A Tour of TensorFlow

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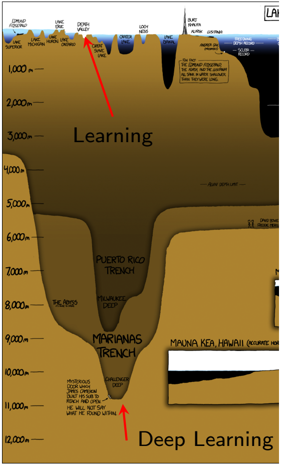
June 1, 2016

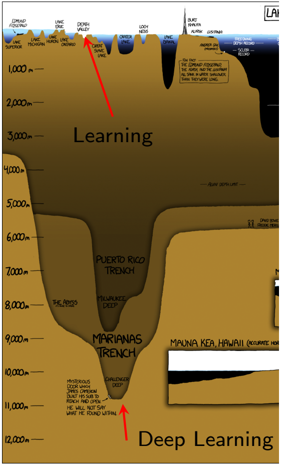
A Tour of TensorFlow



Learning

Deep Learning

A Tour of TensorFlow

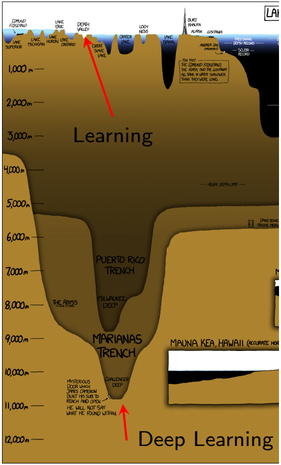


Learning

Deep Learning

TensorFlow is

A Tour of TensorFlow



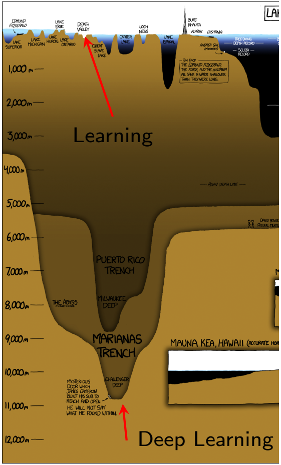
Learning

Deep Learning

TensorFlow is

- An open source deep learning library

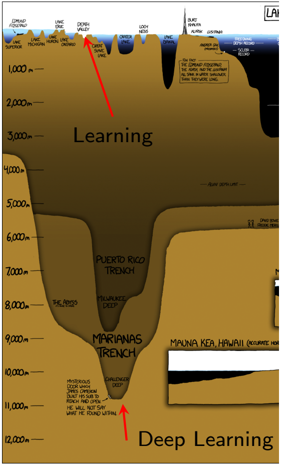
A Tour of TensorFlow



TensorFlow is

- An open source deep learning library
- Released by Google in November 2015

A Tour of TensorFlow



Learning

Deep Learning

TensorFlow is

- An open source deep learning library
- Released by Google in November 2015
- Especially suited to:
  - “Large-scale machine learning on
  - heterogeneous distributed systems”

Contents

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2. Execution Model
3. Visualization Tools
4. Use Cases
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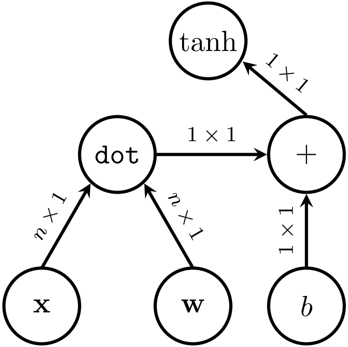
Computational Paradigms

