

Tensorflow介绍

Introduction to Tensorflow

什么是Tensorflow

- 是一个深度学习的开源库
- 最开始是由谷歌大脑团队开发的，为了研究机器学习与深度学习
- 2015年11月在Github上开源，2017年1月发布了1.0的pre-view版本
- 可以广泛的被应用到各种领域中
- 提供了广泛的API使得用户可以构建属于自己的各种模型

选择Tensorflow的原因

- TensorFlow 是一个端到端平台，无论是专家还是初学者，它都可以助您轻松构建和部署机器学习模型。

完整的生态系统

- 轻松构建模型
 - TensorFlow 提供多个抽象级别，因此可以根据自己的需求选择合适的级别。您可以使用高阶 Keras API 构建和训练模型，该 API 让您能够轻松地开始使用 TensorFlow 和机器学习。
 - 如果您需要更高的灵活性，则可以借助 Eager Execution 进行快速迭代和直观的调试。对于大型机器学习训练任务，您可以使用 Distribution Strategy API 在不同的硬件配置上进行分布式训练，而无需更改模型定义。

完整的生态系统

- 随时随地进行可靠的机器学习生产
 - TensorFlow 始终提供直接的生产途径。不管是在服务器、边缘设备还是网络上，TensorFlow 都可以助您轻松地训练和部署模型，无论您使用何种语言或平台。
 - Tensorflow Lite 可以将模型部署在移动终端
 - Tensorflow.js 可以将模型部署在浏览器或者Node.js上

完整的生态系统

- 强大的研究实验
- 构建和训练先进的模型，并且不会降低速度或性能。借助 Keras Functional API 等功能，TensorFlow 可以灵活地创建复杂拓扑并实现相关控制。为了轻松地设计原型并快速进行调试，请使用即刻执行环境。

丰富的资源

- 提供丰富的模型
- <https://github.com/tensorflow/models>

Models and examples built with TensorFlow

3,580 commits

118 branches

10 releases

518 contributors

Apache-2.0


Branch: master

[New pull request](#)
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saberkun Merged commit includes the following changes: (#7309)





















Latest commit 8c7a0e7 8 hours ago

official	Merged commit includes the following changes: (#7309)	8 hours ago
research	Merged commit includes the following changes: (#7249)	8 days ago
samples	Fix #5814	8 months ago
tutorials	Fix for TF-models #7216: CIFAR-10 tutorial for multi-GPU fails becaus...	8 days ago
.gitignore	Add gitignore entries for word-embedding tutorial training data files (...)	5 months ago
.gitmodules	Move the research models into a research subfolder (#2430)	2 years ago
AUTHORS	Spatial Transformer model	3 years ago
CODEOWNERS	Update CODEOWNERS (#7251)	8 days ago
CONTRIBUTING.md	Fixing small typo	2 years ago
ISSUE_TEMPLATE.md	Add code spans for python code for obtaining the python version. (#6527)	4 months ago
LICENSE	Update LICENSE	3 years ago
README.md	Add Contribution and License in README (#4022)	last year
WORKSPACE	Consolidate privacy/ and differential_privacy/.	3 years ago

 yongzhe2160 and dreamdragon Merged commit includes the following changes: (#7249) ...

Latest commit b722196 8 days ago

..

 a3c_blogpost	Fixed #6183; Typo Correction and Pyglet Docs link (#6328)	4 months ago
 adv_imagenet_models	Update README.md in adv_imagenet_models.	2 years ago
 adversarial_crypto	Update to tf 1.14 syntax, fix bug #7125 (needed additional expand for...	17 days ago
 adversarial_logit_pairing	Adversarial logit pairing - update table formatting	last year
 adversarial_text	Fix compatibility for newer tensorflow and python3 (#6587)	3 months ago
 astronet	Move tensorflow_models/research/astronet to google-research/exoplanet-ml	8 months ago
 attention_ocr	Fix momentum value flag from string to float	last year
 audioset	Moved research/audioset VGGish code into its own subdirectory (#7009)	last month
 autoaugment	Update README.md (#6380)	4 months ago
 autoencoder	Bugfix for initialization in autoencoder. (#3477)	last year
 brain_coder	long was removed in Python 3 (en masse)	2 years ago
 cognitive_mapping_and_planning	Typo: resnet_v2_50_path --> rgb_resnet_v2_50_path (#3273)	last year
 cognitive_planning	adding implementation of https://arxiv.org/abs/1805.06066 (#5265)	11 months ago
 compression	MS-SSIM: Read image data as binary	last year
 cvt_text	Fix cvt_text citation.	10 months ago
 deep_contextual_bandits	Readme changes.	last year
 deep_speech	specify the 'num_gpus' argument (#7157)	18 days ago
 deeplab	Update download_and_convert_ade20k.sh (#7160)	19 days ago
 delf	Some refactoring + Google Landmarks dataset scripts (#7014)	last month
 differential_privacy	remove all code related to differential privacy (#6045)	6 months ago

