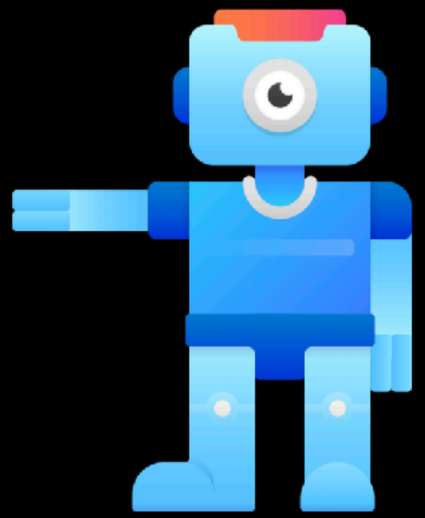


MODERN COMPUTER VISION

BY RAJEEV RATAN

Deep Learning Libraries

Introduction to Deep Learning Libraries or APIs

Deep Learning Computations

- Implementing deep learning on computers is difficult
- It requires a lot of moving parts
- Massive amounts of calculations
- Takes a lot of time and can be prone to breaking
- Complexity in implementing special features

Don’t Try Deep Learning At Home!

Actually You Should

Don’t Try Making Your Own Deep Learning Low Level Code!

Because it’s been done

Deep Learning Libraries to the Rescue!

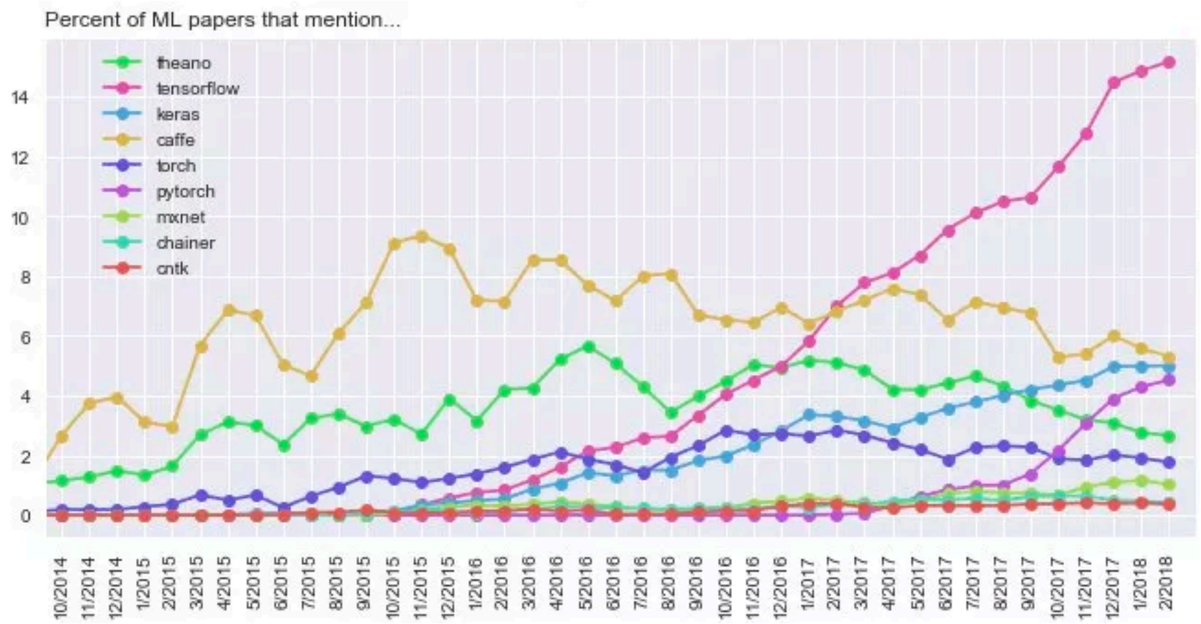
- Google and Facebook have developed Open Source Deep Learning libraries.

