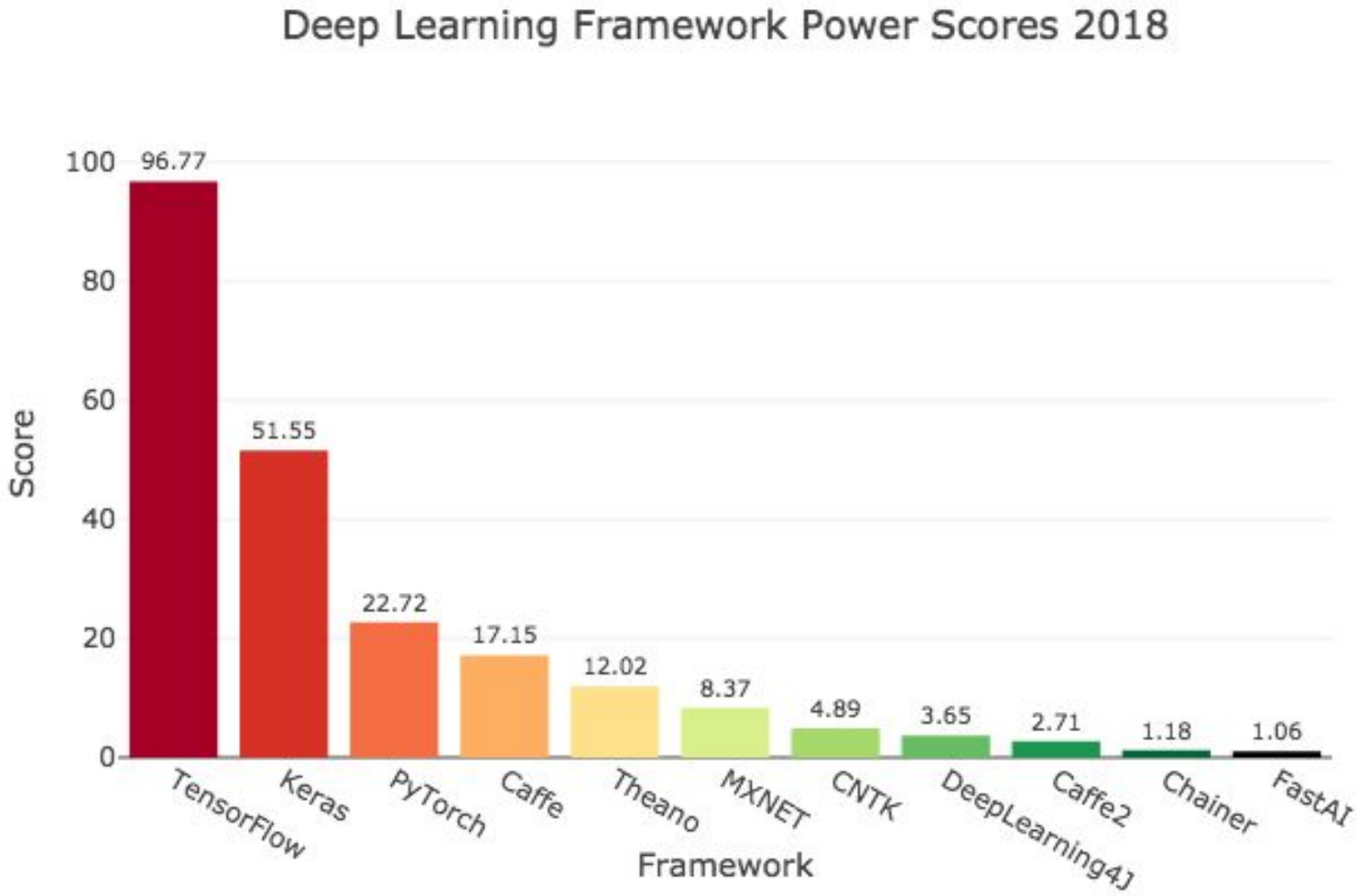
- **Person 1:** Well it's an ML library!!
- **Person 2:** But isn't it is a complex one, I know a few which are very simple and easy to use like Sci-Kit learn, PyTorch, Keras, etc. Why to use Tensoflow?
- **Person 1:** Ok, Can you implement your own Model in Sci-Kit learn and scale it if you want?
- **Person 2:** No. Ok but then for Deep Learning, why not to use Keras or PyTorch? It has so many models already available in it.
- **Person 1:** Tensorflow is not only limited to implementing your own models. It also has lot many models available in it. And apart from that you can do a large scale distributed model training without writing complex infrastructure around your code or develop models which need to be deployed on mobile platforms.
- **Person 2:** Ok. Now I understand "Why Tensorflow?"