完善的社区

- 如果遇到技术问题，可以访问Stack Overflow

The screenshot shows the Stack Overflow interface for the [tensorflow] tag. The left sidebar contains navigation links for Home, PUBLIC, Stack Overflow, Tags, Users, Jobs, TEAMS, and What's this?. The main content area is titled 'Questions tagged [tensorflow]' and includes an 'Ask Question' button. Below the title, there is a notice about adding language tags and a list of links: 'Learn more...', 'Improve tag info', 'Top users', 'Synonyms (1)', and 'tensorflow jobs'. The page shows 45,263 questions, with filters for Newest, Active, Bounties (7), Unanswered, and a Filter button. The first question is titled 'ValueError: Duplicate plugins for name projecto' and has 0 votes, 0 answers, and 5 views. The second question is titled 'Tensorflow: generate label map file' and has 1 vote, 0 answers, and 4 views. The right sidebar contains a 'Blog' section with links to 'Making...', 'Intro...', and 'Featured' sections, and a 'Custom' section with a 'Create a' button.

完善的社区

- 如果遇到Bug，可以访问Github

The screenshot shows the TensorFlow GitHub repository page. At the top, it displays the repository name 'tensorflow / tensorflow' and various statistics: 'Used by 45,191', 'Watch 8,573', 'Star 131,631', and 'Fork 76,368'. Below this, there are tabs for 'Code', 'Issues 2,386', 'Pull requests 272', 'Projects 1', 'Security', and 'Insights'. The main heading reads 'An Open Source Machine Learning Framework for Everyone' with a link to 'https://tensorflow.org'. Below the heading are tags for 'tensorflow', 'machine-learning', 'python', 'deep-learning', 'deep-neural-networks', 'neural-network', 'ml', and 'distributed'. A progress bar shows '61,077 commits', '30 branches', '88 releases', '2,095 contributors', and 'Apache-2.0' license. Below the progress bar are buttons for 'Branch: master', 'New pull request', 'Create new file', 'Upload files', 'Find File', and 'Clone or download'. The commit history table shows the latest commit by 'tanzhenyu and tensorflower-gardener' with the message 'Safely remove the compile override for WideDeep.' and a link to the commit '8887a3c' from '1 hour ago'. The table lists several files and folders with their commit messages and timestamps.

File/Folder	Commit Message	Time Ago
.github/ISSUE_TEMPLATE	Fix formatting for docs issue	3 months ago
tensorflow	Safely remove the compile override for WideDeep.	1 hour ago
third_party	Update the docker container.	2 hours ago
tools	Merge pull request #25673 from Ryan-Qiyu-Jiang:env_capture_script_mor...	last month
.bazelrc	Add a new flag that's always true for all oss build.	4 hours ago
.gitignore	Adds CocoaPods support to the Swift test app.	3 months ago
ACKNOWLEDGMENTS	TensorFlow: Improve performance of Alexnet	4 years ago
ADOPTERS.md	Internal file cleanup.	3 years ago
AUTHORS	Merge changes from github.	2 years ago
BUILD	Export 'configure' and 'configure.py' to allow inverse dependent repo...	9 months ago

一直在更新

Roadmap

Last updated: Jun 4, 2019

TensorFlow is a fast-moving, community supported project. This roadmap provides guidance about priorities and focus areas of the TensorFlow team and lists the functionality expected in upcoming releases of TensorFlow. Many of these areas are driven by community use cases, and we welcome further [contributions](#) to TensorFlow.

TensorFlow 2.0 Beta is available

[As announced previously](#), we have been working on TensorFlow 2.0, which is a significant milestone and a major new release, with a focus on ease of use and simplification.

