

Introduction to TensorFlow™

TensorFlow

A multidimensional array.



TensorFlow



A graph of operations.

History of DL Tools

- Mark 1 Perceptron – 1960
- Torch – 2002
- CUDA – 2007
- Theano – 2008
- Caffe – 2014
- DistBelief – 2011
- TensorFlow 0.1 – 2015
- PyTorch 0.1 – 2017
- TensorFlow 1.0 – 2017
- PyTorch 1.0 – 2017
- TensorFlow 2.0 – 2019

TensorFlow in One Slide

- **What is it:** Deep Learning Library (*and more*)
 - **Facts:** Open Source, Python, Google
 - **Community:**
 - 117,000+ GitHub stars
 - TensorFlow.org: Blogs, Documentation, DevSummit, YouTube talks
 - **Ecosystem:**
 - **Keras:** high-level API
 - **TensorFlow.js:** in the browser
 - **TensorFlow Lite:** on the phone
 - **Colaboratory:** in the cloud
 - **TPU:** optimized hardware
 - **TensorBoard:** visualization
 - **TensorFlow Hub:** graph modules
 - **Alternatives:** PyTorch, MXNet, CNTK
- **Extras:**
 - Swift for TensorFlow
 - TensorFlow Serving
 - TensorFlow Extended (TFX)
 - TensorFlow Probability
 - Tensor2Tensor

TensorFlow Statistics

41,000,000

Downloads

50,000+

commits



9,900+

pull requests

1,800+

contributors

Search Results on Github

 tensorflow  Pull requests Issues Marketplace Explore

Repositories 54K

Code 9M

Commits 773K

Issues 111K

Marketplace 0



Topics 291

Wikis 5K

Users 717

Languages



Python	28,020
Jupyter Notebook	11,919
JavaScript	1,151
HTML	965
C++	937
Java	747
Shell	450
Dockerfile	212
TypeScript	178
C#	148

 **Tensorflow**  Star

TensorFlow is an open source software library for numerical computation.
[See topic](#)

54,357 repository results



Sort: Best match ▾

tensorflow/tensorflow  C++  122k

An Open Source Machine Learning Framework for Everyone

[tensorflow](#) [python](#) [machine-learning](#)



Apache-2.0 license Updated 14 minutes ago 2 issues need help

aymericdamien/TensorFlow-Examples  Jupyter Notebook  29.8k

TensorFlow Tutorial and Examples for Beginners with Latest APIs

[tensorflow](#) [python](#) [machine-learning](#) [tutorial](#)

