Introduction to TensorFlow

About myself (Kyle Zeller)

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- ➢ Student/Researcher (EEGs, BCI, & ML)

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Outline

1. What is TensorFlow?
2. Why to use it?
3. How does it work?
4. CloudML discussion

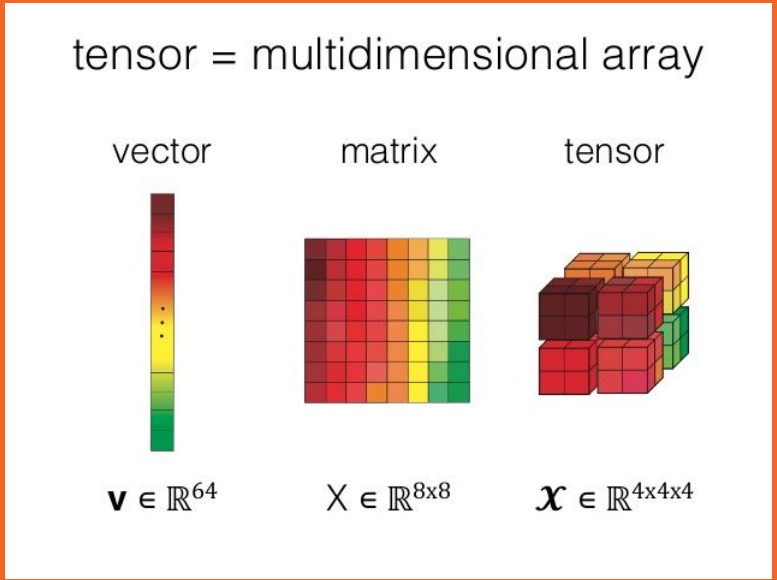
TensorFlow

- Developed by the Google Brain Team
- Provides primitives for defining functions on tensors
- Open Source library for numerical computation using data flow graphs

Tensors

Simply viewed as a numerical multidimensional array:

E.g. Scalars, Vectors, & Matrices as Tensors



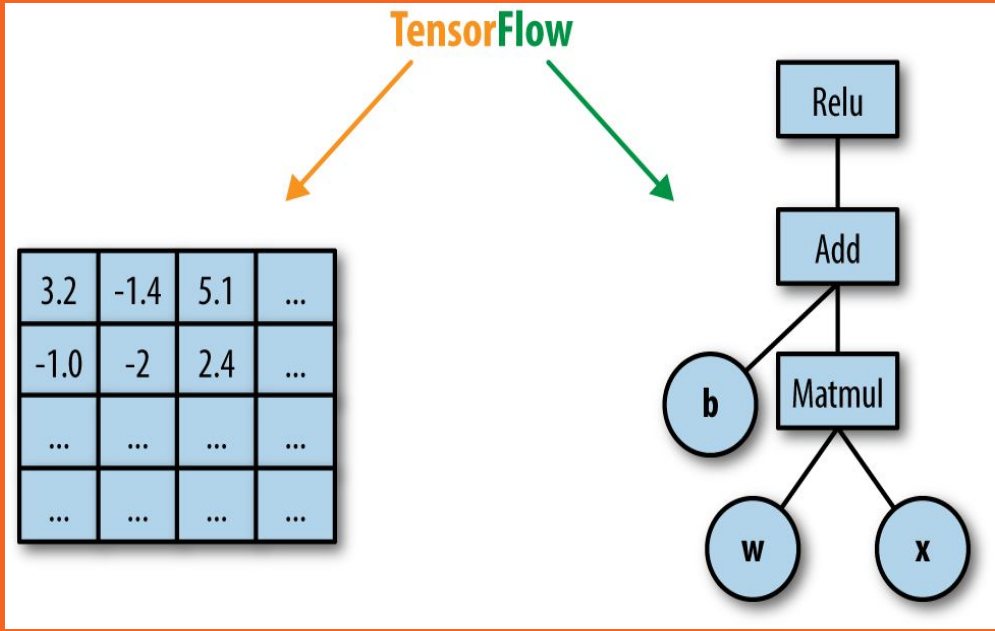
Data Flow Graph

Computations are represented as graphs:

- Nodes are the operations (ops)
- Edges are the Tensors (Mult. Dim. Arrays)

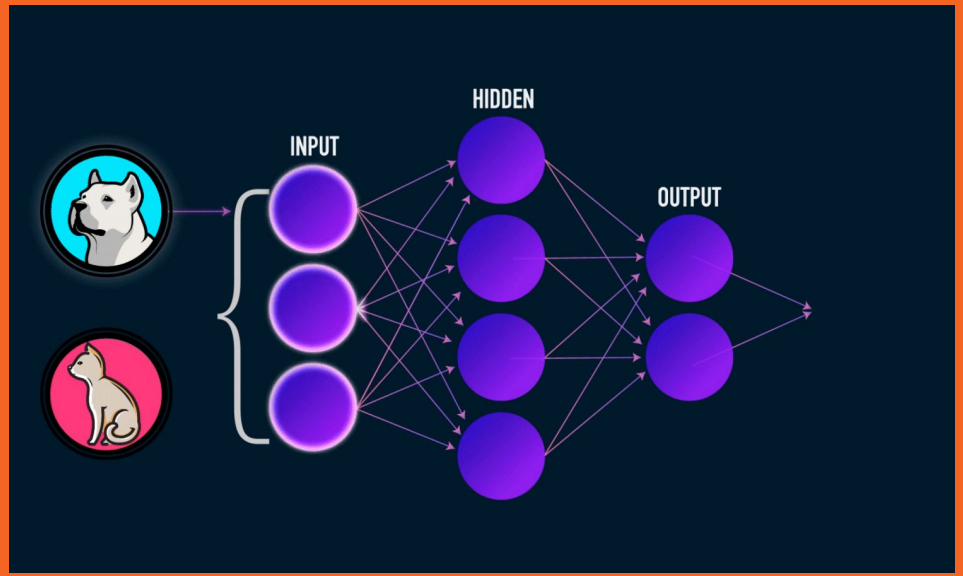
Program Phase/s:

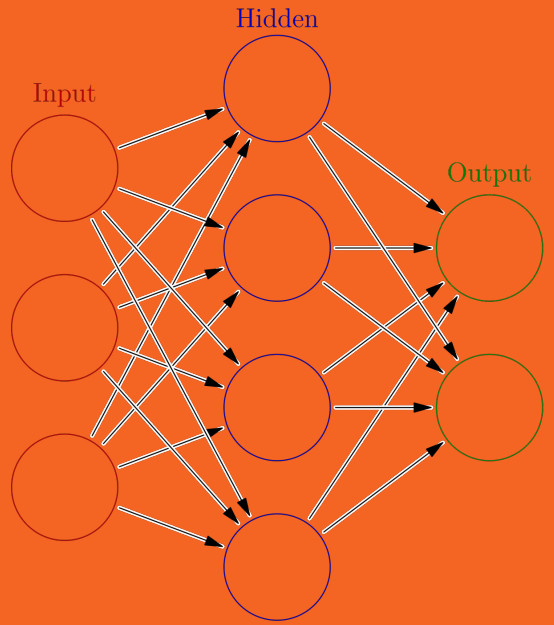
- Construction: Creating a model
- Execution: Pushing the data through the graph



Neural Networks & Deep Learning

- Testing a Neural Network within your browser





Why TensorFlow?