What TF does for You?

- Creates own environment, takes care of everything you will need!
  - Manage memory allocations
- Statistical and Deep Learning both methods can be implemented
- 3D list, computation of Graph is fast because of the very powerful and Optimised Data Structure
- Good for Research and Testing
- Useful for Production level coding
- Catches errors at Compile time
- It is Scalable

TF has the largest community




Deep Learning Framework Power Scores 2018
Score
100
80
60
40
20
0
96.77
51.55
22.72
17.15
12.02
8.37
4.89
3.65
2.71
1.18
1.06
TensorFlow
Keras
PyTorch
Caffe
Theano
MXNET
CNTK
DeepLearning4J
Caffe2
Chainer
FastAI
Framework

More than 2k contributors

tensorflow / **tensorflow**

Used by 48,665 | Watch 8,583 | Star 133,720 | Fork 77,181

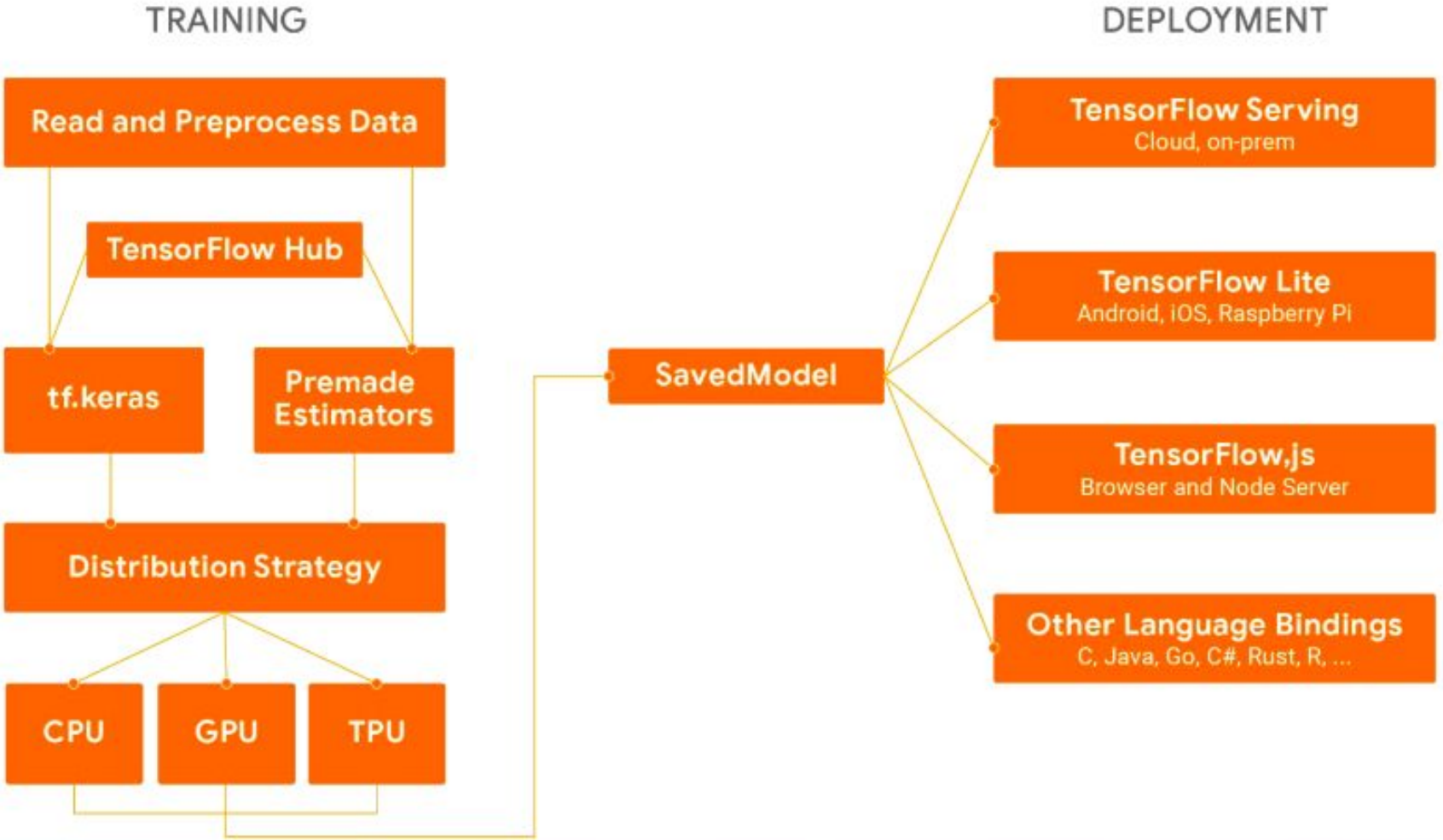
Code | Issues 2,429 | Pull requests 241 | Projects 1 | Security | Insights