Updated 9 hours ago

jikexueyuanwiki/tensorflow-zh  TeX  10.4k

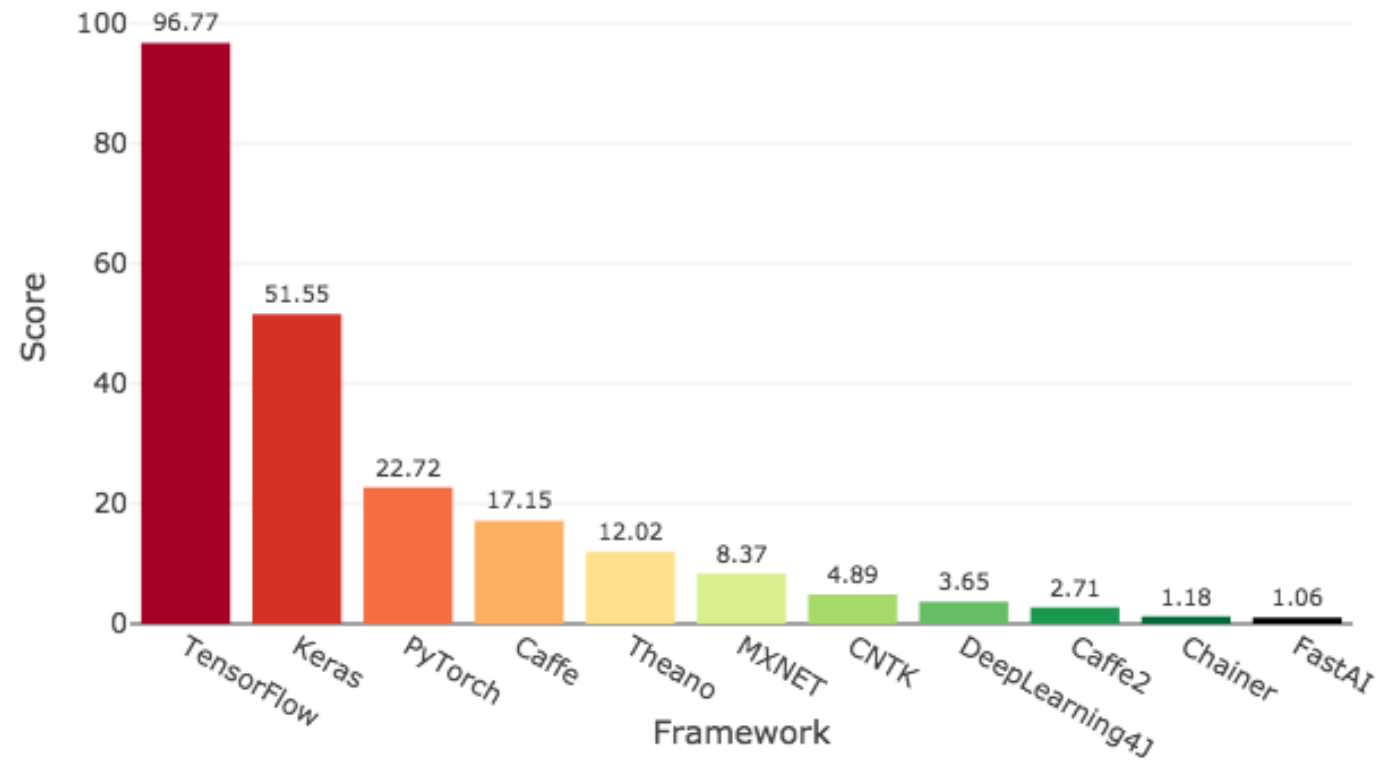
谷歌全新开源人工智能系统TensorFlow官方文档中文版

Updated on 12 Jul 2018

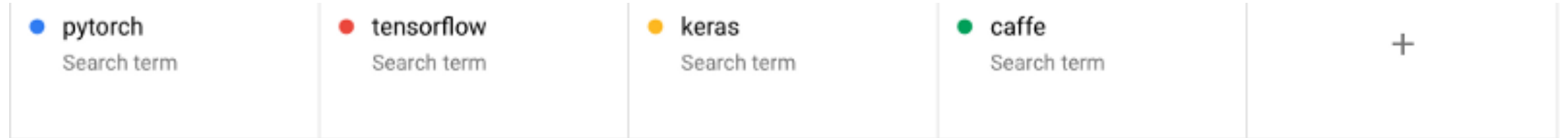
[Advanced search](#) [Cheat sheet](#)