Alternatives:

- Torch
- Caffe
- Theano (Keras, Lasagne)
- DL4J
- Mxnet
- CuDNN
- DSSTNE
- DIANNE

Caffe

K

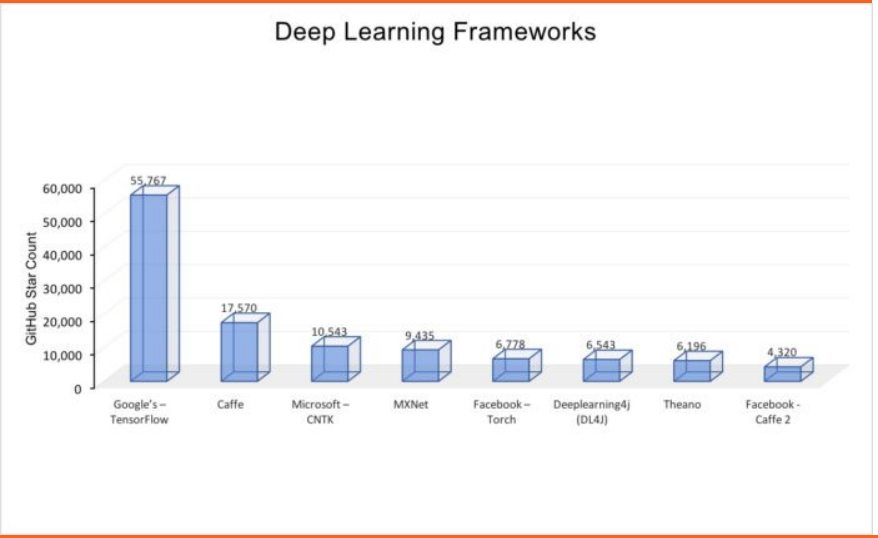
cuDNN

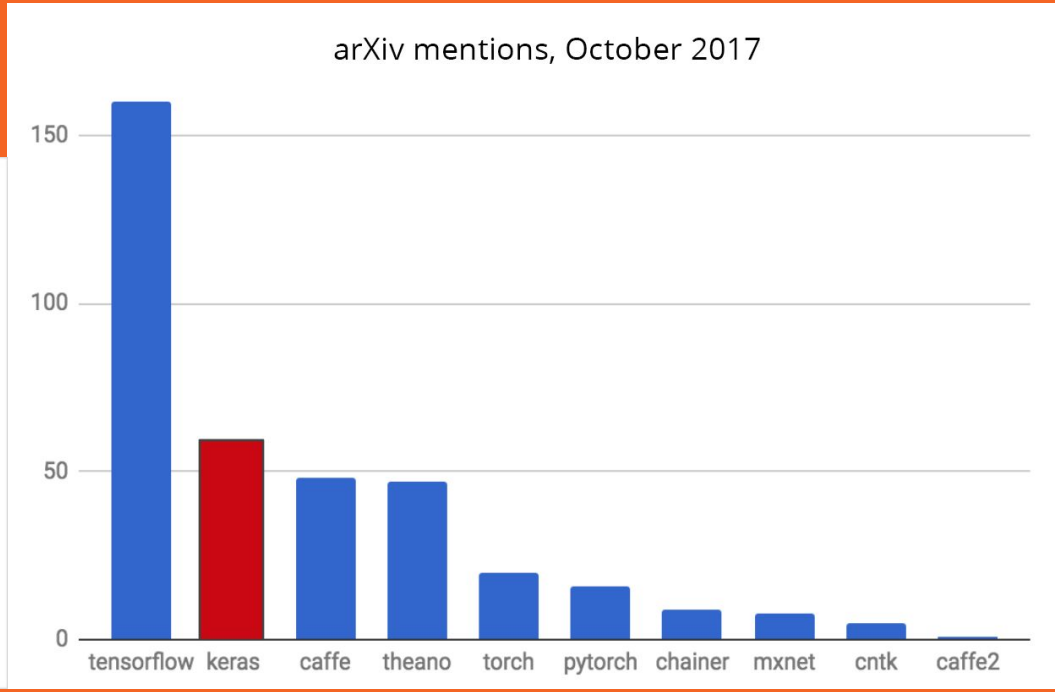
theano

DL4J

Why TensorFlow?