- These two brilliant libraries allow us to create Neural Networks in Python very easily.
- They are now quite mature and offer excellent speed, reliability, stability and support.

Deep Learning Libraries

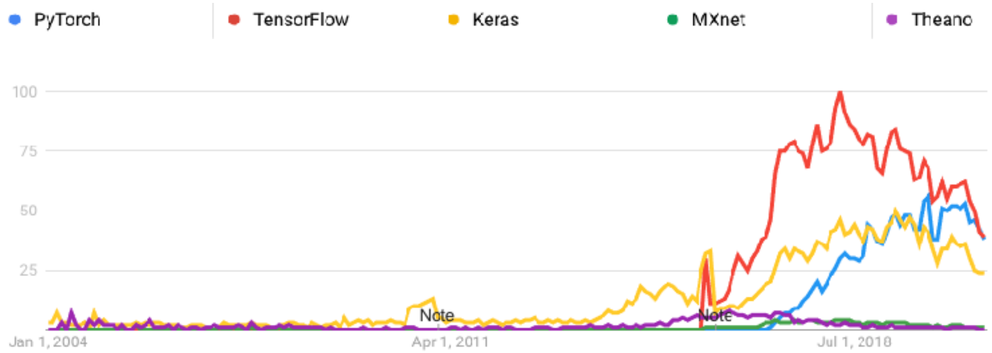
PyTorch, TensorFlow, Keras and others!

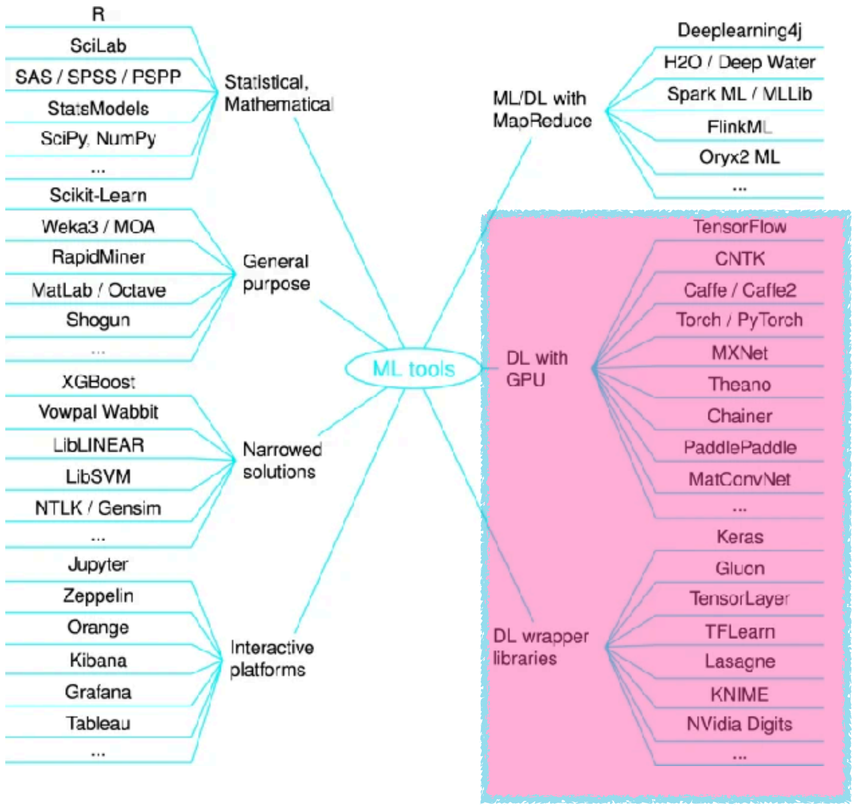
- While PyTorch and TensorFlow/Keras have come out on top, many others vied for this title such as Theano, Caffe, MXNet, PaddlePaddle



