

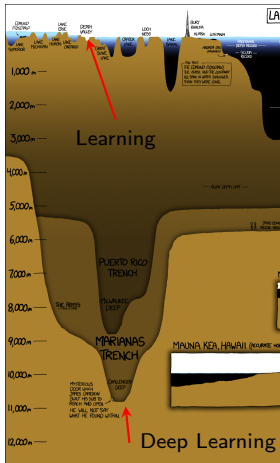
A Tour of TensorFlow



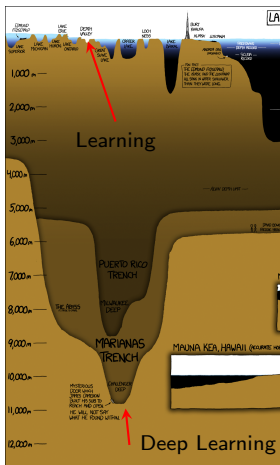
Peter Goldsborough

June 2, 2016

A Tour of TensorFlow

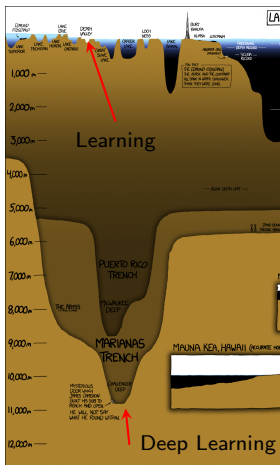


A Tour of TensorFlow



TensorFlow is

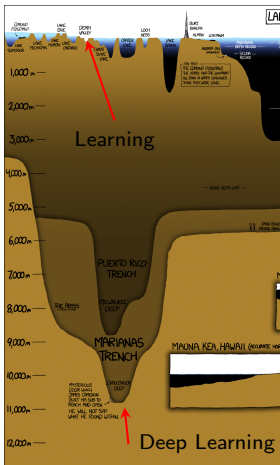
A Tour of TensorFlow



TensorFlow is

- ▶ An open source deep learning library

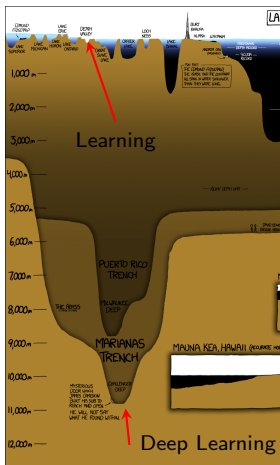
A Tour of TensorFlow



TensorFlow is

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

A Tour of TensorFlow



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”

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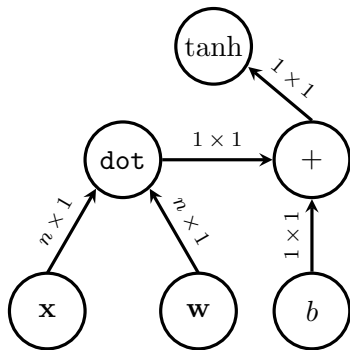
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Computational Paradigms