An Open Source Machine Learning Framework for Everyone https://tensorflow.org

tensorflow | machine-learning | python | deep-learning | deep-neural-networks | neural-network | ml | distributed

64,502 commits | **42** branches | **89** releases | **2,176** contributors | Apache-2.0

Compatibility with the TensorFlow Ecosystem


TRAINING
DEPLOYMENT
Read and Preprocess Data
TensorFlow Hub
tf.keras
Premade Estimators
Distribution Strategy
CPU
GPU
TPU
SavedModel
TensorFlow Serving
Cloud, on-prem
TensorFlow Lite
Android, iOS, Raspberry Pi
TensorFlow.js
Browser and Node Server
Other Language Bindings
C, Java, Go, C#, Rust, R, ...

Deploy Anywhere

Servers

TensorFlow
Extended

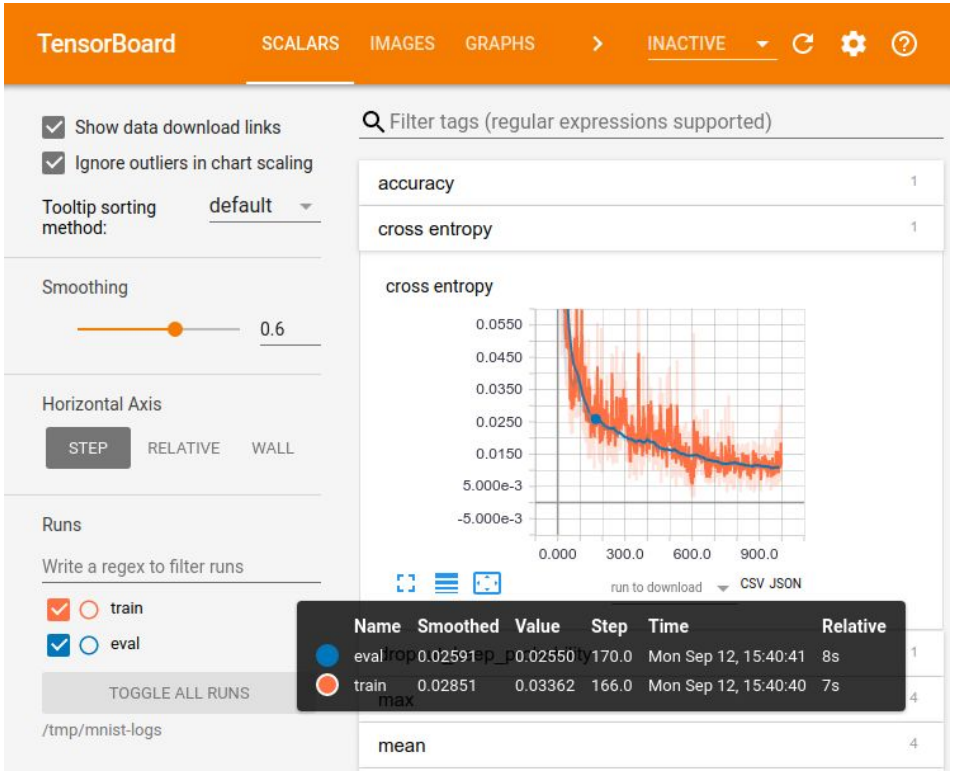
Edge devices

TensorFlow
Lite

JavaScript

TensorFlow
.JS

Visualize with TensorBoard



Let’s try a basic classification using TF

https://www.tensorflow.org/tutorials/keras/basic_classification

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Q&A

Comments

Suggestions

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Thank you :)

Happy Learning!