Andrej Karpathy (@karpathy) 10 marca 2018

pic.twitter.com/YOYAvc33iN





TensorFlow

Developed by Google

- Free and open-source Deep Learning Library
- Developed internally by Google Brain and open-sourced in 2015
- Written in C++ and CUDA *(NVIDIA's Compute Unified Device Architecture API for programming on GPUs)*
- Primarily used in Python but APIs/wrappers exist for several other languages (C++, Go, Java, JavaScript, Swift).
- TensorFlow 2.0 was released in 2019

PyTorch

Developed by Facebook

- Free and open-source Deep Learning Library
- Developed by Facebook's AI Research Team
- It is a C-based tensor Library written with CUDA capabilities
- Primarily meant for use in Python, though C++ is well supported
- PyTorch is Python based scientific computing package aimed at:
    1. A replacement for NumPy using the power of GPUs
    2. A Deep Learning research platform providing both flexibility and speed

Keras

Developed by François Chollet

- Free and open-source Deep Learning API Interface for Python
- Initially supported several Deep Learning Backends (TensorFlow & Theano), as of Version 2.3+, its sole focus was TensorFlow.
- Written in Python…for Python
- Primarily meant to make TensorFlow more accessible by abstracting some of low level work
- It also contained several implementations of NN layers and tools
- As for 2019, Keras is now bundled with TensorFlow2.0

Summary

- TensorFlow and PyTorch are fairly low-level
- Keras is simpler, quicker to implement and less prone to user errors
- TensorFlow has wider adoption in industry
- PyTorch due to flexibility, has gained more popularity in research and academia, taking over from Caffe

Interested in Comparing Deep Learning Software?

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

Comparison of deep-learning software

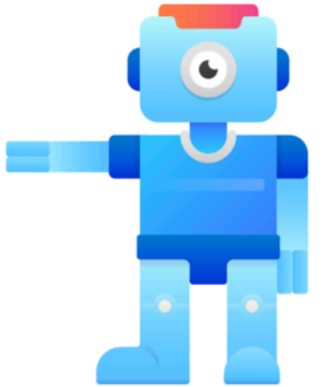
From Wikipedia, the free encyclopedia

The following table compares notable software frameworks, libraries and computer programs for deep learning.

Contents [hide]

Deep-learning software by name [edit]

Software	Creator	Initial Release	Software license[a]	Open source	Platform	Written in	Interface	OpenMP support	OpenCL support
BigDL	Jason Dai (Intel)	2016	Apache 2.0	Yes	Apache Spark	Scala	Scala, Python		
Caffe	Berkeley Vision and Learning Center	2013	BSD	Yes	Linux, macOS, Windows[2]	C++	Python, MATLAB, C++	Yes	Under development[3]
Chainer	Preferred Networks	2015	BSD	Yes	Linux, macOS	Python	Python	No	No
Deeplearning4j	Skymind engineering team; Deeplearning4j community; originally Adam Gibson	2014	Apache 2.0	Yes	Linux, macOS, Windows, Android (Cross-platform)	C++, Java	Java, Scala, Clojure, Python (Keras), Kotlin	Yes	No[7]
Dlib	Davis King	2002	Boost Software License	Yes	Cross-platform	C++	C++, Python	Yes	No
Flux	Mike Innes	2017	MIT license	Yes	Linux, MacOS, Windows (Cross-platform)	Julia	Julia		
Intel Data Analytics Acceleration Library	Intel	2015	Apache License 2.0	Yes	Linux, macOS, Windows on Intel CPU[13]	C++, Python, Java	C++, Python, Java[13]	Yes	No
Intel Math Kernel Library	Intel		Proprietary	No	Linux, macOS, Windows on Intel CPU[14]		C[15]	Yes[16]	No
Keras	François Chollet	2015	MIT license	Yes	Linux, macOS, Windows	Python	Python, R	Only if using Theano as backend	Can use Theano, Tensorflow or PlaidML as backends



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Next...

Building and Training Your First Convolutional Neural Network with PyTorch