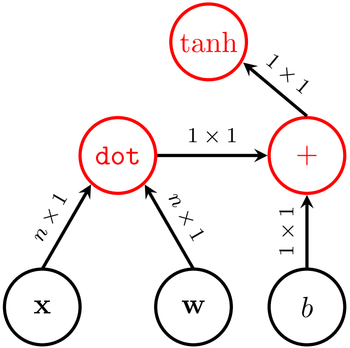
Computational Paradigms



$$\hat{y} = \tanh(\mathbf{x}^\top \mathbf{w} + b)$$

Computational Graphs

Computational Paradigms

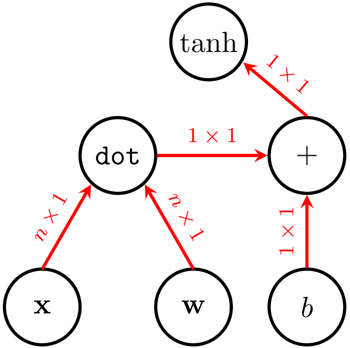


$$\hat{y} = \tanh(\mathbf{x}^\top \mathbf{w} + b)$$

Computational Graphs

1. Operations

Computational Paradigms

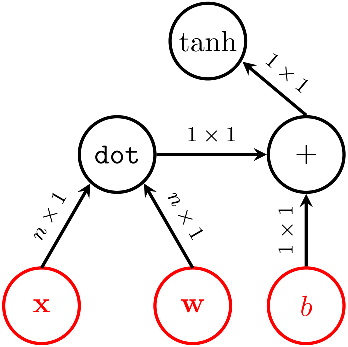


$$\hat{y} = \tanh(\mathbf{x}^\top \mathbf{w} + b)$$

Computational Graphs

1. Operations
2. Tensors

Computational Paradigms

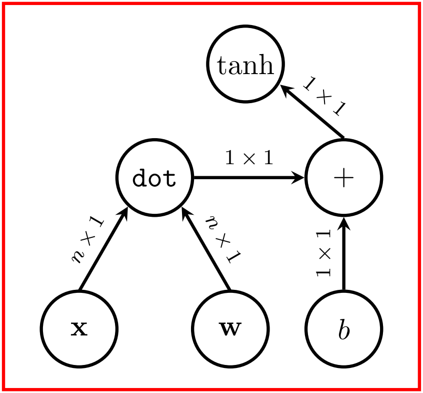


$$\hat{y} = \tanh(\mathbf{x}^\top \mathbf{w} + b)$$

Computational Graphs

1. Operations
2. Tensors
3. Variables

Computational Paradigms



$\hat{y} = \texttt{session.run}(\tanh(\mathbf{x}^\top \mathbf{w} + b))$

Computational Graphs

1. Operations
2. Tensors
3. Variables
4. Sessions

Execution Model

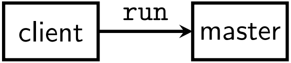
Execution Model

client

Actors

1. Client

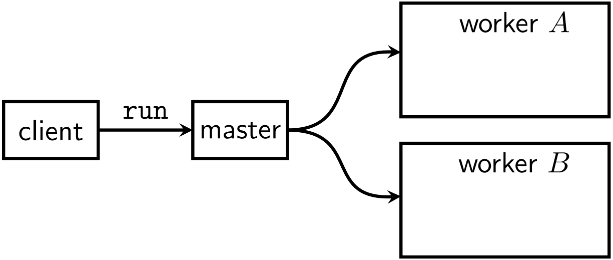
Execution Model



Actors

1. Client
2. Master

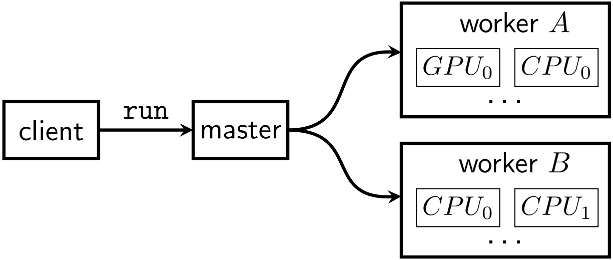
Execution Model



Actors

1. Client
2. Master
3. Workers

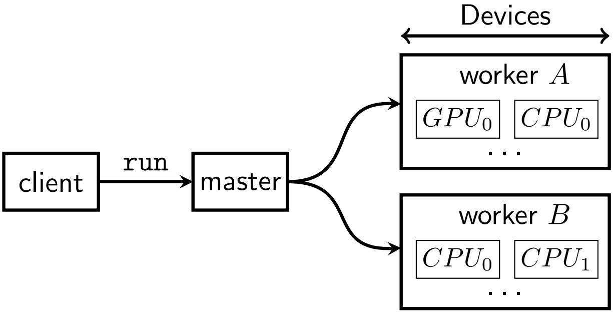
Execution Model



Actors

1. Client
2. Master
3. Workers
4. Devices

Execution Model



Actors

1. Client
2. Master
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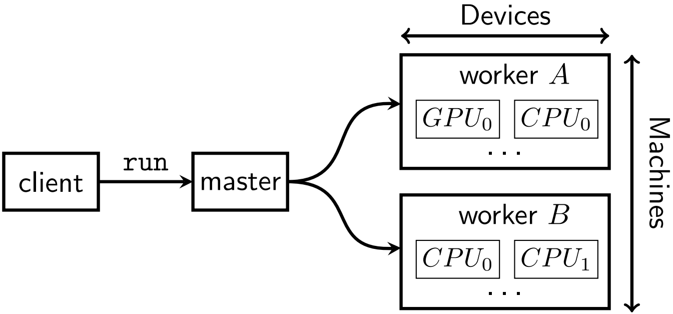
Execution Model