The 2.0 Beta release is available now. Users can use this today and get started with all that TensorFlow 2.0 has to offer. This is an early version meant to share with users what the TensorFlow 2.0 API will be like, to gather feedback, and to identify and fix issues. Below are some of the key enhancements:

- Eager execution as a central feature of 2.0. It aligns users' expectations about the programming model better with TensorFlow practice and should make TensorFlow easier to learn and apply.
- Keras tightly integrated with the TensorFlow ecosystem, and has support for Eager execution, `tf.data` API, `tf.distribute.MirroredStrategy` for multi-GPU training, TensorBoard visualization, and TF Lite and TF.js conversion.

缺点

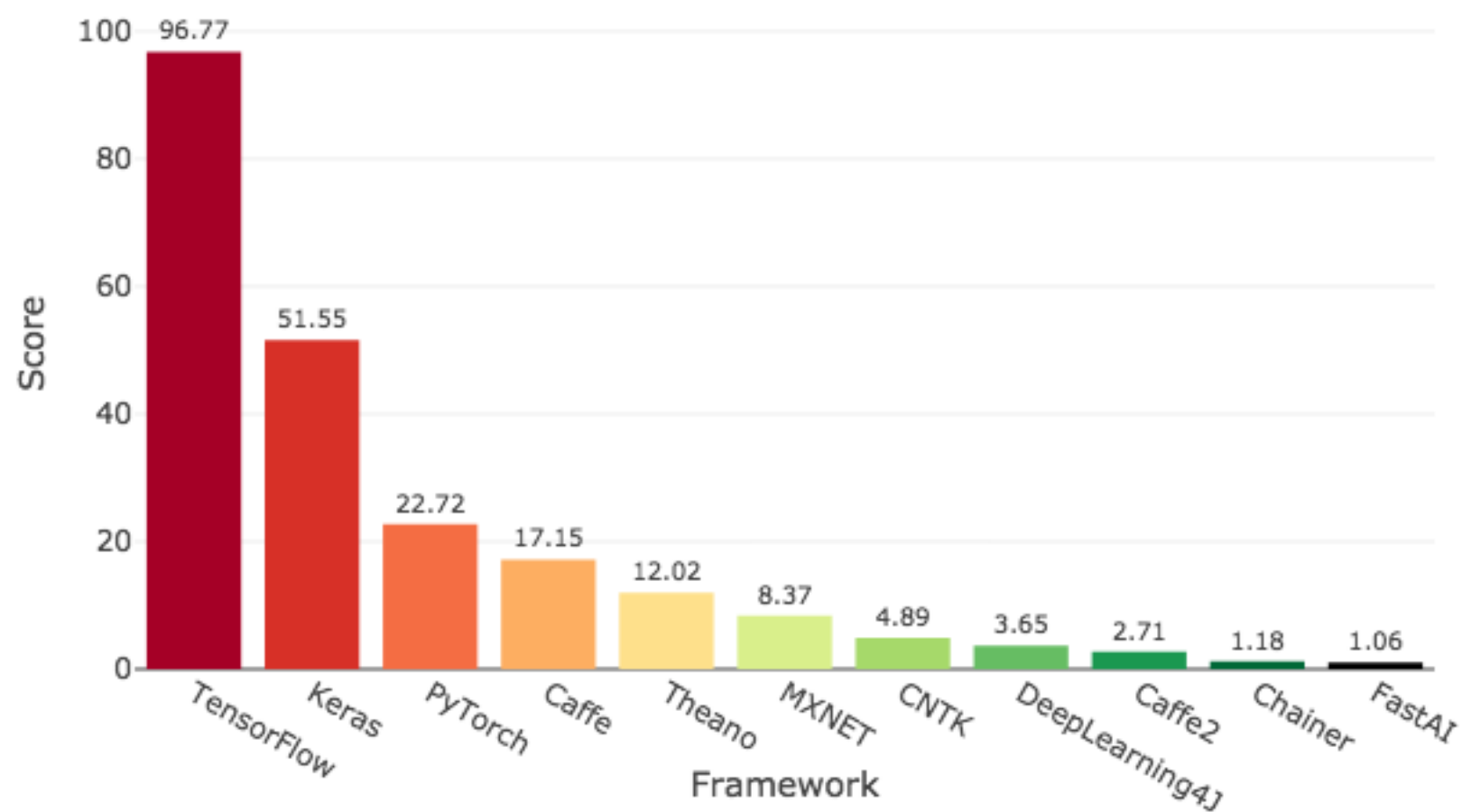
- API变动频繁，一直处于快速迭代过程中，向后减肉不好
- 低级API比较晦涩难懂，不适合初学者。但是现在有了明显的改善
- 运行略慢于其他框架

其他框架

- Caffe
- Caffe2
- PyTorch
- Keras
- then
- mxnet
- ...