TensorFlow has the largest community

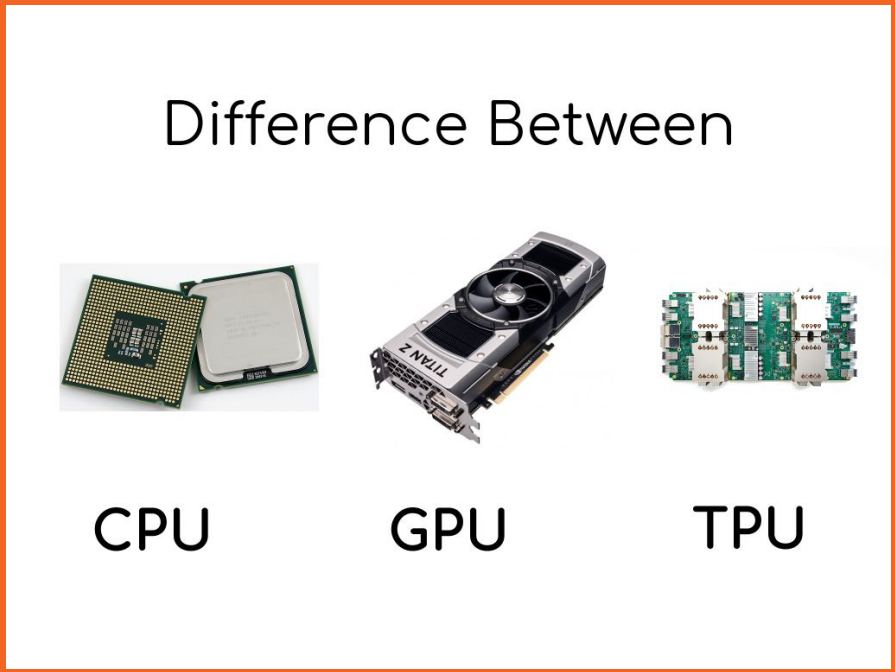




Why TensorFlow?

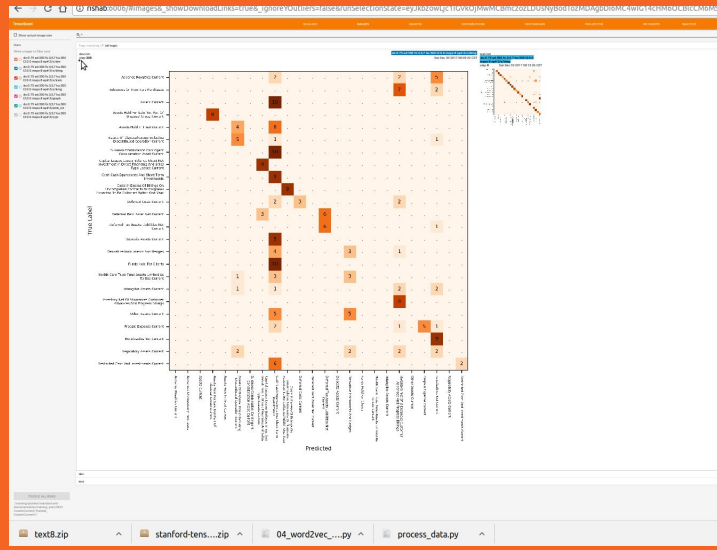
Scalability and Portability:

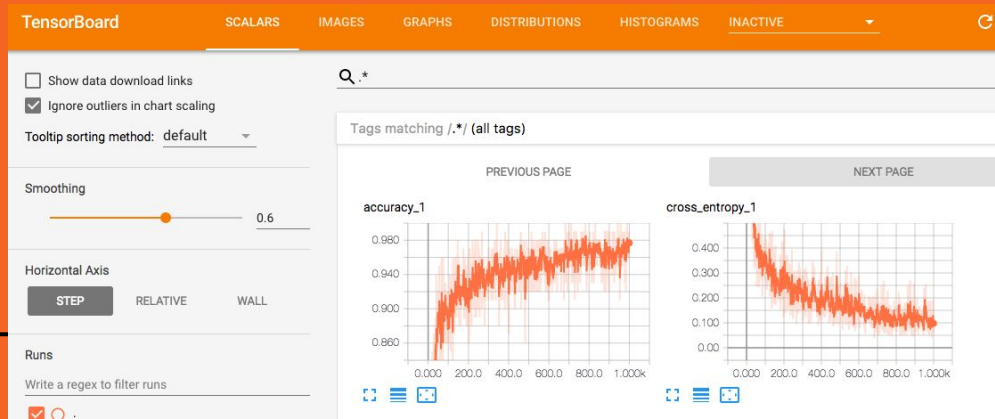
- Runs on CPUs, GPUs, TPUs over one or more machines, but also phones and raspberry pi's



Why TensorFlow?

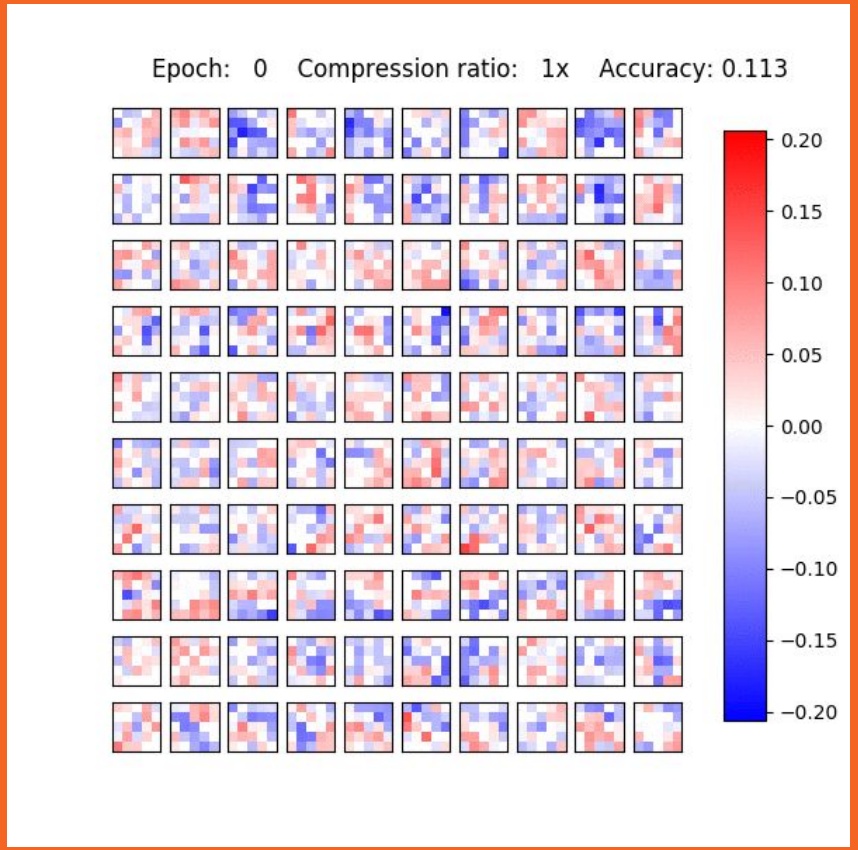
- Specific functionalities for deployment (TF Serving / CloudML)
- Easier / more documentation (for the general public)
- Included visualization tool (Tensorboard)
- Simplified interfaces like SKFlow





How it works / Demo

- **Example from the workshop**



CloudML

- Training your model on GPU clusters:
  - Amazon AWS
  - EC2 GPU Instances of Type P2/P3/G3
- Hosting your model:
  - Docker

THANK YOU