Popularity

Deep Learning Framework Power Scores 2018



Google Search Statistics



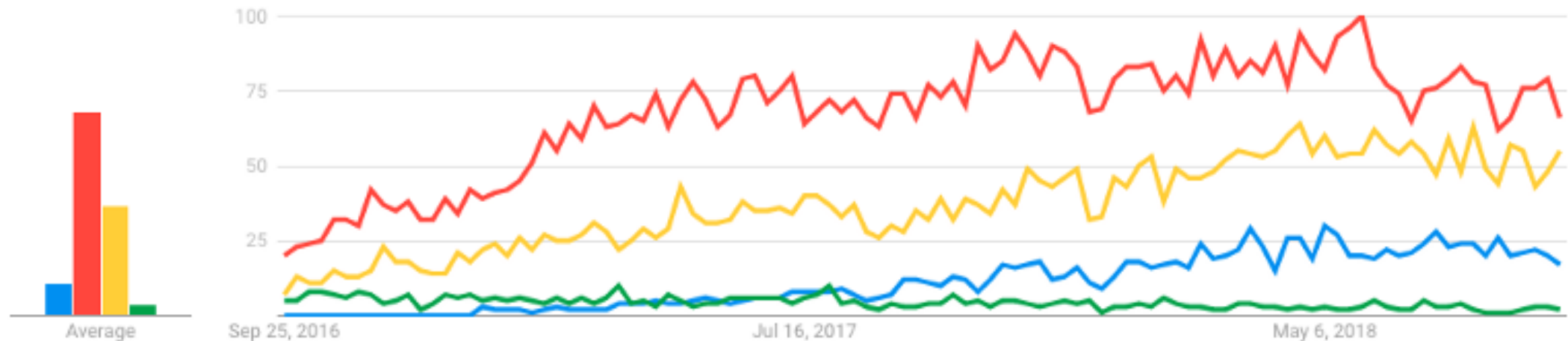
Worldwide ▼

9/20/16 - 9/21/18 ▼

Machine Learning & Arti... ▼

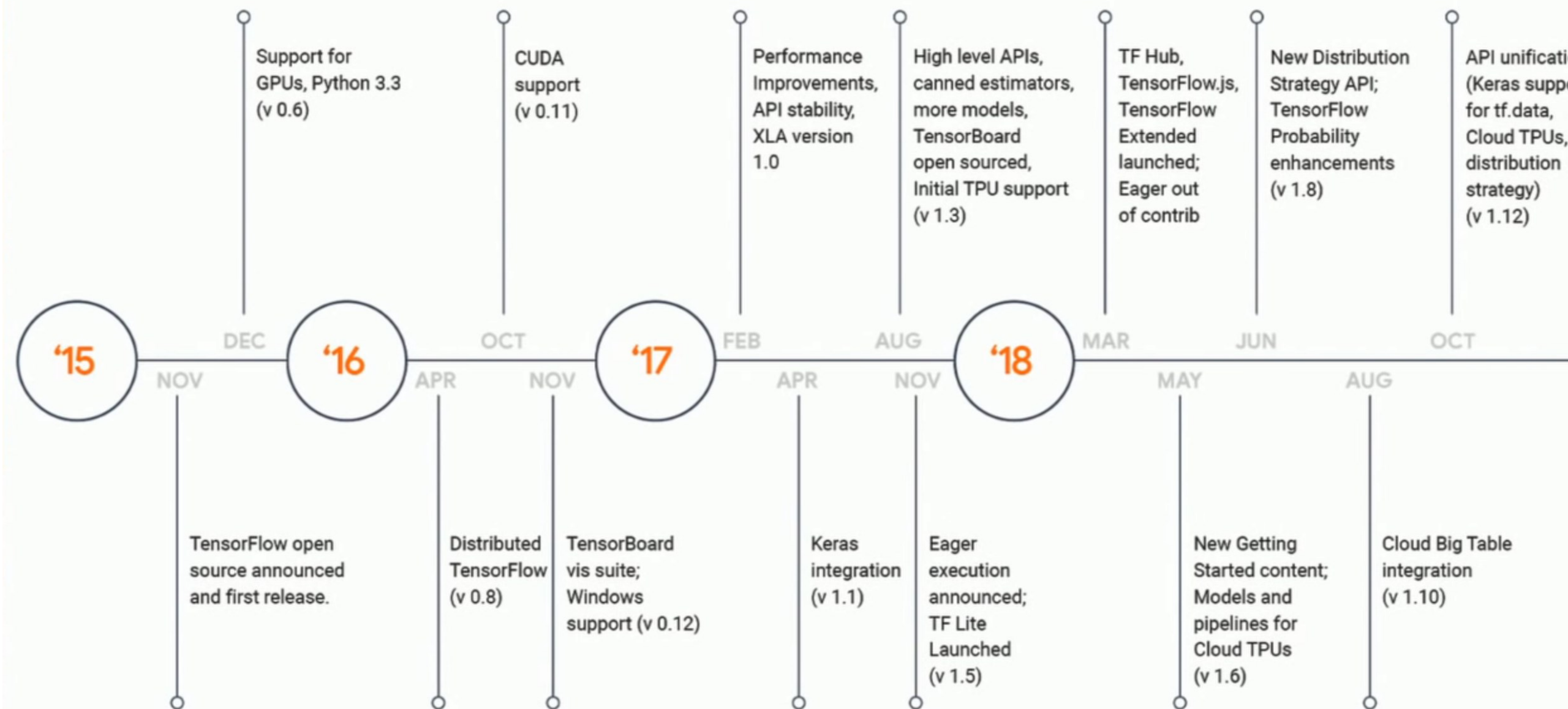
Web Search ▼

Interest over time ?