其他框架

Deep Learning Framework Power Scores 2018



Keras

- Keras 于2015年3月首次发布，拥有“为人类而不是机器设计的API”，得到Google的支持。它是一个用于快速构建深度学习原型的高层神经网络库，由纯Python编写而成，以TensorFlow，CNTK，Theano和MXNet为底层引擎，提供简单易用的API接口，能够极大地减少一般应用下用户的工作量。
- 初学者可以快速入门

Keras

- 优点
 - 更简洁，更简单的API
 - 丰富的教程和可重复使用的代码
 - 更多的部署选项（直接并且通过TensorFlow后端），更简单的模型导出
 - 支持多GPU训练
- 缺点
 - 过度封装导致丧失灵活性，导致用户在新增操作或是获取底层的数据信息时过于困难
 - 许多BUG都隐藏于封装之中，无法调试细节
 - 初学者容易依赖于 Keras 的易使用性而忽略底层原理

PyTorch

- PyTorch于2016年10月发布，是一款专注于直接处理数组表达式的低级API。前身是 Torch（一个基于 Lua 语言的深度学习库）。Facebook 人工智能研究院对PyTorch提供了强力支持。PyTorch 支持动态计算图，为更具数学倾向的用户提供了更低层次的方法和更多的灵活性，目前许多新发表的论文都采用PyTorch作为论文实现的工具，成为学术研究的首选解决方案。
- 如果你是一名科研工作者，倾向于理解你的模型真正在做什么，那么就考虑选择PyTorch。

PyTorch

- 优点

- 简洁易用：更少的抽象，更直观的设计，建模过程简单透明，所思即所得，代码易于理解
- 可以为使用者提供更多关于深度学习实现的细节，如反向传播和其他训练过程
- 活跃的社区：提供完整的文档和指南，作者亲自维护的论坛供用户交流和求教问题。当然与Tensorflow相比，社区还是更小
- 代码很Pythonic（简洁、优雅），更好的调试功能，默认的运行模式更像传统的编程。

- 缺点

- 无可视化接口和工具
- 导出模型不可移植，工业部署不成熟
- 代码冗余量较大

Caffe/Caffe2

- Caffe的全称是Convolutional Architecture for Fast Feature Embedding，它是一个清晰、高效的深度学习框架，于2013年底由加州大学伯克利分校开发，核心语言是C++。它支持Python和MATLAB接口。
- Caffe的一个重要特色是可以在不编写代码的情况下训练和部署模型。
- 如果您是C++熟练使用者，并对CUDA计算游刃有余，你可以考虑选择Caffe

Caffe/Caffe2

- 优点
 - 核心程序用C++编写，因此更高效，适合工业界开发
 - 网络结构都是以配置文件形式定义，不需要用代码设计网络
 - 拥有大量的训练好的经典模型（AlexNet、VGG、Inception)在其 Model Zoo里
- 缺点
 - 缺少灵活性和扩展性：Caffe是基于层的网络结构，如果要实现一个新的层，用户必须要利用C++实现它的前向和后向传播代码。如果需要新层运行在GPU上，则同时还需要用户自己实现CUDA代码。这种限制使得不熟悉C++和CUDA的用户扩展Caffe十分困难
 - GitHub上基于Caffe的新的项目越来越少，已经很少用于学术界
 - 缺乏对递归网络RNN和语言建模的支持，不适用于文本、声音或时间序列数据等其他类型的深度学习应用
- 另外，Caffe2 于2017年由facebook团队发布，是一个兼具表现力、速度和模块性的开源深度学习框架。它沿袭了大量的 Caffe 设计，可解决多年来在 Caffe 的使用和部署中发现的瓶颈问题。但Caffe2仍然是一个不太成熟的框架，官网至今没提供完整的文档，安装也比较麻烦，编译过程时常出现异常，在GitHub上也很少找到相应的代码。