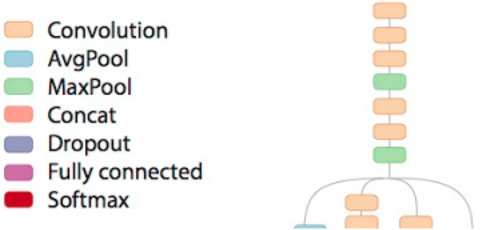


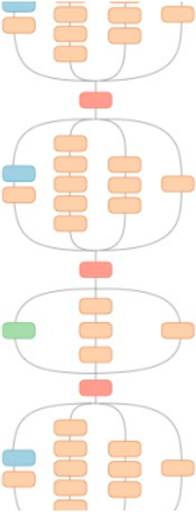
Actors

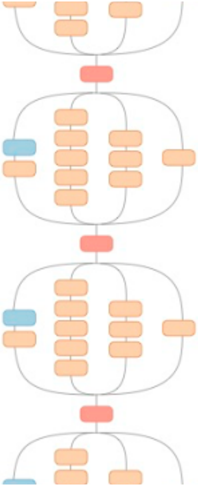
1. Client
2. Master
3. Workers
4. Devices

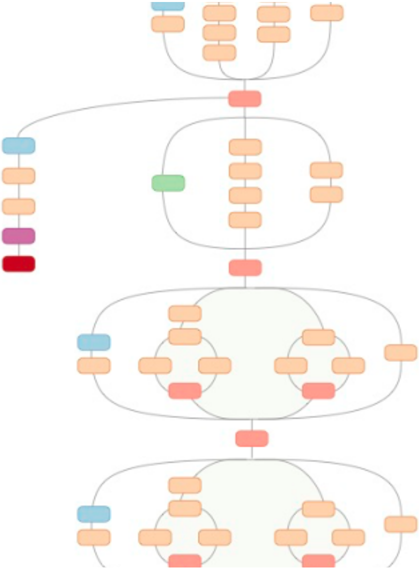
Visualization Tools

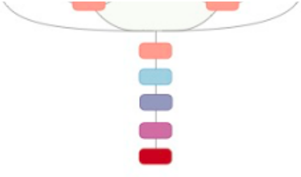
- Deep Neural Networks have the tendency of being . . . deep
- Easy to drown in the complexity of an architecture
- $>$ 36,000 nodes for Google's *Inception* model









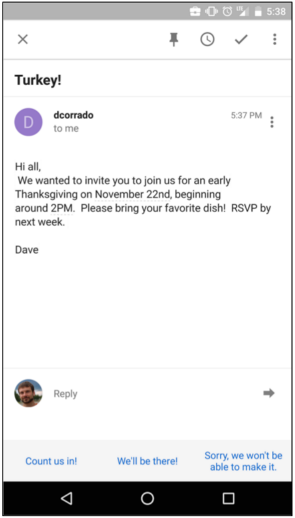


Source: http://googleresearch.blogspot.de/2016/03/train-your-own-image-classifier-with.html

TensorBoard to the Rescue

Use Cases

- Smart email replies in Google *Inbox*
- Emails mapped to "thought vectors"
- LSTMs synthesize valid replies



Turkey!

dcorrado
to me
5:37 PM

Hi all,
We wanted to invite you to join us for an early Thanksgiving on November 22nd, beginning around 2PM. Please bring your favorite dish! RSVP by next week.

Dave

Source: http://googleresearch.blogspot.de/2015/11/computer-respond-to-this-email.html

Use Cases

- Google DeepMind now using TensorFlow
- Already for *AlphaGo*
- According to a DeepMind SWE reasons are:
  - Integration with Google Cloud Platform,
  - Python,
  - Support for TPUs,
  - Ability to run on many GPUs.

Source: https://deepmind.com/css/images/opengraph/alphago-logo.png

Walkthrough

Thank You