Companies Using Tensorflow

- Google
- OpenAI
- DeepMind
- Snapchat
- Uber
- Airbus
- eBay
- Dropbox
- A bunch of startups

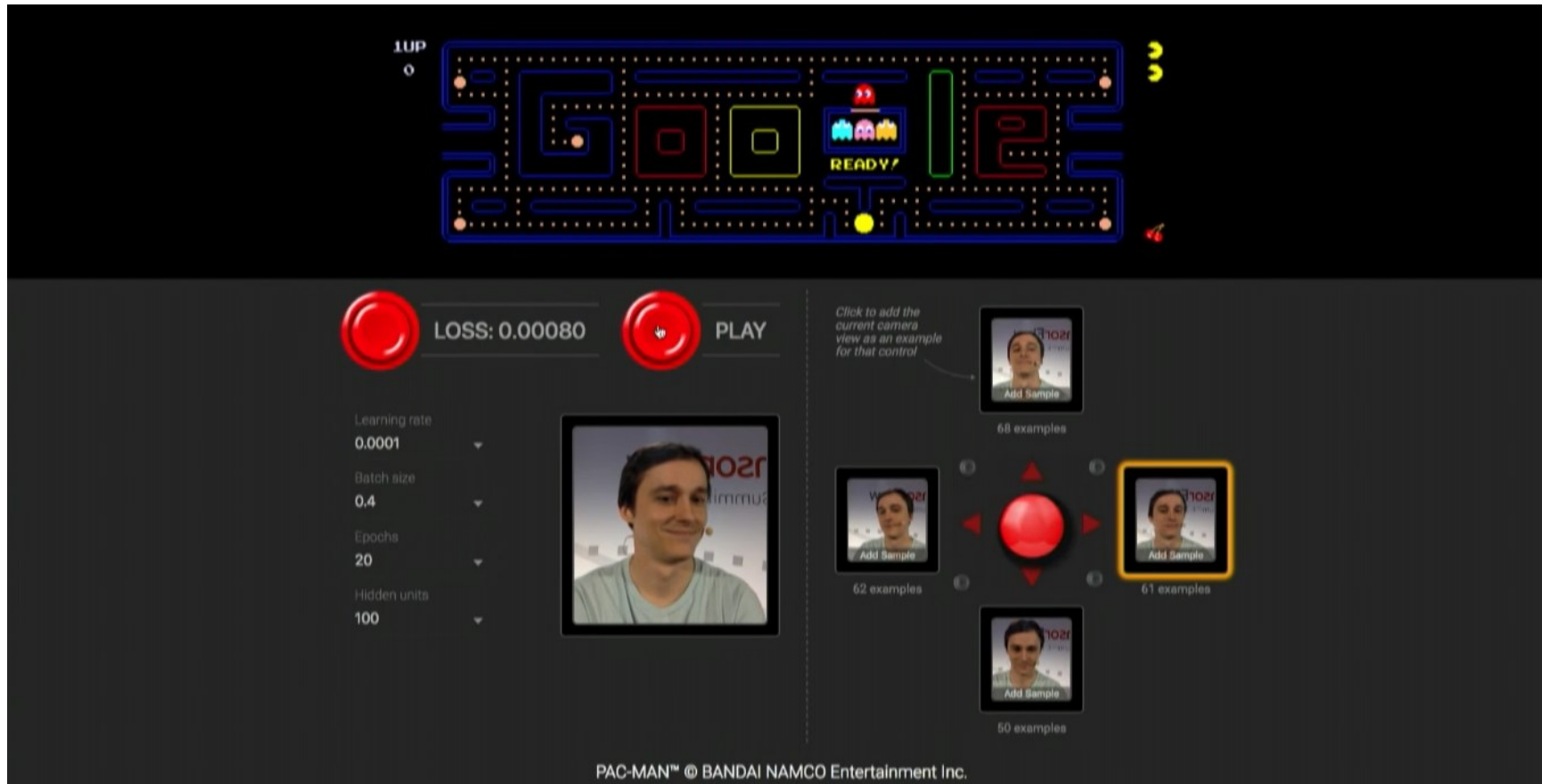


TensorFlow.js

- <http://bit.ly/pose-net>
- <http://bit.ly/body-fix>

- [Magenta](#) (Google)
 - Use machine learning to create compelling art and music. Their projects are really fun! For example, please check out [Draw Together with a Neural Network](#).