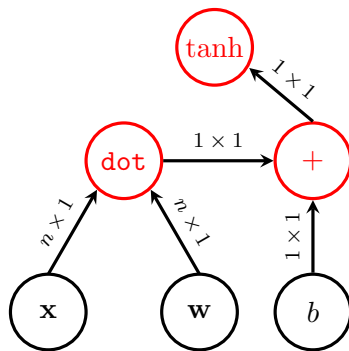
Computational Paradigms



Computational Graphs

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

Computational Paradigms

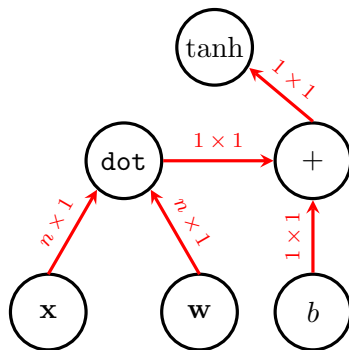


$$\hat{y} = \tanh(\mathbf{x}^T \mathbf{w} + b)$$

Computational Graphs

1. Operations

Computational Paradigms

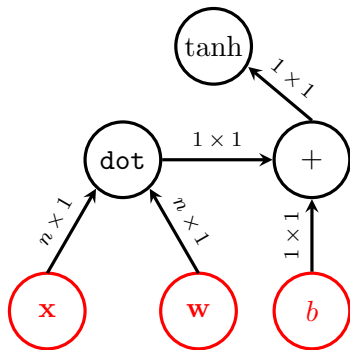


$$\hat{y} = \tanh(\mathbf{x}^T \mathbf{w} + b)$$

Computational Graphs

1. Operations
2. Tensors

Computational Paradigms

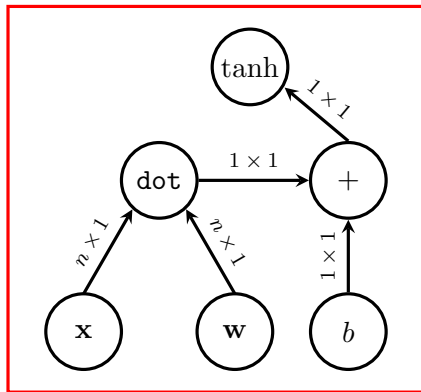


$$\hat{y} = \tanh(\mathbf{x}^T \mathbf{w} + b)$$

Computational Graphs

1. Operations
2. Tensors
3. Variables

Computational Paradigms



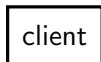
Computational Graphs

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

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

Execution Model

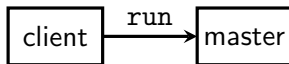
Execution Model



Actors

1. Client

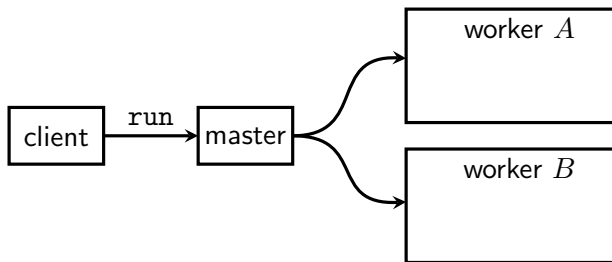
Execution Model



Actors

1. Client
2. Master

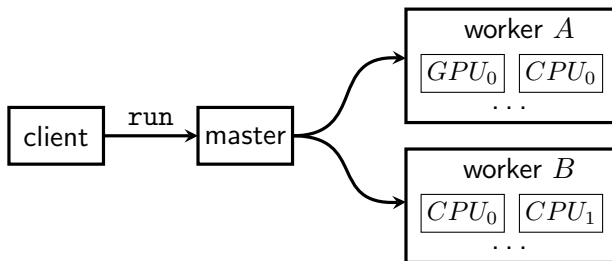
Execution Model



Actors

1. Client
2. Master
3. Workers

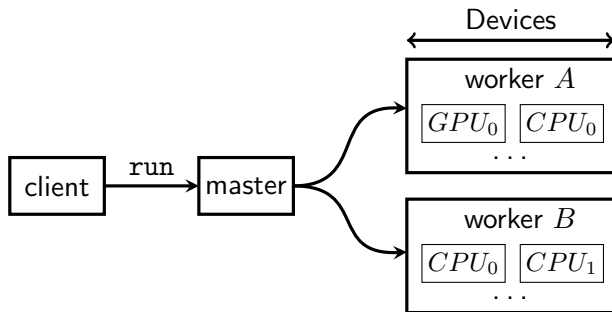
Execution Model



Actors

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

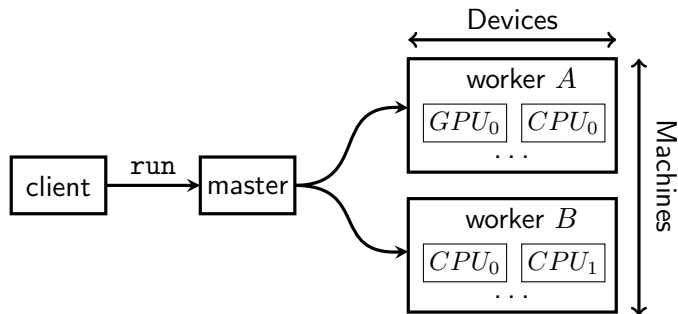
Execution Model



Actors

1. Client
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4. Devices

Execution Model

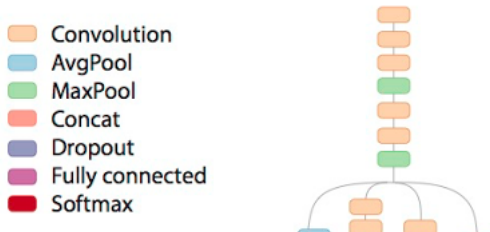


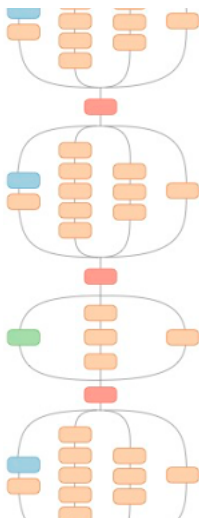
Actors

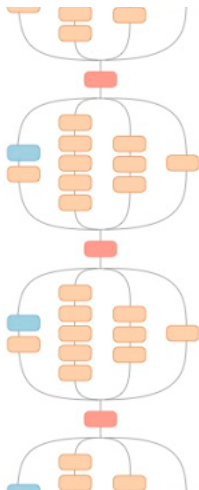
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2. Master
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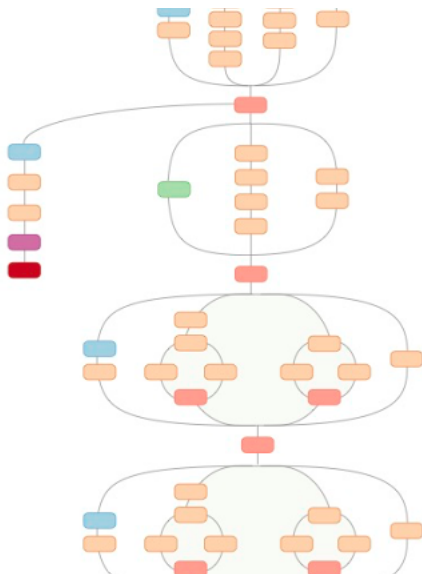
Visualization Tools

- ▶ 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









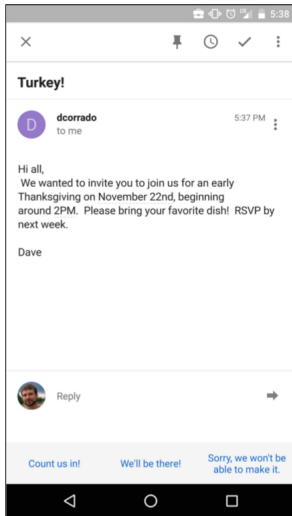


Source: <http://googleresearch.blogspot.de/2016/03/train-your-own-image-classifier-with.html>

TensorBoard to the Rescue

Use Cases

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



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