- Webcam controller PacMan



TensorFlow Dev Summit 2019

Recap of the 2019 TensorFlow Dev Summit




TensorFlow
Mar 8 · 7 min read

Posted by Fred Alcober and Sandeep Gupta, on behalf of the TensorFlow team

TensorFlow held its third and biggest yet annual Developer Summit in Sunnyvale, CA on March 6 and 7, 2019. The event was attended by approximately 1,000 machine learning enthusiasts and watched over livestream by tens of thousands more.





TensorFlow
구독자 83,927명

홈

동영상

재생목록

커뮤니티

채널

정보

🔍


구독중 8.3만

🔔

업로드한 동영상 ▶


모두 재생

정렬 기준




Federated Learning
TensorFlow Dev Summit

13:26




Sonnet 2.0
TensorFlow Dev Summit

14:27




Mesh TensorFlow
TensorFlow Dev Summit

15:14




NERSC
TensorFlow Dev Summit

14:54



TF.js at Creative Labs
TensorFlow Dev Summit

5:53



TF.text
TensorFlow Dev Summit

5:12

TensorFlow Federated (TFF): Machine Learning on...
조회수 723회 · 13시간 전
자막


Sonnet 2.0 (TF Dev Summit '19)
조회수 854회 · 13시간 전
자막

Mesh-TensorFlow: Model Parallelism for...
조회수 403회 · 13시간 전
자막

Exascale Deep Learning for Climate Analytics (TF Dev...
조회수 797회 · 13시간 전
자막


AI Experiments: Making AI Accessible through Play (TF...
조회수 324회 · 13시간 전
자막

Improving Text In TensorFlow (TF Dev Summit '19)
조회수 276회 · 13시간 전
자막




TF Lattice
TensorFlow Dev Summit

5:07




Uber Manifold
TensorFlow Dev Summit

5:19




NetEase
TensorFlow Dev Summit

9:31




TensorFlow.js (Julia)
TensorFlow Dev Summit

5:27



Butterfly
TensorFlow Dev Summit

5:15



Powered by TensorFlow: utilizing deep learning to...
TensorFlow Dev Summit

2:43

TF Lattice: Control Your ML with Monotonicity (TF Dev...
조회수 162회 · 14시간 전
자막


Building a Visual Debugging Tool for ML - TF.js in...
조회수 1.2천회 · 14시간 전
자막

Netease Youdao: AI Leader in Online Education in China (...
조회수 174회 · 14시간 전
자막

TensorFlow.js: A Julian Front End to the TensorFlow Worl...
조회수 281회 · 14시간 전
자막


Democratizing Ultrasound via ML (TF Dev Summit '19)
조회수 1.1천회 · 14시간 전
자막

Powered by TensorFlow: utilizing deep learning to...
조회수 1.8천회 · 19시간 전
자막




TensorFlow Extended (TFX) Pre-training Workflow
TensorFlow Dev Summit

2:59




TensorFlow Extended (TFX) Post-training Workflow
TensorFlow Dev Summit

31:35




TensorFlow Extended (TFX) Pre-training Workflow
TensorFlow Dev Summit

15:07




TF Probability
TensorFlow Dev Summit

13:57



Reinforcement Learning with TF-Agents
TensorFlow Dev Summit

15:58



TensorFlow Hub: Reusable Machine Learning
TensorFlow Dev Summit

7:36

Powered by TensorFlow: helping paleographers...
조회수 1.2천회 · 21시간 전
자막


TensorFlow Extended (TFX) Pre-training Workflow (TF...
조회수 768회 · 1일 전
자막

TensorFlow Extended (TFX) Post-training Workflow (TF...
조회수 857회 · 1일 전
자막

TensorFlow Probability: Learning with confidence (T...
조회수 2.5천회 · 1일 전
자막


Reinforcement Learning in TensorFlow with TF-Agents...
조회수 2천회 · 1일 전
자막

TensorFlow Hub: Reusable Machine Learning (TF Dev...
조회수 651회 · 1일 전
자막




TensorFlow.js 1.0
TensorFlow Dev Summit

17:51




UniRoma: In Codice Ratio
TensorFlow Dev Summit

11:22




TensorFlow Community
TensorFlow Dev Summit

13:24




Watch the DEV SUMMIT 2019 Livestream
TensorFlow Dev Summit

9:01:45



TensorFlow 2.0
TensorFlow Dev Summit

22:21



Swift for TensorFlow: The Next-Generation Machine...
TensorFlow Dev Summit

31:22

TensorFlow.js 1.0 (TF Dev Summit '19)
조회수 1.7천회 · 1일 전
자막


In Codice Ratio: Machine Transcription in the Vatican...
조회수 723회 · 1일 전
자막

TensorFlow Open Source Community And...
조회수 452회 · 1일 전
자막

TensorFlow Dev Summit 2019 Livestream
조회수 2.8만회 · 1일 전
자막


Introducing TensorFlow 2.0 and its high-level APIs (TF...
조회수 2.5만회 · 1일 전
자막

Swift for TensorFlow: The Next-Generation Machine...
조회수 4.8천회 · 1일 전
자막




New Features In TensorBoard
TensorFlow Dev Summit

7:43




Datasets and Models
TensorFlow Dev Summit

9:34




Building Models with tf.function & tf.autograph
TensorFlow Dev Summit

14:38




TensorFlow Lite
TensorFlow Dev Summit

44:45



TensorFlow Dev Summit 2019 Keynote
TensorFlow Dev Summit

31:43



Powered by TensorFlow:
TensorFlow Dev Summit

2:38

What's new in TensorBoard

TensorFlow Datasets (TF Dev

tf.function and Autograph (TF

TensorFlow Lite (TF Dev

TensorFlow Dev Summit

Powered by TensorFlow:

TensorFlow 2.0

- 2018년 8월 15일 로드맵 공개 / 2019년 1월 프리뷰 공개
 - 개발 / 사용 양측에서의 사용성 개선
 - 일관성 강화
 - 미래의 최적화를 위한 룬 확보
- API 대대적 정리
 - 다양한 코드를 받아들이며 동일한 기능을 하는 여러 API가 존재함
 - 하나씩만 남기고 모두 제거
- 개발 편의성 개선
 - 디버그 편의성 개선
- Name space의 일관성 유지
 - 전역 변수 형태의 참조 모두 제거
- 대규모 훈련의 편의성 개선
 - Distributed TensorFlow로 별도 관리되던 부분 통합

TensorFlow 2.0

- API cleanup
- tf.keras
- Eager execution
- Functions, not sessions

```
# TensorFlow 1.X
outputs = session.run(f(placeholder), feed_dict={placeholder: input})
# TensorFlow 2.0
outputs = f(input)
```


API Cleanup

- `tf.contrib` → TF Addons (<https://github.com/tensorflow/addons>)
- `tf.app`, `tf.flags`, `tf.logging` is removed
- No more Globals: `tf.global_variables_initializer()`, `tf.variable_scope()`, etc
- Duplicated API cleanup
- Parameter name and order compatible with numpy (e.g `dim` → `axis`)
- Support legacy API at `tf.compat.v1`

TensorFlow 1.x

```
>>> import tensorflow as tf
>>>
>>> t = tf.nn.sigmoid([0.])
>>>
>>> print(t)
```

```
Tensor("Sigmoid_1:0", shape=(1,), dtype=float32)
```

TensorFlow 2.x

```
>>> import tensorflow as tf
>>>
>>> t = tf.nn.sigmoid([0.])
>>>
>>> print(t)
```

```
tf.Tensor([0.5], shape=(1,), dtype=float32)
```

```
>>>
>>> print(t.numpy())
```

```
[0.5]
```

TensorFlow 1.x

```
import tensorflow as tf

## 그래프를 정의합니다
g = tf.Graph()
with g.as_default():
    x = tf.placeholder(dtype=tf.float32,
                       shape=(None), name='x')
    w = tf.Variable(2.0, name='weight')
    b = tf.Variable(0.7, name='bias')
    z = w * x + b
    init = tf.global_variables_initializer()

## 세션을 만들고 그래프 g를 전달합니다
with tf.Session(graph=g) as sess:
    ## w와 b를 초기화합니다
    sess.run(init)
    ## z를 평가합니다
    for t in [1.0, 0.6, -1.8]:
        print('x=%4.1f --> z=%4.1f'%(
            t, sess.run(z, feed_dict={x:t})))
```

TensorFlow 2.x

```
import tensorflow as tf

w = tf.Variable(2.0, name='weight')
b = tf.Variable(0.7, name='bias')

# z를 평가합니다
for x in [1.0, 0.6, -1.8]:
    z = w * x + b
    print('x=%4.1f --> z=%4.1f'%(x, z))
```